CENTERVILLE CITY COUNCIL AGENDA

NOTICE IS HEREBY GIVEN THAT THE CENTERVILLE CITY COUNCIL WILL HOLD ITS REGULAR PUBLIC MEETING AT 7:00 PM ON JUNE 1, 2021 AT THE CENTERVILLE CITY HALL COUNCIL CHAMBERS, 250 NORTH MAIN STREET, CENTERVILLE, UTAH. THE AGENDA IS SHOWN BELOW.

Meetings of the City Council of Centerville City may be conducted via electronic means pursuant to Utah Code Ann. 52-4-207, as amended. In such circumstances, contact will be established and maintained via electronic means and the meeting will be conducted pursuant to the Electronic Meetings Policy established by the City Council for electronic meetings.

Centerville City, in compliance with the Americans With Disabilities Act, provides accommodations and auxiliary communicative aids and services for all those citizens in need of assistance, including hearing devices. Persons requesting these accommodations for City-sponsored public meetings, services, programs, or events should call Jacob Smith, Administrative Services Director, at 801-295-3477, giving at least 24 hours notice prior to the meeting.

The full packet of backups materials can be found at http://centerville.novusagenda.com/agendapublic.

A. ROLL CALL

B. PRAYER OR THOUGHT

Councilwoman Stephanie Ivie

C. PLEDGE OF ALLEGIANCE

D. OPEN SESSION (This item allows for the public to comment on any subject of municipal concern, including agenda items that are not scheduled for a public hearing. Citizens are encouraged to limit their comments to two (2) minutes per person. Citizens may request a time to speak during Open Session by calling the City Recorder's office at 801-295-3477, or may make such request at the beginning of Open Session.) Please state your name and city of residence.

E. BUSINESS

1. Appointment of City Recorder and Oath of Office

   Consider Resolution No. 2021-23 appointing Jennifer Hansen as the City Recorder for Centerville City and conduct Oath of Office

2. Appointment of Finance Director and Oath of Office

   Consider Resolution No. 2021-24 appointing Nate Plaizier as the Finance Director for Centerville City and conduct Oath of Office

3. Public Hearing - FY 2021 Budget Amendment

Public Hearing - Amendments to FY2021 Budget - Resolution No. 2021-17

4. Public Hearing - Compensation Schedule and Justice Court Judge Compensation

   Compensation Schedule and Justice Court Judge's Compensation

5. Public Hearing - FY 2022 Final Budget

   A. Public Hearing on proposed budget for FY2022
   B. Discuss other potential revisions to FY2022 budget
   C. Discuss Truth-in-Taxation process and schedule public hearing for the final adoption of the FY22 budget and Truth-in-Taxation public hearing
   D. FY2022 Final Budget - Resolution No. 2020-18

6. Public Hearing - Zoning Map Amendment - Randall Property

   Consider the proposed Zoning Map Amendment for property located at approximately 285 North 100 East from Residential-Medium (R-M) to Public Facilities-Medium (PF-M) - Ordinance No. 2021-05

7. Public Hearing - Zoning Code Amendments - Newspaper Noticing Amendments

   Consider amendments to the Centerville Zoning Code and Subdivision Ordinance regarding newspaper noticing in accordance with recent State law amendments adopted with SB 201 - Ordinance No. 2021-10

8. UDOT Outside Engineering Services Reimbursement Agreement

   Consider UDOT Outside Engineering Services Reimbursement Agreement in connection with the construction of the West Davis Corridor and its impact on identified City owned facilities in the project area

9. City Standards and Specifications and Detail Drawings

   Consider adoption of Resolution No. 2021-09 updating and amending the City Standards and Specifications, including Detail Drawings

10. Shared Agency Agreement and End-User License Agreement for Motorola Flex Software for Police Department

    Consider Shared Agency Agreement and End-User License Agreement for Motorola Flex Software for Police Department

11. Municipal Code Amendments - Glass Recycling - CMC 7.08

    Consider Municipal Code Amendments to CMC 7.08 to allow glass recycling services - Ordinance No. 2021-15

12. Glass Collection and Recycling Agreement with Momentum Recycling, LLC

    Consider Glass Collection and Recycling Agreement with Momentum Recycling, LLC for glass recycling services

13. Minutes Review and Acceptance

    May 18, 2021 Work Session Minutes
    May 18, 2021 Regular Session Minutes

14. City Council Report

    Councilman George McEwan

15. Mayor's Report

16. City Manager's Report

F. CLOSED SESSION (Closed Meeting, if necessary, for reasons allowed by State Law, including, but not limited to, the provisions of section 52-4-205 of the Utah Open and Public Meetings Act, and for the Attorney-Client matters that are

privileged pursuant to Utah Code ann. 78B-1-137, as amended)

G. ADJOURNMENT

Jennifer Hansen
Centerville City Recorder

CENTERVILLE

Staff Backup Report
6/1/2021

Item No.

Short Title: Councilwoman Stephanie Ivie

Initiated By:

Staff Representative:

SUBJECT

RECOMMENDATION

BACKGROUND

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 1.

Short Title: Appointment of City Recorder and Oath of Office

Initiated By: Mayor Clark Wilkinson

Staff Representative: Brant Hanson, City Manager

SUBJECT

Consider Resolution No. 2021-23 appointing Jennifer Hansen as the City Recorder for Centerville City and conduct Oath of Office

RECOMMENDATION

Approve Resolution No. 2021-23 appointing Jennifer Hansen as the City Recorder for Centerville City and conduct Oath of Office.

BACKGROUND

Pursuant to Utah Code 10-3-916, the Mayor, with the advice and consent of the City Council, is to appoint a qualified person to the office of City Recorder. Jennifer Hansen has been recently selected by the City to perform the duties of the City Recorder. The City Manager and Mayor recommend officially appointing Jennifer Hansen as the Centerville City Recorder. Resolution No. 2021-23 has been prepared for this purpose.

ATTACHMENTS:

Description

- Resolution No. 2021-23 - City Recorder

RESOLUTION NO. 2021-23

A RESOLUTION DESIGNATING AND APPOINTING A QUALIFIED PERSON TO THE APPOINTED OFFICE OF CITY RECORDER

WHEREAS, pursuant to *Utah Code Ann.* § 10-3-916, the Mayor, with the advice and consent of the City Council, is to appoint a qualified person to the office of City Recorder; and

WHEREAS, the Mayor and the City Council desire to appoint Jennifer Hansen to the office of City Recorder to perform the duties and responsibilities of such office as more particularly provided herein.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, AS FOLLOWS:

Section 1. **Appointment.** Jennifer Hansen is hereby appointed to the office of City Recorder. This appointment is subject to the ordinances, rules and regulations of Centerville City and the laws of the State of Utah for the office of City Recorder. Jennifer Hansen shall serve at the pleasure of the City Council as the City Recorder for Centerville City for an undefined term of office.

Section 2. **Repealer.** Resolution No. 2020-29 appointing Jennifer Hansen as the Deputy City Recorder is hereby repealed.

Section 3. **Severability.** If any section, part or provision of this Resolution is held invalid or unenforceable, such invalidity or unenforceability shall not affect any other portion of this Resolution, and all sections, parts and provisions of this Resolution shall be severable.

Section 4. **Effective Date.** This Resolution and the appointment set forth herein shall become effective immediately.

PASSED AND ADOPTED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, THIS 1st DAY OF JUNE, 2021.

CENTERVILLE CITY

By:_____
Mayor Clark A. Wilkinson

ATTEST:

_____
Jennifer Hansen, City Recorder

CERTIFICATE OF PASSAGE AND EFFECTIVE DATE

According to the provisions of the U.C.A. § 10-3-719, as amended, resolutions may become effective without publication or posting and may take effect on passage or at a later date as the governing body may determine; provided, resolutions may not become effective more than three months from the date of passage. I, the municipal recorder of Centerville City, hereby certify that foregoing resolution was duly passed by the City Council and became effective upon passage or a later date as the governing body directed as more particularly set forth below.

_____ DATE: _____
JENNIFER HANSEN, City Recorder

EFFECTIVE DATE: ____ day of _____, 2021.

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 2.

Short Title: Appointment of Finance Director and Oath of Office

Initiated By: Mayor Clark Wilkinson

Staff Representative: Brant Hanson, City Manager

SUBJECT

Consider Resolution No. 2021-24 appointing Nate Plaizier as the Finance Director for Centerville City and conduct Oath of Office

RECOMMENDATION

Approve Resolution No. 2021-24 appointing Nate Plaizier as the Finance Director for Centerville City and conduct Oath of Office.

BACKGROUND

Pursuant to Utah Code 10-6-157, the Mayor, with the advice and consent of the City Council, is to appoint a qualified person to the position of Finance Director. Nate Plaizier has been recently selected and hired by the City to perform the duties of Finance Director. The City Manager and Mayor recommend officially appointing Nate Plaizier as the Finance Director. Resolution No. 2021-24 has been prepared for this purpose.

ATTACHMENTS:

Description

- Resolution No. 2021-24 - Finance Director

RESOLUTION NO. 2021-24

A RESOLUTION DESIGNATING AND APPOINTING A QUALIFIED PERSON TO THE POSITION OF FINANCE DIRECTOR

WHEREAS, pursuant to Utah Code § 10-6-157, the City has created the position of Finance Director as more particularly set forth in Centerville Municipal Code 3.02.100 (Finance Director); and

WHEREAS, the Mayor and City Council desire to appoint Nate Plaizier to the position of Finance Director to perform the duties and responsibilities of such position as more particularly provided herein.

NOW THEREFORE, IT IS HEREBY RESOLVED BY THE CITY COUNCIL OF CENTERVILLE, UTAH, AS FOLLOWS:

Section 1. Appointment. Nate Plaizier is hereby appointed to the position of Finance Director. This appointment is subject to the ordinances, rules and regulations of Centerville City and the laws of the State of Utah for the position of Finance Director. Nate Plaizier shall serve at the pleasure of the City Council as the Finance Director for Centerville City for an undefined term of office. By State law, the Finance Director may not assume the duties of City Treasurer.

Section 2. Repealer. Resolution No. 2019-24 appointing an Interim Finance Director is hereby repealed.

Section 3. Severability. If any section, clause or portion of this Resolution is declared invalid by a court of competent jurisdiction, the remainder shall not be affected thereby and shall remain in full force and effect.

Section 4. Effective Date. This Resolution shall become effectively immediately.

PASSED AND ADOPTED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, ON THIS 1st DAY OF JUNE, 2021.

ATTEST: **CENTERVILLE CITY**

_____ By: _____

Jennifer Hansen, City Recorder Mayor Clark A. Wilkinson

CERTIFICATE OF PASSAGE AND EFFECTIVE DATE

According to the provisions of the U.C.A. § 10-3-719, as amended, resolutions may become effective without publication or posting and may take effect on passage or at a later date as the governing body may determine; provided, resolutions may not become effective more than three months from the date of passage. I, the municipal recorder of Centerville City, hereby certify that foregoing resolution was duly passed by the City Council and became effective upon passage or a later date as the governing body directed as more particularly set forth below.

_____ DATE: _____

JENNIFER HANSEN, City Recorder

EFFECTIVE DATE: _____ day of _____, 2021.

CENTERVILLE

Staff Backup Report
6/1/2021

Item No. 3.

Short Title: Public Hearing - FY2021 Budget Amendment

Initiated By: Jacob Smith, Administrative Services Director

Staff Representative: Jacob Smith, Administrative Services Director

SUBJECT

Public Hearing - Amendments to FY2021 Budget - Resolution No. 2021-17

RECOMMENDATION

Approve Resolution No. 2021-17 adopting amendments to the FY2021 Budget.

BACKGROUND

The FY2021 Budget has been amended several times this last year. Thankfully, this was due to better than budgeted sales tax numbers. The budget needs to be amended again for several projects and equipment purchases. The attached document explains all amendments in a summary fashion.

GENERAL FUND

REVENUE

Sales tax and RAP tax brought in much more than expected and even exceeded prior years percent increases year-over-year. The increase in revenue, as well as business licenses and building fee revenue increases, will be used to fund a few amendments to expenses.

EXPENSES

Emergency Management

Update budget to reflect actual costs - windstorm Sept. 2020

Larger than expected mid-year changes to assessments

- Animal Control
- Weber Basin Water

Capital Projects/Equipment

- Niche wall in the Cemetery
- Playground resurfacing
- F150 for Police

Other

- Increase in engineering workload
- Utopia Transfer – adjusted to reflect actual numbers
- Increase in Whitaker capital due to increase in RAP Tax collected
- Transfer to Fund 47 Capital Projects of fund balance over 20% of operating

RAP TAX

Increase in expected revenue leads to an increase in the allocations to Parks, the Whitaker Building and the Theater.

PARKS FUND

REVENUE

Increase in park impact fees, last payment of grant money for Island View and increase in allocation of RAP Tax.

EXPENSES

Increase in general CAPITAL PROJECTS line

FUND 47 CAPITAL PROJECTS FUND

Amending budget to allow for the transfer of fund balance exceeding 20% of operating to be transferred to this account for future capital projects and equipment purchases.

TRANSPORTATION FUND

Increase in anticipated sales tax and use of fund balance to pay for last summer and anticipated projects this summer.

UTOPIA FUND

Adjust transfers to reflect actual increment and rebate revenue received

WATER ENTERPRISE FUND

Amend to cover the costs of capital projects (400 East)

DRAINAGE ENTERPRISE FUND

Amend to cover the costs of overages with the Decant Station and to fund summer projects

Also of note, attached is a summary of an interfund transfer executed in May 2021. These transfers do not result in an overall increase in revenue or expenses and are done internally to shore up individual departmental budgets.

ATTACHMENTS:

Description

- FY21 Budget Amendments - June 1
- FY21 Interfund Amendments - May

FY 2021 FINAL AMENDMENTS

GENERAL FUND

REVENUE		Current Budget	Amended Budget	Difference	Notes
10-31-300000	SALES TAX - GENERAL	4,200,000	4,570,285	370,285	Currently have $4,444,000
10-32-100000	BUSINESS LICENSES	50,000	61,500	11,500	Matches current revenue
10-32-110000	BUILDING FEES	170,000	175,000	5,000	Expected revenue
10-39-200000	TRANSFER FROM OTHER FUNDS	48,040	50,040	2,000	Result of increase in RAP tax - Whitaker
			NET INCREASE/DECREASE	388,785	
EXPENSES					
Police					
10-4120-740.0	CAPITAL EQUIPMENT	166400	206400	40,000	F150 this year in lieu of FY22
Emergency Management					
10-4150-323	WINDSTORM CLEANUP	10,000	60,000	50,000	Close to actual costs
10-4150-325	WINDSTORM REPAIRS	10,000	130,000	120,000	Close to actual costs
Animal Control					
10-4253-310.0	DAVIS COUNTY SERVICES	40,000	48,000	8,000	Midyear increase
Engineering					
10-4490-316.0	ENG SERVICES - COMMUNITY DEV.	25,000	90,000	65,000	Increase in workload
10-4490-317.0	ENG SERVICES - INSPECTION	25,000	15,000	(10,000)	
10-4490-322.0	ENG SERVICES - MISCELLANEOUS	3,000	15,000	12,000	Increase in workload
Parks					
10-4510-270.0	UTILITIES - WATER WEBER BASIN	21,000	26,000	5,000	Increase in water rates
10-4510-750.0	CAPITAL PROJECTS	6,500	94500	88,000	Includes Niche Wall and Playground resurfacing
Whitaker Building					
10-4599-750.0	CAPITAL PROJECTS	31,000	33,000	2,000	Increase allocation from RAP Tax
Transfers					
10-4710-950.0	UTOPIA	141,103	149,888	8,785	Increase due to less than expected transfer of tax increment from RDA
10-4710-990.0	TRANSFER TO FUND 47		0 GENERAL FUND BALANCE OVER 20%		
			NET INCREASE/DECREASE	388,785	
				-	

RAP TAX

REVENUE					
27-31-350000	RAP TAX	420,000	460,000	40,000	Increase in RAP taxes received
EXPENSES					
27-5000-710.0	Parks (85%+interest income)	359,000	393,000	34,000	Increases due to allocation formula
27-5000-750.0	Whitaker (5%)	21,000	23,000	2,000	
27-5000-800.0	DCPA (5%)	21,000	23,000	2,000	
27-5000-850.0	TBD (5%) - Transfer to Parks	21,000	23,000	2,000	
			NET INCREASE/DECREASE	40,000	

PARKS

REVENUE					
45-34-700000	PARK IMPACT FEES	40,000	72,000	32,000	
45-34-920000	TRANSFER IN - RAP TAX	380,000	416,000	36,000	Increased allocation from RAP Tax
45-33-700000	GRANT REVENUE	0	52,358	52,358	Island View grant money - final payment
		NET INCREASE/DECREASE		120,358	
EXPENSES					
45-4810-100.0	CAPITAL PROJECTS	0	165,206	165,206	Money available for other park projects
	CONTRIBUTION TO FUND BALANCE	44848	0	(44,848)	Moved to Park Capital Projects
		NET INCREASE/DECREASE		120,358	

FUND 47 - CAPITAL PROJECTS

REVENUE			
47-34-800000	TRANSFER IN - GENERAL FUND	0	GENERAL FUND BALANCE OVER 20% OF OPERATING
EXPENSES			
47-4710-980.0	CONTRIB. FUND 47 BALANCE	0	GENERAL FUND BALANCE OVER 20% OF OPERATING

TRANSPORTATION

REVENUE					
	Use of Fund Balance	0	437,408	437,408	
48-31-300000	SALES TAX	337,000	410,000	73,000	
48-38-450000	CONTRIBUTIONS	0	4,000	4,000	
		NET INCREASE/DECREASE		514,408	
EXPENSES					
48-4000-710.0	CAPITAL PROJECTS	1,285,592	1,800,000	514,408	Matches actual amount of projects summer 2020 and spring 2021
		NET INCREASE/DECREASE		514,408	

UTOPIA

REVENUE					
49-30-100000	TRANSFER IN - UTOPIA REBATE	120,848	120,844	(4)	
49-34-800000	TRANSFER IN - GENERAL FUND	141,103	149,888	8,785	Adjusted to pay obligation
49-34-850000	TRANSFER - TAX INCREMENT	240,000	231,219	(8,781)	Actual amount of available increment from RDA
		NET INCREASE/DECREASE		-	

WATER

REVENUE				
	USE OF FUND BALANCE	0	225000	225,000
EXPENSES				
51-5154-750.0	CAPITAL PROJECTS	637,197	862,197	225,000

DRAINAGE

REVENUE				
	USE OF FUND BALANCE	0	600000	600,000
EXPENSES				
53-4000-750.0	CAPITAL PROJECTS	317,430	917,430	600,000

RDA

EXPENSES					
20-4000-420.0	OTHER OBLIGATIONS	268,476	256,257	(12,219)	Balancing number
20-4000-435.0	CONTRACTUAL - RIMINI	0	21,000	21,000	New agreement with Rimini LLC
20-4710-830.0	TRANSFER - ADDITIONAL INCREM	240,000	231,219	(8,781)	Actual amount of increment collected
		NET INCREASE/DECREASE		-	

GENERAL FUND AMENDMENTS		CURRENT BUDGET	AMENDED BUDGET	NOTES
Council and Mayor				
10-4111-510	SPECIAL CONTINGENCY	10,000	16,000	To cover Spearhead Contract
Court				
10-4120-330	EDUCATION & TRAINING	700	0	Will not be using at all
Admin				
10-4130-220	PUBLIC NOTICES	500	1,000	Recruitments - national
10-4130-240	OFFICE SUPPLIES	1,000	1,500	Restore to historical levels
10-4130-260	EQUIP MAINT & SUPPLIES	2,550	3,000	Increase in Laserfiche and Liberty Recorder
10-4130-480	MISC SUPPLIES	250	1,500	Restore to historical levels
10-4130-482	EMPLOYEE - SERVICE	2,000	3,000	Service recognitions
10-4130-745	NETWORK EQUIPMENT/LICENSING	20,000	23,000	Recommended upgrades and licensing
10-4130-755	WEBSITE	15,000	29,000	Transition and delayed start costs
Finance				
10-4140-111	OVERTIME PAY	1,500	2,000	Overtime due to windstorm and staffing
10-4140-131	RETIREMENT	38,625	34,500	Delay in hiring FD
10-4140-132	MEDICAL INSURANCE	44,700	40,000	Delay in hiring FD
10-4140-240	OFFICE SUPPLIES	1,500	3,000	Restore to historical levels
10-4140-310	PROFESSIONAL SERVICES	600	1,400	Restore to historical levels
10-4140-320	BANKING SERVICES	12,000	15,000	Increase use of credit cards - utility payments
10-4140-480	MISC SUPPLIES	800	1,500	Restore to historical levels
10-4140-511	INSURANCE - LIABILITY	37,000	28,000	Actual amount
Youth Council				
10-4180-480	MISCELLANEOUS	3,400	100	Not much happpened
10-4180-486	SPRING CONFERENCE	2,500	0	Did not happen
10-4180-645	EASTER EGG HUNT	1,000	0	Did not happen
Police				
10-4210-111.0	OVERTIME PAY	32,000	16,000	Will not be using all
10-4210-112.0	OVERTIME PAY - WARRANT SERVICE	10,300	0	Will not be using
10-4210-115.0	OVERTIME PAY-BAILIFF	11,300	0	No court
10-4210-122.0	PART TIME WAGES - OFFICE	0	10,000	Temporary help
10-4210-220.0	PUBLIC NOTICES	300	1,000	Using Indeed - costs more
10-4210-250.0	VEHICLE MAINTENANCE - MISC	14,000	23,000	Aging fleet
10-4210-512.0	INSURANCE - AUTO LIAB.	8,220	10,000	Midyear increase in insurance
10-4210-740.0	CAPITAL EQUIPMENT	146,400	166,400	Accounting for shade structure

K9				
10-4223-310.0	PROFESSIONAL SERVICES	1,500	2,000	K9 budget almost spent
PW Admin				
10-4405-480.0	MISC SUPPLIES	4,000	3,250	Won't need all of it
10-4405-512.0	INSURANCE - AUTO LIABILITY	1,750	1,800	Midyear increase
Streets				
10-4410-481.0	SNOW REMOVAL	38,500	15,000	Not much snow this year
10-4410-740.0	CAPITAL EQUIPMENT	329,500	353,000	Increase for Salt Racker
Parks				
10-4510-120.0	TEMPORARY AND PART TIME WAGE	171,000	146,099	Late start this year and not much used in Summer 2020
10-4510-133.0	UNEMPLOYMENT	0	270	One filing in 2020
10-4510-277.0	UTILITIES - SEWER	1,304	1,400	midyear increase
10-4510-752.0	CITIZEN PARTICIPATION PROJECTS	0	500	Have had a few projects
Park Bldg				
10-4595-514.0	INSURANCE	820	1,100	Increase in insurance cost
PW Bldg				
10-4596-277.0	UTILITIES - SEWER	500	900	Overall increase in sewer rates
10-4596-280.0	TELEPHONE SERVICE & EQUIPMENT	11,000	11,600	New phone system
City Hall				
10-4597-482.0	MAINTENANCE & REPAIR	12,000	17,000	Electronic door system issues, elevator repairs
10-4597-514.0	INSURANCE	6,400	6,600	Increase in insurance cost
10-4597-750.0	CAPITAL PROJECTS	35,000	41,000	Increase cost of chairs; blinds for Council Chamber
	TOTAL	1,031,419	1,031,419	

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 4.

Short Title: Public Hearing - Compensation Schedule and Justice Court Judge Compensation

Initiated By: Jacob Smith, Administrative Services Director

Staff Representative: Jacob Smith, Administrative Services Director

SUBJECT

Compensation Schedule and Justice Court Judge's Compensation

RECOMMENDATION

Adopt Ordinance 2021-07 updating and amending the Centerville Job Value and Compensation Schedule.

Adopt Resolution 2021-19 fixing the compensation of the Municipal Justice Court Judge.

BACKGROUND

Each year, the City updates the Centerville Job Value and Compensation Schedule to account for any amended or new positions within the City as well as adjust the pay ranges according to the prior year's CPI.

Each year we are required by law to adopt a resolution fixing the judge's salary. The law requires the judge receive an increase equal to the average increase of all municipal employees.

ATTACHMENTS:

Description

- Ordinance 2021-7 Job Value and Compensation Schedule
- Exhibit A Job Value and Compensation Schedule
- Resolution 2021-20 Judge Compensation

ORDINANCE NO. 2021-07

AN ORDINANCE UPDATING AND AMENDING THE CENTERVILLE JOB VALUE AND COMPENSATION SCHEDULE

WHEREAS, the City Council previously adopted the Centerville Job Value and Compensation Schedule regarding the City's current compensation plan; and

WHEREAS, the City Council desires to update and amend the Centerville Job Value and Compensation Schedule as more particularly provided herein; and

WHEREAS, the City has provided notice and held a public hearing on the proposed Centerville Job Value and Compensation Schedule in accordance with Utah Code § 10-3-818 for appointed officers.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, AS FOLLOWS:

Section 1. **Amendment.** The "Centerville Job Value and Compensation Schedule" is hereby amended as more particularly set forth in Exhibit A, attached hereto and incorporated by this reference.

Section 2. **Severability.** If any section, part, or provision of this Ordinance is held invalid or unenforceable, such invalidity or unenforceability shall not affect any other portion of this Ordinance, and all sections, parts, and provisions of this Ordinance shall be severable.

Section 3. **Effective Date.** This Ordinance shall become effective immediately upon publication or posting, or thirty (30) days after passage, which occurs first.

PASSED AND ADOPTED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, THIS 1st DAY OF JUNE, 2021.

CENTERVILLE CITY

ATTEST:

_____
Jennifer Hansen, City Recorder

_____
Mayor Clark A. Wilkinson

Voting by the City Council

	"AYE"	"NAY"
Councilmember Ince	_____	_____
Councilmember Ivie	_____	_____
Councilmember Fillmore	_____	_____
Councilmember McEwan	_____	_____
Councilmember Mecham	_____	_____

CERTIFICATE OF PASSAGE AND PUBLICATION OR POSTING

According to the provisions of the U.C.A. 9 10-3-713, as amended, I, the municipal recorder of Centerville City, hereby certify that foregoing ordinance was duly passed by the City Council and published, or posted at: (1) 250 North Main; (2) 655 North 1250 West; and (3) RB's Gas Station, on the foregoing referenced dates.

_____ DATE: _____
JENNIFER HANSEN, City Recorder

RECORDED this _____ day of _____, 2021.

PUBLISHED OR POSTED this _____ day of _____, 2021.

EXHIBIT A

CENTERVILLE JOB VALUE AND COMPENSATION SCHEDULE (2021)

Centerville Position, Job Value and Pay Schedule 7/2021 (yearly)

JOB TITLE	Job Value	Min	Mid	Mid	Max
CITY MANAGER	26.08	$ 108,279	$ 127,638	$ 129,935	$ 155,922
POLICE CHIEF	22.69	$ 94,125	$ 110,953	$ 112,950	$ 135,540
CITY ATTORNEY	22.47	$ 93,259	$ 109,933	$ 111,912	$ 134,294
PUBLIC WORKS DIRECTOR	19.96	$ 83,992	$ 99,009	$ 100,791	$ 120,949
FINANCE DIRECTOR	19.38	$ 81,991	$ 96,650	$ 98,390	$ 118,068
COMMUNITY DEVELOPMENT DIRECTOR	18.38	$ 78,631	$ 92,689	$ 94,357	$ 113,228
ADMINISTRATIVE SERVICES DIRECTOR	18.05	$ 77,573	$ 91,442	$ 93,088	$ 111,706
PARKS & RECREATION DIRECTOR	17.90	$ 77,090	$ 90,872	$ 92,508	$ 111,010
LIEUTENANT	17.77	$ 76,660	$ 90,365	$ 91,992	$ 110,390
DEPUTY PUBLIC WORKS DIRECTOR	15.01	$ 68,344	$ 80,564	$ 82,014	$ 98,416
WATER SUPERVISOR	12.69	$ 62,051	$ 73,145	$ 74,462	$ 89,354
SERGEANT	11.69	$ 60,652	$ 71,496	$ 72,783	$ 87,339
STREET SUPERVISOR	10.94	$ 57,008	$ 67,201	$ 68,410	$ 82,092
MASTER POLICE OFFICER	10.61	$ 55,493	$ 65,415	$ 66,592	$ 79,911
PARKS SUPERVISOR	10.58	$ 55,344	$ 65,239	$ 66,414	$ 79,696
ASSISTANT CITY PLANNER	9.89	$ 52,287	$ 61,635	$ 62,745	$ 75,293
MASTER MECHANIC	9.57	$ 50,945	$ 60,054	$ 61,135	$ 73,362
DRAINAGE UTILITY SUPERVISOR	9.53	$ 50,763	$ 58,325	$ 60,916	$ 73,099
PATROL OFFICER III	9.46	$ 50,487	$ 59,514	$ 60,585	$ 72,702
LEAD WATER MAINTENANCE OPERATOR	9.38	$ 50,134	$ 59,098	$ 60,161	$ 72,194
IT MANAGER	9.37	$ 50,099	$ 59,056	$ 60,119	$ 72,143
CITY TREASURER	9.35	$ 50,021	$ 58,964	$ 60,025	$ 72,030
ACCOUNTANT II	9.13	$ 49,139	$ 57,925	$ 58,967	$ 70,761
GIS MANAGER/IT SUPPORT TECHNICIAN	9.06	$ 48,870	$ 57,608	$ 58,645	$ 70,374
WATER ELECTRICIAN	8.67	$ 47,313	$ 55,772	$ 56,776	$ 68,131
PATROL OFFICER II	8.66	$ 47,258	$ 55,707	$ 56,710	$ 68,052
LEAD STREET MAINTENANCE OPERATOR	8.60	$ 47,046	$ 55,457	$ 56,455	$ 67,746
CITY RECORDER	8.03	$ 44,865	$ 52,886	$ 53,838	$ 64,606
PLANNER II	7.94	$ 44,559	$ 52,525	$ 53,471	$ 64,165
WATER MAINTENANCE OPERATOR III	7.91	$ 44,442	$ 52,387	$ 53,330	$ 63,996
PATROL OFFICER I	7.90	$ 44,417	$ 52,358	$ 53,300	$ 63,960
LEAD PARKS MAINTENANCE OPERATOR	7.90	$ 44,417	$ 52,358	$ 53,300	$ 63,960
JOURNEY MECHANIC	7.77	$ 43,945	$ 51,801	$ 52,734	$ 63,281
COURT CLERK SUPERVISOR	7.70	$ 43,680	$ 51,489	$ 52,416	$ 62,899
RECREATION/EVENT COORDINATOR	7.44	$ 42,753	$ 50,397	$ 51,304	$ 61,565
STREET MAINTENANCE OPERATOR III	7.31	$ 42,300	$ 49,862	$ 50,760	$ 60,912
ACCOUNTANT I	7.04	$ 41,368	$ 48,765	$ 49,642	$ 59,571
PARKS MAINTENANCE SPECIALIST III	6.87	$ 40,802	$ 48,097	$ 48,962	$ 58,755
PLANNER I	6.77	$ 40,455	$ 47,688	$ 48,547	$ 58,256
EMERGENCY MANAGEMENT/ADMINISTRATIVE ASSISTANT	6.70	$ 40,211	$ 47,400	$ 48,253	$ 57,904
WATER MAINTENANCE OPERATOR II	6.55	$ 39,721	$ 46,823	$ 47,665	$ 57,198
DISPATCHER/LEAD	6.48	$ 39,511	$ 46,575	$ 47,414	$ 56,896
WHITAKER MUSEUM DIRECTOR	6.39	$ 39,224	$ 46,237	$ 47,069	$ 56,483
DISPATCHER II/COMMUNITY LIAISON	6.33	$ 39,003	$ 45,976	$ 46,804	$ 56,165
COURT CLERK III	6.22	$ 38,658	$ 45,569	$ 46,389	$ 55,667
STREET MAINTENANCE OPERATOR II	6.16	$ 38,464	$ 45,341	$ 46,157	$ 55,389
PLANNING & ZONING TECHNICIAN	5.79	$ 37,312	$ 43,983	$ 44,774	$ 53,729
APPRENTICE MECHANIC	5.64	$ 36,857	$ 43,447	$ 44,229	$ 53,075
PARKS MAINTENANCE SPECIALIST II	5.62	$ 36,804	$ 43,384	$ 44,165	$ 52,998
WATER MAINTENANCE OPERATOR I	5.43	$ 36,230	$ 42,707	$ 43,476	$ 52,171
DISPATCHER II	5.43	$ 36,219	$ 42,695	$ 43,463	$ 52,156
ACCOUNTING TECHNICIAN II	5.42	$ 36,191	$ 42,661	$ 43,429	$ 52,115
STREET MAINTENANCE OPERATOR I	5.33	$ 35,921	$ 42,343	$ 43,105	$ 51,726
COURT CLERK II	5.11	$ 35,281	$ 41,589	$ 42,338	$ 50,805
BUILDING CUSTODIAN	4.87	$ 34,606	$ 40,793	$ 41,527	$ 49,833
DISPATCHER I/COMMUNITY LIAISON	4.78	$ 34,349	$ 40,490	$ 41,219	$ 49,463
DISPATCHER I	4.25	$ 32,866	$ 38,742	$ 39,440	$ 47,328
PARKS MAINTENANCE SPECIALIST I	4.23	$ 32,836	$ 38,707	$ 39,404	$ 47,284
COURT CLERK I	4.23	$ 32,834	$ 38,704	$ 39,400	$ 47,281
ACCOUNTING TECHNICIAN I	4.08	$ 32,430	$ 38,228	$ 38,916	$ 46,700
ADMINISTRATIVE ASSISTANT	4.08	$ 32,418	$ 38,213	$ 38,901	$ 46,682

Centerville Position, Job Value and Pay Schedule 7/2021 (hourly)

JOB TITLE	Job Value	Min	Mid	Max
CITY MANAGER	26.08	$ 52.06	$ 62.47	$ 74.96
POLICE CHIEF	22.69	$ 45.25	$ 54.30	$ 65.16
CITY ATTORNEY	22.47	$ 44.84	$ 53.80	$ 64.56
PUBLIC WORKS DIRECTOR	19.96	$ 40.38	$ 48.46	$ 58.15
FINANCE DIRECTOR	19.38	$ 39.42	$ 47.30	$ 56.76
COMMUNITY DEVELOPMENT DIRECTOR	18.38	$ 37.80	$ 45.36	$ 54.44
ADMINISTRATIVE SERVICES DIRECTOR	18.05	$ 37.29	$ 44.75	$ 53.70
PARKS & RECREATION DIRECTOR	17.90	$ 37.06	$ 44.48	$ 53.37
LIEUTENANT	17.77	$ 36.86	$ 44.23	$ 53.07
DEPUTY PUBLIC WORKS DIRECTOR	15.01	$ 32.86	$ 39.43	$ 47.32
WATER SUPERVISOR	12.69	$ 29.83	$ 35.80	$ 42.96
SERGEANT	11.69	$ 29.16	$ 34.99	$ 41.99
STREET SUPERVISOR	10.94	$ 27.41	$ 32.89	$ 39.47
MASTER POLICE OFFICER	10.61	$ 26.68	$ 32.02	$ 38.42
PARKS SUPERVISOR	10.58	$ 26.61	$ 31.93	$ 38.32
ASSISTANT CITY PLANNER	9.89	$ 25.14	$ 30.17	$ 36.20
MASTER MECHANIC	9.57	$ 24.49	$ 29.39	$ 35.27
DRAINAGE UTILITY SUPERVISOR	9.53	$ 24.41	$ 29.29	$ 35.14
PATROL OFFICER III	9.46	$ 24.27	$ 29.13	$ 34.95
LEAD WATER MAINTENANCE OPERATOR	9.38	$ 24.10	$ 28.92	$ 34.71
IT MANAGER	9.37	$ 24.09	$ 28.90	$ 34.68
CITY TREASURER	9.35	$ 24.05	$ 28.86	$ 34.63
ACCOUNTANT II	9.13	$ 23.62	$ 28.35	$ 34.02
GIS MANAGER/IT SUPPORT TECHNICIAN	9.06	$ 23.50	$ 28.19	$ 33.83
WATER ELECTRICIAN	8.67	$ 22.75	$ 27.30	$ 32.76
PATROL OFFICER II	8.66	$ 22.72	$ 27.26	$ 32.72
LEAD STREET MAINTENANCE OPERATOR	8.60	$ 22.62	$ 27.14	$ 32.57
CITY RECORDER	8.03	$ 21.57	$ 25.88	$ 31.06
PLANNER II	7.94	$ 21.42	$ 25.71	$ 30.85
WATER MAINTENANCE OPERATOR III	7.91	$ 21.37	$ 25.64	$ 30.77
PATROL OFFICER I	7.90	$ 21.35	$ 25.63	$ 30.75
LEAD PARKS MAINTENANCE OPERATOR	7.90	$ 21.35	$ 25.63	$ 30.75
JOURNEY MECHANIC	7.77	$ 21.13	$ 25.35	$ 30.42
COURT CLERK SUPERVISOR	7.70	$ 21.00	$ 25.20	$ 30.24
RECREATION/EVENT COORDINATOR	7.44	$ 20.55	$ 24.67	$ 29.60
STREET MAINTENANCE OPERATOR III	7.31	$ 20.34	$ 24.40	$ 29.28
ACCOUNTANT I	7.04	$ 19.89	$ 23.87	$ 28.64
PARKS MAINTENANCE SPECIALIST III	6.87	$ 19.62	$ 23.54	$ 28.25
PLANNER I	6.77	$ 19.45	$ 23.34	$ 28.01
EMERGENCY MANAGEMENT/ADMINISTRATIVE ASSISTANT	6.70	$ 19.33	$ 23.20	$ 27.84
WATER MAINTENANCE OPERATOR II	6.55	$ 19.10	$ 22.92	$ 27.50
DISPATCHER/LEAD	6.48	$ 19.00	$ 22.80	$ 27.35
WHITAKER MUSEUM DIRECTOR	6.39	$ 18.86	$ 22.63	$ 27.16
DISPATCHER II/COMMUNITY LIAISON	6.33	$ 18.75	$ 22.50	$ 27.00
COURT CLERK III	6.22	$ 18.59	$ 22.30	$ 26.76
STREET MAINTENANCE OPERATOR II	6.16	$ 18.49	$ 22.19	$ 26.63
PLANNING & ZONING TECHNICIAN	5.79	$ 17.94	$ 21.53	$ 25.83
APPRENTICE MECHANIC	5.64	$ 17.72	$ 21.26	$ 25.52
PARKS MAINTENANCE SPECIALIST II	5.62	$ 17.69	$ 21.23	$ 25.48
WATER MAINTENANCE OPERATOR I	5.43	$ 17.42	$ 20.90	$ 25.08
DISPATCHER II	5.43	$ 17.41	$ 20.90	$ 25.07
ACCOUNTING TECHNICIAN II	5.42	$ 17.40	$ 20.88	$ 25.06
STREET MAINTENANCE OPERATOR I	5.33	$ 17.27	$ 20.72	$ 24.87
COURT CLERK II	5.11	$ 16.96	$ 20.35	$ 24.43
BUILDING CUSTODIAN	4.87	$ 16.64	$ 19.97	$ 23.96
DISPATCHER I/COMMUNITY LIAISON	4.78	$ 16.51	$ 19.82	$ 23.78
DISPATCHER I	4.25	$ 15.80	$ 18.96	$ 22.75
PARKS MAINTENANCE SPECIALIST I	4.23	$ 15.79	$ 18.94	$ 22.73
COURT CLERK I	4.23	$ 15.79	$ 18.94	$ 22.73
ACCOUNTING TECHNICIAN I	4.08	$ 15.59	$ 18.71	$ 22.45
ADMINISTRATIVE ASSISTANT	4.08	$ 15.59	$ 18.70	$ 22.44

RESOLUTION NO. 2021-20

A RESOLUTION FIXING THE COMPENSATION OF THE MUNICIPAL JUSTICE COURT JUDGE OF THE CENTERVILLE CITY JUSTICE COURT

WHEREAS, pursuant to Utah Code § 78A-7-207, the City Council has reviewed the compensation paid to the Justice Court Judge of the City; and

WHEREAS, the City Council has determined that no increase in the compensation of the Justice Court Judge is warranted at the present time.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH:

Section 1. **Adoption**. Effective July 1, 2021, and until further determination of the City Council, the compensation of the Justice Court Judge presiding over the municipal Justice Court for the City of Centerville shall be $53,592.98 per year. The Judge may elect to continue participation in the City's employee health insurance plan, and a portion of his compensation may be applied towards the health insurance premium.

Section 2. **Submission Requirement**. A copy of this Resolution shall be furnished to the State Court Administrator as required by law.

Section 3. **Effective Date**. This Resolution shall become effective immediately upon its passage.

PASSED AND ADOPTED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH ON THIS 1st DAY OF JUNE, 2021.

CENTERVILLE CITY

BY:_____
Clark A. Wilkinson, Mayor

ATTEST:

_____
Jennifer Hansen, City Recorder

CERTIFICATE OF PASSAGE AND EFFECTIVE DATE

According to the provisions of the U.C.A. 910-3-719, as amended, resolutions may become effective without publication or posting and may take effect on passage or at a later date as the governing body may determine; provided, resolutions may not become effective more than three months from the date of passage. I, the municipal recorder of Centerville City, hereby certify that foregoing resolution was duly passed by the City Council and became effective upon passage or a later date as the governing body directed as more particularly set forth below.

_____ DATE: _____
JENNIFER HANSEN, City Recorder

EFFECTIVE DATE: _____ day of _____, 2021.

CENTERVILLE

Staff Backup Report
6/1/2021

Item No. 5.

Short Title: Public Hearing - FY2022 Final Budget

Initiated By: Jacob Smith, Finance Director

Staff Representative: Jacob Smith, Finance Director

SUBJECT

A. Public Hearing on proposed budget for FY2022
B. Discuss other potential revisions to FY2022 budget
C. Discuss Truth-in-Taxation process and schedule public hearing for the final adoption of the FY22 budget and Truth-in-Taxation public hearing
D. FY2022 Final Budget - Resolution No. 2020-18

RECOMMENDATION

Confirm public hearing date and time for FY2022 Budget and Proposed Truth-in-Taxation

Adopt FY2022 budget as presented as the tentative budget

BACKGROUND

Every year, staff and Council prepare a balanced annual budget to fund personnel, operations, buildings, services and equipment. The final budget can be found on the City's website, attached to this agenda item and a physical copy is available at City Hall and the Public Works Facility.

This year, Council has proposed a property tax increase which requires a Truth-in-Taxation hearing. Staff recommends finalizing the proposed budget, deciding on the new property tax amount, and scheduling the public hearing for both the Final City Budget FY2022 and the Truth-in-Taxation hearing for August 10, 2022.

ATTACHMENTS:

Description

- Resolution 2021-18 Adoption of Final Budget
- Exhibit A FY22 Budget

RESOLUTION NO. 2021-18

A RESOLUTION ADOPTING THE FY2022 BUDGET OF FUNDS AND ACCOUNTS FOR CENTERVILLE CITY, UTAH AND PROVIDING AN EFFECTIVE DATE

WHEREAS, the City is required by State law to adopt a final budget for each fund by June 30, 2021, pursuant to Utah Code § 10-6-118; and

WHEREAS, the City has provided the notice and held public hearings as required by law for the tentative and final budget in accordance with Utah Code § 10-6-114; and

WHEREAS, in accordance with applicable provisions of State law, the City Council desires to adopt the FY2022 final budget as more particularly provided herein.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, AS FOLLOWS:

Section 1. **Adoption.** The FY2022 final budget is hereby adopted, including all funds and accounts, as shown in the attached Exhibit A and dated June 1, 2021.

Section 2. **Severability.** If any section, part or provision of this Resolution is held invalid or unenforceable, such invalidity or unenforceability shall not affect any other portion of this Resolution, and all sections, parts and provisions of this Resolution shall be severable.

Section 3. **Effective Date.** This Resolution shall become effective immediately upon its passage.

PASSED AND ADOPTED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, THIS 1st DAY OF JUNE, 2021.

CENTERVILLE CITY

By:_____
Mayor Clark A. Wilkinson

I hereby certify that the above Resolution entitled "A Resolution Adopting the FY 2022 Budget of Funds and Accounts for Centerville City, Utah and Providing an Effective Date" is a true and accurate copy of the Resolution passed on the 1st day of June, 2021.

ATTEST:

_____
Jennifer Hansen, City Recorder

CERTIFICATE OF PASSAGE AND EFFECTIVE DATE

According to the provisions of the U.C.A. § 10-3-719, as amended, resolutions may become effective without publication or posting and may take effect on passage or at a later date as the governing body may determine; provided, resolutions may not become effective more than three months from the date of passage. I, the municipal recorder of Centerville City, hereby certify that foregoing resolution was duly passed by the City Council and became effective upon passage or a later date as the governing body directed as more particularly set forth below.

_____ DATE: _____
JENNIFER HANSEN, City Recorder

EFFECTIVE DATE: ____ day of _____, 2021.

EXHIBIT A

FY2021 FINAL BUDGET

Centerville City
FINAL BUDGET
FISCAL YEAR 2021-2022

Table of Contents

		Page
I.	**BUDGET MESSAGE**	iii
II.	**SUMMARY OF ALL FUNDS**	1
III.	**GENERAL FUND**	
	Revenues & Expenditures Summary	2
	General Fund Expenditures	3
	General Fund Revenue Detail	4
IV.	**GOVERNMENT SERVICES EXPENDITURES**	
	Summary	6
	City Council	7
	Justice Court	8
	Administration	9
	Attorney	10
	Finance	11
	Attorney Services	12
	Emergency Management	13
	Elections	14
	Youth Council	15
	Whitaker	16
VI.	**FIRE SERVICES EXPENDITURES**	
	Summary	17
	Fire Services	18
V.	**POLICE EXPENDITURES**	
	Summary	19
	Police	20
	Beer Tax	21
	School Crossing Program	22
	K-9	23
	DARE Program	24
	Animal Control	25
VII.	**PUBLIC WORKS EXPENDITURES**	
	Summary	26
	Public Works Administration	27
	Streets	28
	GIS Division	29
	General Engineering Services	30
VIII.	**PARKS AND RECREATION EXPENDITURES**	
	Summary	31
	Parks Department	32
	Recreation Committees	33
	Community Events	34

IX. **PUBLIC BUILDINGS EXPENDITURES**
Summary 35
Parks & Recreation Facility 36
Public Works Facility 37
City Hall 38
Public Works Storage/Decant Station 39
Whitaker Home 40
X. **COMMUNITY DEVELOPMENT EXPENDITURES**
Summary 41
Community Development 42
Boards and Commissions 43
Building & Zoning 44
XI. **TRANSFERS**
Summary 45
Transfers to Non-Departmental 46
XII. **RECREATION FUND**
Summary 47
Recreation fund 48
XIII. **RAP TAX FUND**
Summary 49
RAP Tax Fund 50
XIV. **CEMETERY PERPETUAL CARE FUND**
Cemetery Perpetual Care Fund Summary 51
XV. **DEBT SERVICE FUND**
Summary 52
Sales Tax Revenue Bonds - 2009 53
XVI. **CAPITAL IMPROVEMENT FUNDS**
Summary 54
Parks 55
City Capital Projects 56
Transportation 57
UTOPIA 58
XVII. **ENTERPRISE FUNDS**
Summary 59
Water Fund Revenues 60
Water Fund Expenditures 60
Sanitation Fund 62
Drainage Utility 63
Telecommunications 64
XVIII. **RDA**
Summary 65
Redevelopment Agency Fund 66

CENTERVILLE CITY
250 North Main · Centerville, Utah 84014-1824 · (801) 295-3477 · Fax: (801) 292-8034
Incorporated in 1915

Mayor
Clark A. Wilkinson

City Council
Tamilyn Fillmore
William Ince
Stephanie Ivie
George McEwan
Robyn Mecham

City Manager
Brant T. Hanson

To: Mayor
City Council
Centerville Citizens
From: Brant Hanson, City Manager
Subject: Budget Message – A Summary of the FY 2022 Proposed Budget
Date: May 4, 2021

I am transmitting with this Budget Message our Proposed Budget for Fiscal Year 2022. I recommend the City Council tentatively adopt the Proposed Budget as the Tentative Budget, initiating a period for public comment. The City Council can revise the Tentative Budget before adopting the Final Budget. As required by State law, the City Council will need to schedule a public hearing to adopt the Final Budget, which in the past is generally scheduled at the first City Council meeting in June. Based on the historical trends, I propose the Public Hearing be scheduled on June 1, 2021. Historically, Council has delayed the approval of the Final Budget to the following City Council meeting, which will be June 15, 2021.

Overview of Proposed Budget

Our proposed budget for the fiscal year beginning July 1, 2021 (known as FY 2022) reflects a balanced budget that shows significant progress toward funding key services provided by the City including streets, water, parks, drainage infrastructure and replacing and repairing the aging fleet and buildings. Additionally, the recruiting, retention, and training of productive employees is a priority to maintain knowledgeable, qualified staff to maintain the high level of service expected by residents and business. Finally, this budget provides the necessary funding to help Centerville begin to return to pre-pandemic levels of service with a small recreation program, traditional public events, maintaining our theater and supporting the theater production company, and continued enhancement of the historical Whitaker home.

In FY 2021, like the rest of the world, the City encountered unprecedented events that required us to take necessary precautions to ensure the continuation of services. The City adopted a budget with drastically reduced revenues and a subsequent list of deferred priorities. As the year progressed, the City received federal relief funds and better than forecasted sales tax revenues. As a result, the City Council amended the FY 2021 budget several times and were able to fund most of the deferred priorities, build the General Fund Balance to a healthy level, and complete many pandemic-related projects.

Due to the City's healthy financial position and anticipating additional federal relief funds at the end of FY21 and FY22, the City will be able to fund most of the requests made by the individual departments for the recruitment and retention of personnel, the maintenance of service levels,

and the repair and replacement of capital equipment and buildings (see Capital Equipment and Projects list, pg. xi).

The Proposed Budget includes significant funding for capital projects, including $800,000 in water system and drainage improvements and $1.5 million for road maintenance projects which includes $150,000 for sidewalk maintenance. The City completely renovated Island View Park and is fully operational this year. The final phase on the upper level and addition of shade structures throughout the park awaits funding that will take a few more years to collect through the City's RAP taxes. New to the Centerville City Cemetery will be a "Niche Wall" that will allow for 48 spaces for cremation urns.

Federal Relief Funding

Beginning late in FY20 and all of FY21, the City along with the world grappled with a pandemic. In late March 2020, Congress and the President passed into law the Coronavirus Aid, Relief, and Economic Security Act (CARES Act). Federal aid was then distributed to the states and within Utah, a portion was shared with the cities. We received three tranches of aid totaling $1,514,517 to help mitigate the effects of the pandemic. The U.S. Department of the Treasury gave guidance on the proper use of these funds.

With this guidance, we were able to complete many projects including replacing the City Hall front doors with motion activated doors, providing protective glass for the administrative and public works offices, modifying desks and cubicles with splash shields, replacing plumbing fixtures with touchless ones, replacing current computer and telephonic equipment with mobile equipment to enable employee's to work from home, software purchases and changes to enable more virtual services and meetings, changes to the public buildings HVAC systems to include ionization filters, modifying the Council Chambers to allow for virtual public meetings, and a lot of personal protection equipment.

In total, these projects and equipment used just over $400,000 of the funds. The remaining $1.1 million will be used to help pay the salaries of frontline public safety employees from March 20, 2020 to June 30, 2021. Through many discussions with the Governor's Office and the Treasury, we have been assured this is an allowed use of the funds. As a precaution, we are proposing the City retain the freed-up funds until we have passed a successful audit of the CARES Act money. As the addition of these funds to our General Fund Reserve will cause the City to exceed the statutory limit of 25%, we propose transferring these funds to our City's Capital Improvement Fund.

In March 2021, Congress and the President passed into law the American Rescue Plan Act (ARPA). Again, the City will receive an allocation from the Federal government passed though the State, although at this time we have not received specific guidance from the Treasury on how to use these funds. In general, we are expecting another $1.9 million in relief funds to be used during FY21 to FY24. Eligible uses include revenue replacement, pay for essential workers, economic recovery, and investments in critical infrastructure.

We are expecting more detailed guidance when the funds are dispersed in early May 2021. As such, we will modify the Proposed Budget to accommodate the additional revenue and account for the allowed expenditures.

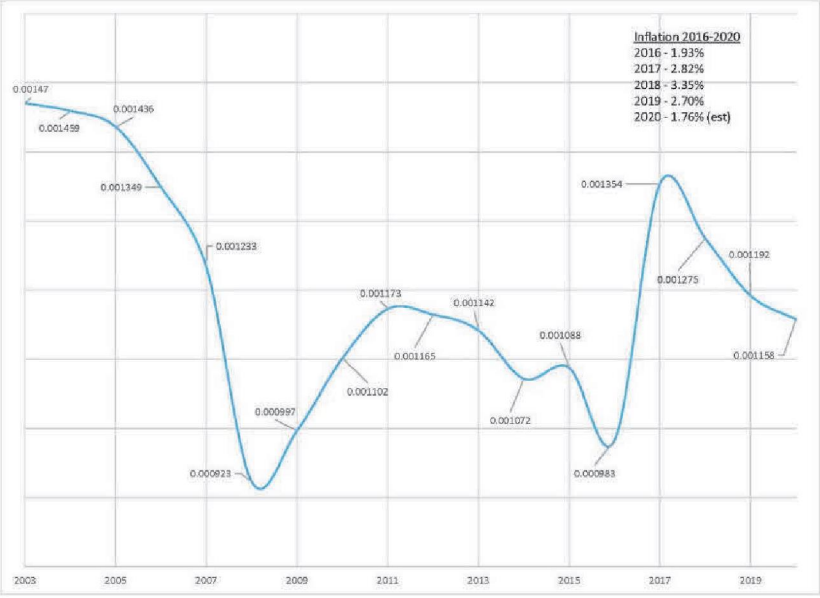
General Fund Revenues

The three largest sources of tax revenue for the General Fund are Sales Tax, Property Tax, and the Energy Sales and Use Tax (referred to as "franchise tax" for power and natural gas in the budget document). Sales Tax revenue in the current fiscal year is estimated to be 5.6% higher than the prior year, which is much stronger than anticipated. In the FY 2022 Proposed Budget, we are projecting sales tax revenues to increase by 5.6% over the estimated amount for FY 2021. The City will receive additional federal relief funds (American Rescue Plan Act: ARPA) that can be used to shore up any lost revenue due to the recent pandemic. If sales tax begins to decrease, the City will use ARPA funds to replace the lost revenue.

This Proposed Budget includes only a small increase in property tax due to development. We have not included a proposal for a property tax increase done through a Truth-in-Taxation hearing as the General Fund Reserve balance is at a healthy level, federal relief funds have and will shore up any revenue deficits and possibly provide other capital funding opportunities, and the City has the necessary revenue to fund current personnel, operations, and most capital requests. However, the recent influx of federal relief funds has masked the ongoing deficiency within our ongoing revenue sources – mainly property taxes. Operational costs continue to increase with inflation and the need for more personnel to maintain our high level of service, and no new sources of revenue are available to finance these costs.

The following graph shows the City's property tax rates over the past few years.

Property Tax Rates Centerville City 2003-Present



In 2017, the City Council increased the property tax levy. Since that time, the rate has dropped back down to 2011-12 levels. We propose having a strategic discussion next fiscal year regarding the City's financial sustainability, service levels, increasing costs, and the City's revenue portfolio.

The other major tax revenue source in the General Fund is the **Energy Sales and Use Tax**. This tax (6%) is applied to the monthly bills for electric power and natural gas. The amount of revenue from this source fluctuates somewhat from year to year depending on the collective energy usage within the community, but generally speaking, has remained relatively level for several years. By contrast, **municipal telecommunications tax revenue** has declined as telephone users abandoned traditional land lines in favor of cell phones and internet phone service.

Transportation Funding

The "Transportation Projects Fund", created in FY 2018 provides a great first step into improving and providing quality City streets. Sources of revenue include gasoline tax revenue, the County imposed ¼ cent "transportation sales tax", and a transfer from the General Fund. As a result, the FY 2022 Proposed Budget includes $1.5 million for pavement maintenance. In FY 2019, the City Council identified correcting sidewalk faults as a priority and approved $100,000 towards correcting these faults. The City Council provided direction to Staff to fund the sidewalk replacement and repair program at least 5% each year. The FY 2022 Proposed Budget includes $150,000 again to continue to address this issue. Daily street maintenance activities—such as pothole patching, snowplowing, streetlights, etc. continue to be budgeted in the General Fund.

RAP Tax and Park Improvements Funding

The Island View Park Phases I and II are complete and the park is fully functional. For the next few years, the City will need to use most of the RAP Tax revenue to pay off the financing for the park renovations.

In November 2016, Centerville voters approved the renewal of the RAP Tax, a 1/10th cent sales tax. This renewal became effective April 1, 2016. Prior to that date, 90% of the RAP Tax revenue was used to pay debt service for the Davis Center for the Performing Arts, home of CenterPoint Legacy Theatre. The current City Council has decided to use RAP Tax revenue under this new 10-year authorization for the following purposes:

- 85% for parks
- 5% for Whitaker Museum building and grounds improvements
- 5% for maintenance of the Performing Arts Center building
- 5% for purposes to be determined by the Council

We are in year three of the five-year $500,000 repayment to the SDRC's lease agreement provided to add amenities to the Community Park in exchange for priority use of the new sports fields for a number of years. The $500,000 will be repaid to the District from park impact fees (as they become available) and/or RAP Tax revenue. As park impact fees become available, they will repay the RAP taxes borrowed to finish the park expansion.

Enterprise Services and Funding

The City provides drainage utility, culinary water services, and solid waste collection using the enterprise approach. In other words, these services are fully funded with user fees. The Proposed Budget does not account for an increase in fees although a fee increase to fund future Water Projects is highly recommended.

Drainage Utility – Monthly user fees to maintain the City's drainage system are known as "drainage utility" and "subsurface drain" fees. The increases adopted in 2015 are providing about $350,000 per year to fund an ambitious capital improvement/replacement program recommended in the latest update of the Drainage Master Plan. More than $6 million in drainage projects, mostly replacement of existing drainage infrastructure, is being funded over a 10-year period using a pay-as-you-go approach. The replacement of drainage pipes will be coordinated with street repaving work and secondary irrigation providers as much as reasonably possible.

Federal and State storm water regulations now require cities to prevent pollutants from entering the drainage system when washing municipal vehicles and equipment. These pollutants (debris) must be collected and disposed of properly. In FY21, the City completed the Decant Station building located at the Public Works Facility on 1250 West to better comply with these storm water regulations.

Culinary Water -- The most recent update of the culinary water system capital plan focuses on the replacement of water mains. The older area of the City has many miles of cast iron water mains that are coming to the end of their expected life. Breaks in these pipes cause costly damage to roads and interrupt water service to customers. Staff has coordinated these water main replacements with street repaving/reconstruction plans over the next 20 years so that, as much as practical, cast iron pipes are replaced at the same time as the street work is done, thereby reducing overall project costs as well as the road damage caused by breaks in cast iron pipes. As previously mentioned, storm drain replacements are also being coordinated with street projects. In addition, staff are working with other utility providers (irrigation, natural gas, etc.) to persuade them to replace their facilities, if needed, at the same time road work is done.

The available funds and purchasing power for Water Projects has reduced over the years due to the increase in labor, parts, and operating costs. The Proposed Budget includes about $450,000 for projects which is not enough to pay for any amount of significant work. Staff are currently putting together a new Culinary Water Capital Facilities Plan with a recommendation on an increase in culinary water fees.

Personnel Costs

Currently, we are proposing adding public relations responsibilities to our recreation coordinator and making the position full-time. Also, we have included funding for a performance and efficiency audit of the Police Department to determine their current and future needs. Depending on the

results of that audit, we will explore funding mechanisms including grants and a possible property tax increase to fund any of their needs.

We are proposing a 1.8% market rate adjustment to all employee salaries and to the salary schedule, a 2% merit increase to be determined and allocated to employees by Department Heads, and the funding of the final implementation phase of the Compensation Study conducted in FY 2018.

Equipment

A table beginning on page xi identifies department head requests for equipment (exceeding $1000) and which of these requests are included in the Proposed Budget.

Long-Term Financial Obligations

The City has the following long-term financial obligations:

1) repayment of water revenue bonds;
2) an annual pledge for UTOPIA;
3) repayment of the SDRC lease for the Community Park Expansion; and
4) repayment of the Real Property Lease for Island View Park. The Proposed Budget includes the payments due in FY 2021 for each of these obligations.

Water Revenue Bonds – The City issued water revenue bonds in 2012 for water system improvements. This bond issue included $2.1 million in new borrowing and refunded the existing debt of $2.1 million (relating to water system and drainage projects completed earlier). The debt service requirements will be paid entirely from Water Fund revenue and Drainage Utility fees.

UTOPIA – The City began paying its sales tax pledge for UTOPIA in January 2010. The following funding sources are being used to pay the annual pledge, which will be $511,137 in FY 2022:

- **Reimbursement from the RDA Fund for Freedom Hills Park construction.** This park was eligible for funding from the RDA's annual "additional tax increment". Other City funds, however, were used to complete the park sooner; therefore, the RDA's additional increment flows to the City as repayment and is being used for the UTOPIA obligation. This amount will be $388,000.
- **UTOPIA Rebate.** In FY2022, we will receive a rebate from UTOPIA in the amount of $123,137. Each year, provided the rebate is approved by the UIA Board, the City will receive this rebate with a slight increase to cover the increase in the bond payments each year.

See Capital Projects--UTOPIA Fund for the budget relating to the UTOPIA annual pledge payment.

Davis Center for the Performing Arts – Construction of the $14.3 million regional performing arts facility was completed in 2011 and is owned by the Redevelopment Agency of Centerville. Debt service for this facility has been paid from four sources:

1) RAP tax approved by voters in Centerville and Bountiful;
2) RDA tax increment (i.e., property taxes from the businesses in the Redevelopment Project Area);
3) Davis County tourism taxes; and
4) private donations.

As of May 1, 2021, the Sales Tax Revenue Bonds – 2009 have been fully paid and will no longer show up in the budgets of the City as a debt.

Redevelopment Agency

The Centerville Redevelopment Agency (RDA) is a separate legal entity created under State law for the purpose of assisting in the redevelopment of under-developed areas in the City. The City Council serves as the RDA Board of Directors. The RDA's Budget is included in the total Budget document, however, is subject to its own public hearing and adoption process.

The source of revenue for the RDA Fund is the property tax "increment" (or increase) created by increasing the taxable property value in each "Project Area" through redevelopment activities. The RDA is entitled to use a portion of the new property tax revenues for legitimate purposes identified in State law – such as public infrastructure (roads, utilities, etc.) in the Project Area, public amenities, financial assistance to developers, and construction or preservation of affordable housing.

The Centerville RDA Proposed Budget is shown immediately after the Centerville City Proposed Budget. The RDA currently has three Project Areas:

1) Parrish Lane Gateway Project Area (traditional Redevelopment Area);
2) Legacy Crossing at Parrish Lane Project Area (Community Development Area or CDA); and
3) Barnard Creek Project Area (CDA).

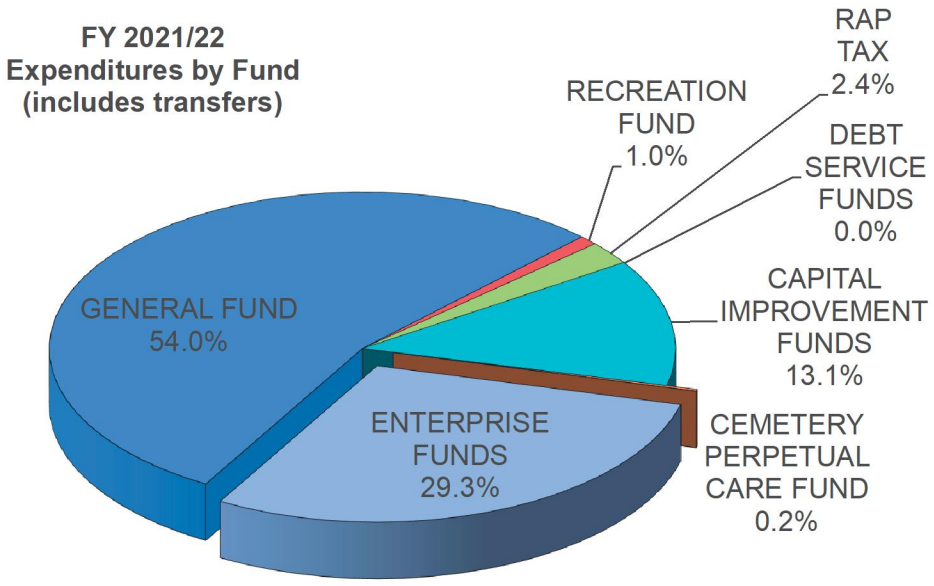
The biggest current commitment related to all Project Areas are tax increment refunds paid to developers to reimburse them for public infrastructure (roads, water mains, storm drains, etc.) and some private on-site improvements. The RDA also receives monthly rental payments from CenterPoint Legacy Theatre for use of the DCPA facility. These rental payments are deposited into a restricted account known as the Theatre Reserve Fund, to be used for major repairs to the facility. These monthly payments can also be used to reimburse the RDA for other facility-related expenses that are not the obligation of CenterPoint Legacy Theatre. NOTE: Due to the recent pandemic, the RDA Board approved the temporary suspension of the collection of these rental payments. We propose using ARPA funds to supplant the suspended rental payments.

Summary of Revenues and Expenditures

A summary for all funds in the Proposed Budget is shown on Page 1 of the Proposed Budget detail document, totaling more than $19.7 million. Summaries of revenues and expenditures for the General Fund are shown on the following pages of the same document. Proposed General Fund expenditures total $10.6 million, or 53.8% of all proposed spending.

Fiscal Year 2021/22
Budget Summary
All Funds
(excluding RDA)

Fund Type	Department Request	Tentative	Adopted
Revenues			
General Fund	$10,753,636	$10,677,600	$10,896,344
Recreation Fund	$192,925	$192,925	$192,925
RAP Tax	$473,000	$473,000	$496,000
Debt Service Funds	$0	$0	$0
Capital Improvement Funds	$2,558,629	$2,580,229	$2,641,829
Cemetery Perpetual Care Fund	$33,800	$34,100	$34,100
Enterprise Funds	$5,788,806	$5,788,962	$5,791,512
Total Sources	$19,800,796	$19,746,816	$20,052,710
Expenditures			
General Fund	$11,365,102	$10,656,094	$10,896,343
Recreation Fund	$192,925	$192,925	$192,925
RAP Tax	$473,000	$473,000	$496,000
Debt Service Funds	$0	$0	$0
Capital Improvement Funds	$2,558,629	$2,580,229	$2,641,829
Cemetery Perpetual Care Fund	$33,800	$34,100	$34,100
Enterprise Funds	$5,203,805	$5,788,962	$5,791,512
Total Expenditures	$19,827,262	$19,725,311	$20,052,710

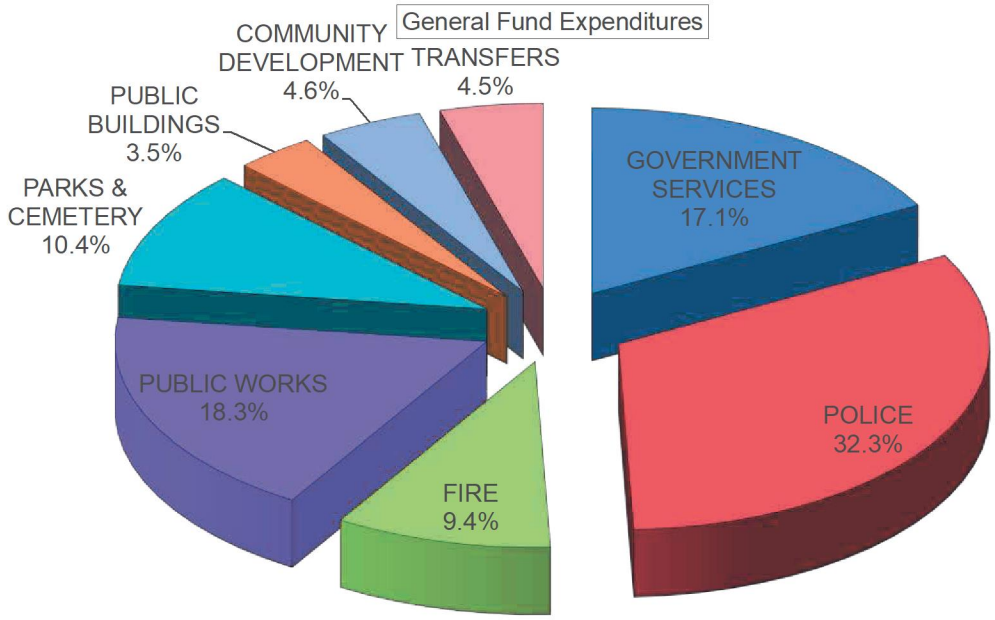


General Fund
Revenues & Expenditures
Summary by Category
Fiscal Year 2021/2022

	2018/19 Actual	2019/20 Actual	2020/21 Estimate	2020/21 Budget	2021/22 Department Request	2021/22 Tentative	2021/22 Adopted
Revenues							
Taxes	$6,834,574	$7,122,336	$7,358,734	$6,902,734	$7,607,000	$7,607,000	$7,827,000
Licenses & Permits	$337,506	$279,368	$298,770	$289,150	$280,670	$280,670	$280,670
Intergovernmental	$51,293	$405,601	$1,223,411	$1,578,267	$57,100	$57,100	$57,100
Charges for Services	$1,099,649	$1,319,043	$1,920,307	$1,924,663	$2,135,771	$2,059,495	$2,057,539
Fines	$395,121	$378,619	$410,000	$400,000	$428,000	$428,000	$428,000
Miscellaneous	$95,739	$67,396	$206,269	$76,550	$81,800	$81,800	$81,800
Contributions & Transfers	$97,817	$82,128	$144,376	$152,876	$145,190	$145,430	$146,130
Total General Fund Revenues	$8,911,700	$9,654,491	$11,561,867	$11,324,240	$10,735,531	$10,659,495	$10,878,239
Use of Restricted Fund Balance	$0	$0	$0	$18,105	$18,105	$18,105	$18,105
Use of Unrestricted Fund Balance	$0	$0	$0	$38,288	$0	$0	$0
Total Sources of Revenues	$8,911,700	$9,654,491	$11,561,867	$11,380,633	$10,753,636	$10,677,600	$10,896,344
Expenditures							
Government Services	$1,381,494	$1,712,329	$3,171,525	$3,059,977	$1,942,267	$1,933,435	$1,943,535
Police	$2,742,965	$2,661,346	$3,086,327	$3,210,744	$3,665,554	$3,499,428	$3,591,054
Fire	$894,321	$893,720	$919,500	$919,500	$1,068,870	$1,068,870	$1,068,870
Public Works	$1,395,694	$1,331,747	$1,642,682	$1,837,107	$2,082,574	$1,761,524	$1,806,424
Parks & Cemetery	$847,485	$816,015	$970,510	$1,015,379	$1,183,130	$1,084,730	$1,143,930
Public Buildings	$239,918	$286,942	$303,145	$331,737	$392,675	$316,675	$317,375
Community Development	$337,888	$353,248	$289,415	$368,768	$518,440	$474,840	$506,440
Transfers/Non-Departmental	$872,798	$862,948	$638,345	$638,345	$511,592	$516,592	$518,715
Funds yet to be allocated							
Total General Fund Expenditures	$8,712,564	$8,918,295	$11,021,449	$11,381,557	$11,365,102	$10,656,094	$10,896,343

GENERAL FUND EXPENDITURES
Fiscal Year 2021/2022

	2018/19 Actual	2019/20 Actual	2020/21 Budget	2021/22 Department Request	2021/22 Tentative	2021/22 Approved Budget
Government Services	$1,381,494	$1,712,329	$3,059,977	$1,942,267	$1,933,435	$1,943,535
Police	$2,742,965	$2,661,346	$3,210,744	$3,665,554	$3,499,428	$3,591,054
Fire	$894,321	$893,720	$919,500	$1,068,870	$1,068,870	$1,068,870
Public Works	$1,395,694	$1,331,747	$1,837,107	$2,082,574	$1,761,524	$1,806,424
Parks & Cemetery	$847,485	$816,015	$1,015,379	$1,183,130	$1,084,730	$1,143,930
Public Buildings	$239,918	$286,942	$331,737	$392,675	$316,675	$317,375
Community Development	$337,888	$353,248	$368,768	$518,440	$474,840	$506,440
Transfers	$872,798	$862,948	$638,345	$511,592	$516,592	$518,715
Total General Fund Expenditures	**$8,712,564**	**$8,918,295**	**$11,381,557**	**$11,365,102**	**$10,656,094**	**$10,896,343**



GENERAL FUND REVENUES
Fiscal Year 2021/2022

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	TAX REVENUES								
10-31-100000	PROPERTY TAXES	1,512,252	1,463,993	1,100,261	1,455,734	1,455,734	1,480,000	1,480,000	1,700,000
10-31-120000	FEE IN LIEU OF TAXES	97,349	100,420	44,728	110,000	110,000	110,000	110,000	110,000
10-31-200000	PROPERTY TAXES - OTHER	14,050	41,917	11,654	40,000	50,000	50,000	50,000	50,000
10-31-300000	SALES TAX - GENERAL	4,189,757	4,499,109	2,384,088	4,755,000	4,200,000	4,960,000	4,960,000	4,960,000
10-31-410000	FRANCHISE TAX - POWER	554,501	548,160	326,766	555,000	605,000	550,000	550,000	550,000
10-31-420000	FRANCHISE TAX - NATURAL GAS	247,990	273,198	54,603	261,000	270,000	270,000	270,000	270,000
10-31-430000	FRANCHISE TAX - TELECOMM.	130,252	107,769	47,657	95,000	125,000	100,000	100,000	100,000
10-31-440000	FRANCHISE TAX - CATV	88,423	87,770	42,890	87,000	87,000	87,000	87,000	87,000
	TOTAL TAX REVENUE	6,834,574	7,122,336	4,012,647	7,358,734	6,902,734	7,607,000	7,607,000	7,827,000
	LICENSES AND PERMITS								
10-32-100000	BUSINESS LICENSES	60,177	59,489	46,556	61,500	50,000	60,000	60,000	60,000
10-32-110000	BUILDING FEES	183,863	158,889	96,237	173,000	170,000	160,000	160,000	160,000
10-32-120000	PLAN CHECK FEES	85,676	50,699	25,110	49,000	60,000	50,000	50,000	50,000
10-32-130000	ELECTRICAL FEES	1,610	2,451	1,820	3,400	2,200	2,500	2,500	2,500
10-32-140000	PLUMBING FEES	1,448	2,170	490	1,500	1,800	2,500	2,500	2,500
10-32-150000	MECHANICAL FEES	3,080	4,015	2,380	5,400	3,000	4,000	4,000	4,000
10-32-160000	STATE SURCHARGE FEE	274	406	310	800	800	500	500	500
10-32-200000	APPROACH FEES (STREET & CURB)	1,346	1,080	3,064	4,000	1,200	1,000	1,000	1,000
10-32-220000	BICYCLE LICENSES	2	9	6	10	50	10	10	10
10-32-230000	CHICKEN & RABBIT PERMITS	30	160	40	160	100	160	160	160
	TOTAL LICENSES AND PERMITS	337,506	279,368	176,013	298,770	289,150	280,670	280,670	280,670
	INTERGOVERNMENTAL REVENUE								
10-33-202000	FEDERAL GRANTS	0	334,852	925,117	1,179,665	1,514,517	0	0	0
10-33-580000	STATE GRANTS - LIQUOR LAW	25,770	20,109	21,496	21,496	26,000	19,350	19,350	19,350
10-33-620000	STATE GRANT - HISTORIC	0	2,500	0	0	0	0	0	0
10-33-610000	SCHOOL RESOURCE OFFICER	17,750	17,750	0	17,750	17,750	17,750	17,750	17,750
10-33-630000	PUBLIC SAFETY GRANTS	7,773	30,390	4,487	4,500	20,000	20,000	20,000	20,000
	TOTAL INTERGOVERNMENTAL	51,293	405,601	951,100	1,223,411	1,578,267	57,100	57,100	57,100
	CHARGES FOR SERVICES								
10-34-120000	SUBDIV INSPECT FEES	34,735	13,234	0	23,000	18,000	18,000	18,000	18,000
10-34-130000	ZONING SUB FEES	59,714	13,725	10,539	21,500	30,000	15,000	15,000	15,000
10-34-140000	BUILDING INSPECTION FEES	0	0	0	0	500	500	500	500
10-34-150000	SALE OF MAPS & PUBLICATIONS	6	0		10	50	50	50	50
10-34-310000	STREET EXCAVATION FEES	4,005	3,665	1,410	3,000	4,800	4,000	4,000	4,000
10-34-330000	STREET LIGHTING FEES	4,147	4,094	2,077	4,140	4,140	4,140	4,140	4,140
10-34-340000	STREET SIGN CHARGES	116	0	234	234	50	50	50	50
10-34-730000	PARK RENTAL FEES	6,330	3,300	1,560	2,000	3,000	3,300	6,400	6,400
10-34-740000	PARK USE AGREEMENTS	2,465	1,633	3,585	4,000	3,000	1,800	2,500	2,500
10-34-800000	CEMETERY LOTS -E	2,600	700	0	0	600	600	600	600
10-34-810000	CEMETERY LOTS -ABCD	1,800	11,780	500	1,100	1,200	1,200	1,200	1,200
10-34-830000	GRAVE OPENING CHARGES	29,000	27,400	14,600	30,000	28,000	28,000	28,000	28,000
10-34-900000	ADMIN OVERHEAD - WATER FUND	475,046	606,174	437,179	955,005	955,005	1,055,002	1,023,201	1,014,701
10-34-910000	ADMIN OVERHEAD - SANITATION	92,522	124,763	74,091	161,083	161,083	174,356	156,512	159,062
10-34-920000	ADMIN OVERHEAD - DRAINAGE/DRAINA(	256,894	317,281	229,418	490,810	490,810	548,752	521,404	520,728
10-34-940000	ADMIN OVERHEAD - RDA/RDA Board	124,531	186,011	101,100	214,425	214,425	271,022	267,937	272,607
10-34-950000	ADMIN OVERHEAD - TELECOMM	5,737	5,283	0	10,000	10,000	10,000	10,000	10,000
	TOTAL CHARGES FOR SERVICES	1,099,649	1,319,043	876,293	1,920,307	1,924,663	2,135,771	2,059,495	2,057,539
	FINES AND FORFEITURES								
10-35-110000	CITY COURT	395,121	378,619	140,677	410,000	400,000	428,000	428,000	428,000
	TOTAL COURT	395,121	378,619	140,677	410,000	400,000	428,000	428,000	428,000

	MISCELLANEOUS REVENUE								
10-36-100000	BANK & INVEST INTEREST	36,290	24,541	5,287	11,000	14,000	36,300	36,300	36,300
10-36-230000	BANKING/ZIONS BANK INT INCOME	2,500	2,102	1,500	3,000	3,000	2,500	2,500	2,500
10-36-250000	RENTAL CHARGES/COMMUNITY CNT	534	0	0	0	500	500	500	500
10-36-270000	SECURITY DEPOSIT/COMM. CENTER	20	0	0	0	50	50	50	50
10-36-280000	MUSEUM/GARDEN FEES	1,240	0	0	1,000	1,000	1,000	1,000	1,000
10-36-290000	SALE OF HISTORIC MAPS	14	0	10	20	50	50	50	50
10-36-350000	YOUTH COUNCIL	0	4,202	0	0	0	4,000	4,000	4,000
10-36-400000	SALE OF FIXED ASSETS	20,873	20,410	14,506	151,000	45,000	20,000	20,000	20,000
10-36-800000	WITNESS FEES	352	333	130	130	500	350	350	350
10-36-810000	INSURANCE REIMBURSEMENT	0	0	33,069	33,069	0	1,000	1,000	1,000
10-36-820000	CITIZEN'S ACADEMY	4,600	1,000	0	0	400	1,000	1,000	1,000
10-36-840000	SEX OFFENDER REGISTRY FEE	50	50	25	50	50	50	50	50
10-36-900000	SUNDRY REVENUE	29,266	14,758	6,434	7,000	12,000	15,000	15,000	15,000
	TOTAL MISCELLANEOUS	95,739	67,396	60,961	206,269	76,550	81,800	81,800	81,800
	CONTRIBUTIONS AND TRANSFERS								
10-39-200000	TRANSFER FROM OTHER FUNDS	54,810	28,546	37,686	48,040	48,040	50,590	50,830	51,530
10-38-200000	TRANSFER FROM RDA - HOMELESS	15,768	32,436	16,668	33,336	33,336	35,000	35,000	35,000
10-38-430000	CONTRIBUTIONS - HISTORIC SITES	501	0	0	0	10,000	10,000	10,000	10,000
10-38-700000	CONTRIBUTIONS/PREPAREDNESS FAIR	12,365	0	0	0	4,000	100	100	100
10-38-470000	POLICE CONTRIBUTIONS	13,240	19,516	1,100	11,000	15,000	7,500	7,500	7,500
10-38-450000	MISC. CONTRIBUTIONS/GRANTS	1,133	1,630	400	52,000	42,500	42,000	42,000	42,000
	TOTAL CONTRIBUTIONS & TRANS	97,817	82,128	55,854	144,376	152,876	145,190	145,430	146,130
	TOTAL REVENUES & CONTRIB.	8,911,700	9,654,491	6,273,545	11,561,867	11,324,240	10,735,531	10,659,495	10,878,239
	USE OF RESTRICTED FUND BALANCE				18,105	18,105	18,105	18,105	18,105
	USE OF UNRESTRICTED FUND BALANCE				0	38,288	0	0	0
	BOND PROCEEDS								
	TOTAL FUND BALANCE /OTHER	0	0	N/A	18,105	56,393	18,105	18,105	18,105
	TOTAL GENERAL FUND REVENUE	8,911,700	9,654,491	6,273,545	11,598,077	11,380,633	10,753,636	10,677,600	10,896,344

GOVERNMENT SERVICES
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
CITY COUNCIL AND MAYOR								
PERSONNEL SERVICES	$56,362	$56,774	$29,675	$58,031	$58,031	$58,371	$58,371	$58,371
OPERATING EXPENDITURES	$65,381	$26,374	$9,354	$36,842	$42,992	$67,355	$57,573	$67,573
TOTAL	$121,743	$83,148	$39,029	$94,873	$101,023	$125,726	$115,944	$125,944
JUSTICE COURT								
PERSONNEL SERVICES	$215,253	$212,918	$96,077	$189,895	$189,895	$215,900	$213,700	$213,700
OPERATING EXPENDITURES	$7,178	$5,590	$1,349	$8,300	$8,950	$9,750	$9,750	$9,750
CAPITAL OUTLAY	$0	$0	$0	$0	$0	$10,000	$8,000	$8,000
TOTAL	$222,432	$218,508	$97,426	$198,195	$198,845	$235,650	$231,450	$231,450
ADMINISTRATION								
PERSONNEL SERVICES	$229,807	$324,164	$204,559	$398,633	$398,633	$581,800	$599,700	$599,700
OPERATING EXPENDITURES	$17,278	$19,283	$18,522	$39,150	$45,700	$53,250	$53,400	$53,400
EMPLOYEE RECOG./ASST.	$18,699	$19,936	$1,562	$13,200	$20,600	$25,000	$25,000	$25,000
NEWSLETTER	$10,136	$9,443	$2,129	$8,200	$8,500	$10,000	$10,000	$10,000
CAPITAL OUTLAY	$47,513	$52,151	$19,450	$52,500	$59,000	$59,000	$59,000	$59,000
TOTAL	$323,433	$424,977	$246,222	$511,683	$532,433	$729,050	$747,100	$747,100
ATTORNEY								
PERSONNEL SERVICES	$153,982	$158,484	$84,988	$172,215	$169,219	$183,600	$183,000	$183,000
OPERATING EXPENDITURES	$6,002	$5,744	$1,924	$7,480	$8,950	$14,800	$14,800	$14,800
CAPITAL OUTLAY	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL	$159,984	$164,228	$86,912	$179,695	$178,169	$198,400	$197,800	$197,800
FINANCE								
PERSONNEL SERVICES	$321,489	$254,291	$127,727	$280,111	$301,058	$399,400	$384,800	$384,900
OPERATING EXPENDITURES	$103,457	$123,039	$58,299	$96,878	$103,150	$97,500	$99,800	$99,800
INSURANCE	$29,582	$25,916	$12,919	$38,000	$33,000	$50,000	$50,000	$50,000
TOTAL	$454,527	$403,246	$198,944	$414,989	$437,208	$546,900	$534,600	$534,700
LEGAL SERVICES								
OPERATING EXPENDITURES	$28,835	$20,158	$11,954	$24,000	$25,500	$26,000	$26,000	$26,000
EMERGENCY MANAGEMENT								
OPERATING EXPENDITURES	$15,331	$337,532	$438,747	$1,709,266	$1,546,480	$12,363	$12,363	$12,363
CAPITAL OUTLAY	$1,878	$2,476	$0	$557	$0	$3,000	$2,500	$2,500
TOTAL	$17,209	$340,008	$438,747	$1,709,823	$1,546,480	$15,363	$14,863	$14,863
ELECTIONS								
OPERATING EXPENDITURES	$9,202	$14,467	$0	$0	$0	$17,200	$17,200	$17,200
TOTAL	$9,202	$14,467	$0	$0	$0	$17,200	$17,200	$17,200
YOUTH COUNCIL								
OPERATING EXPENDITURES	$9,221	$10,516	$0	$160	$200	$9,000	$9,000	$9,000
WHITAKER HOME								
PERSONNEL SERVICES	$28,594	$27,456	$15,758	$30,709	$30,659	$32,100	$32,100	$32,100
OPERATING EXPENDITURES	$6,313	$5,617	$2,075	$4,618	$5,260	$5,878	$6,378	$6,378
CAPITAL OUTLAY	$0	$0	$3,645	$2,780	$4,200	$1,000	$1,000	$1,000
TOTAL	$34,907	$33,073	$21,478	$38,107	$40,119	$38,978	$39,478	$39,478
Total General Government	$1,381,494	$1,712,329	$1,140,712	$3,171,525	$3,059,977	$1,942,267	$1,933,435	$1,943,535

CITY COUNCIL AND MAYOR
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4111-120	WAGES - ELECTED	51,900	51,900	26,550	51,900	51,900	51,900	51,900	51,900
10-4111-130	FICA	2,869	2,869	1,977	3,971	3,971	3,971	3,971	3,971
10-4111-135	WORKERS COMPENSATION	394	805	532	960	960	1,300	1,300	1,300
10-4111-141	TRANSPORTATION ALLOWANCE	1,200	1,200	615	1,200	1,200	1,200	1,200	1,200
	SUBTOTAL	56,362	56,774	29,675	58,031	58,031	58,371	58,371	58,371
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4111-200	UNIFORM PURCHASE	0	0	0	750	750	750	750	750
10-4111-210	ULC&T	11477	12,067	6,034	12,067	12,067	12,430	12,648	12,648
10-4111-211	CHAMBER OF COMMERCE MEMBERS	575	0	575	575	575	575	575	575
10-4111-217	CONTRIBUTIONS	1000	1,000	0	500	500	500	500	500
10-4111-231	MAYOR LUNCHEON	362	534	0	0	600	600	600	600
10-4111-240	OFFICE SUPPLIES	0	126	0	100	100	100	100	100
10-4111-310	RECORDER SERVICES	5,896	2,410	1,438	3,400	6,000	6,000	6,000	6,000
10-4111-314	COMPUTER SERVICES	4200	4,200	0	0	0	0	0	0
10-4111-330	EDUCATION & TRAINING	2,355	1,270	348	2,400	4,000	4,000	4,000	4,000
10-4111-480	MISC SUPPLIES	263	120	0	300	300	300	300	300
10-4111-481	MEETING MEALS	2,536	894	56	200	2,100	2,100	2,100	2,100
10-4111-510	SPECIAL CONTINGENCY	36,717	3,754	903	17,300	16,000	40,000	30,000	40,000
	SUBTOTAL	65,381	26,374	9,354	36,842	42,992	67,355	57,573	67,573
	TOTAL CITY COUNCIL	121,743	83,148	39,029	94,873	101,023	125,726	115,944	125,944

JUSTICE COURT
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4120-110	SALARY AND WAGES	88,372	83,994	34,812	48,944	48,944	55,500	55,500	55,500
10-4120-111	OVERTIME PAY	1,706	1,616	1,003	1,500	1,500	1,500	1,500	1,500
10-4120-120	WAGES - JUDGE	47,238	49,190	26,356	51,631	51,631	53,600	53,600	53,600
10-4120-122	PART-TIME - OFFICE	19,314	18,967	6,987	34,302	34,302	45,800	45,800	45,800
10-4120-130	FICA	10,100	11,220	4,188	10,560	10,560	12,000	12,000	12,000
10-4120-131	RETIREMENT	27,525	27,538	11,490	19,227	19,227	20,500	20,500	20,500
10-4120-132	MEDICAL INSURANCE	20,095	18,784	10,511	22,200	22,200	25,000	22,800	22,800
10-4120-134	LONG TERM DISABILITY	337	375	111	231	231	300	300	300
10-4120-135	WORKERS COMPENSATION	567	1,234	619	1,300	1,300	1,700	1,700	1,700
	SUBTOTAL	215,253	212,918	96,077	189,895	189,895	215,900	213,700	213,700
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4120-210	BOOKS & SUBSCRIPTIONS	811	519	0	800	800	600	600	600
10-4120-230	MILEAGE REIMBURSEMENT	44	48	0	50	100	100	100	100
10-4120-240	OFFICE SUPPLIES	799	835	357	500	500	800	800	800
10-4120-241	PRINTING	258	413	0	200	500	500	500	500
10-4120-242	POSTAGE	1,665	1,680	459	1,000	1,800	1,800	1,800	1,800
10-4120-260	EQUIP MAINT SUPPLIES	0	0	0	50	100	100	100	100
10-4120-262	COPIER SUPPLIES	718	0	0	150	800	800	800	800
10-4120-311	PROFESSIONAL SERVICES	602	662	275	500	700	700	700	700
10-4120-314	COMPUTER SERVICES	0	0	0	2,000	500	500	500	500
10-4120-330	EDUCATION & TRAINING	652	150	0	700	0	700	700	700
10-4120-350	CONTRACT SERVICES - JUDGES	0	300	0	500	500	500	500	500
10-4120-480	MISC SUPPLIES	265	207	99	300	300	300	300	300
10-4120-621	WITNESS FEES	56	37	0	250	250	250	250	250
10-4120-623	JURY FEES	0	0	0	300	300	300	300	300
10-4120-624	INTERPRETOR	1,308	739	159	1,000	1,800	1,800	1,800	1,800
	SUBTOTAL	7,178	5,590	1,349	8,300	8,950	9,750	9,750	9,750
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4120-740	CAPITAL EQUIPMENT	0	0	0	0	0	10,000	8,000	8,000
	SUBTOTAL	0	0	0	0	0	10,000	8,000	8,000
ITEM 1	Computer Equipment						2,000	0	0
ITEM 2	Copier						8,000	8,000	8,000
	TOTAL JUSTICE COURT	222,432	218,508	97,426	198,195	198,845	235,650	231,450	231,450

ADMINISTRATION
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4130-110	SALARY AND WAGES	161,864	223,733	141,885	259,314	259,314	356,900	379,000	379,000
10-4130-111	OVERTIME PAY	0	0	0	500	500	5,500	5,500	5,500
10-4130-130	FICA	13,754	20,870	10,673	19,876	19,876	27,300	29,000	29,000
10-4130-131	RETIREMENT	28,704	37,629	25,663	48,753	48,753	66,800	70,900	70,900
10-4130-132	MEDICAL INSURANCE	18,320	32,909	22,115	61,965	61,965	115,800	105,800	105,800
10-4130-134	LONG TERM DISABILITY	756	701	358	1,225	1,225	300	300	300
10-4130-135	WORKERS COMPENSATION	1,971	4,164	2,348	4,000	4,000	4,000	4,000	4,000
10-4130-141	TRANSPORTATION ALLOWANCE	4,438	4,158	1,518	3,000	3,000	5,200	5,200	5,200
	SUBTOTAL	229,807	324,164	204,559	398,633	398,633	581,800	599,700	599,700
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4130-200	UNIFORM PURCHASE	0	0	0	0	0	1,000	1,000	1,000
10-4130-210	BOOKS AND SUBSCRIPTIONS	60	0	25	800	800	800	800	800
10-4130-211	MEMBERSHIPS	855	2,315	1,040	2,000	3,000	3,000	3,000	3,000
10-4130-213	MUNICIPAL CODE SERVICES	1,500	1,500	0	1,500	1,500	1,500	1,500	1,500
10-4130-220	PUBLIC NOTICES	779	771	579	1,500	1,000	500	500	500
10-4130-230	MILEAGE REIMBURSEMENT	203	54	6	50	600	600	600	600
10-4130-240	OFFICE SUPPLIES	1,096	1,126	519	1,000	1,500	1,300	1,300	1,300
10-4130-241	PRINTING	565	199	250	400	700	700	700	700
10-4130-242	POSTAGE	983	651	75	250	1,000	1,050	1,050	1,050
10-4130-260	EQUIP MAINT & SUPPLIES	2,549	900	0	2,550	3,000	2,550	2,700	2,700
10-4130-264	IT SERVICES AND LICENSES	0	0	0	0	0	10,000	10,000	10,000
10-4130-280	TELEPHONE - AIR TIME	292	396	53	1,200	1,500	3,000	3,000	3,000
10-4130-310	PROFESSIONAL SERVICES	1,334	5,644	11,550	16,500	17,600	13,000	13,000	13,000
10-4130-330	EDUCATION AND TRAINING	6,831	4,370	3,233	10,000	12,000	15,000	15,000	15,000
10-4130-480	MISC SUPPLIES	232	1,357	1,192	1,400	1,500	250	250	250
	SUBTOTAL	17,278	19,283	18,522	39,150	45,700	53,250	53,400	53,400
	EMPLOYEE RECOGNITION/ASSISTANCE								
10-4130-481	EMPLOYEE - TUITION	2,779	4,000	0	4,000	5,000	6,000	6,000	6,000
10-4130-482	EMPLOYEE - SERVICE	3,347	4,703	1,562	2,600	3,000	4,700	4,700	4,700
10-4130-483	EMPLOYEE - DINNER	5,112	6,005	0	6,600	6,600	6,500	6,500	6,500
10-4130-484	EMPLOYEE - FITNESS BENEFIT	3,903	4,151	0	0	6,000	4,200	4,200	4,200
10-4130-487	VOLUNTEER SERVICE RECOGNITION	3,558	1,077	0	0	0	3,600	3,600	3,600
	SUBTOTAL	18,699	19,936	1,562	13,200	20,600	25,000	25,000	25,000
	CITY NEWSLETTER								
10-4130-485	NEWSLETTER - POSTAGE	2,990	3,102	982	3,000	2,500	3,200	3,200	3,200
10-4130-486	NEWSLETTER - PRINTING	7,146	6,341	1,148	5,200	6,000	6,800	6,800	6,800
	SUBTOTAL NEWSLETTERS	10,136	9,443	2,129	8,200	8,500	10,000	10,000	10,000
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4130-740	CAPITAL EQUIPMENT	21,558	23,431	78	2,000	7,000	8,000	8,000	8,000
10-4130-745	NETWORK EQUIPMENT/LICENSING	21,900	23,554	4,035	21,500	23,000	40,000	40,000	40,000
10-4130-755	WEBSITE	4,055	5,166	15,337	29,000	29,000	11,000	11,000	11,000
	SUBTOTAL	47,513	52,151	19,450	52,500	59,000	59,000	59,000	59,000
	ITEM 1								
	ITEM 2								
	ITEM 3								
	TOTAL EXECUTIVE	323,433	424,977	246,222	511,683	532,433	729,050	747,100	747,100

ATTORNEY
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4135-110	SALARY AND WAGES	117,283	117,642	64,114	127,000	124,004	133,600	133,600	133,600
10-4135-120	PART TIME WAGES	0	0		-	-	-	-	-
10-4135-130	FICA	9,006	10,276	4,739	9,486	9,486	10,300	10,500	10,500
10-4135-131	RETIREMENT	19,364	20,698	11,495	23,591	23,591	25,200	25,200	25,200
10-4135-132	MEDICAL INSURANCE	6,610	7,132	4,269	8,850	8,850	10,300	9,500	9,500
10-4135-134	LONG TERM DISABILITY	497	527	269	588	588	700	700	700
10-4135-135	WORKERS COMPENSATION	1,222	2,209	102	2,700	2,700	3,500	3,500	3,500
	SUBTOTAL	153,982	158,484	84,988	172,215	169,219	183,600	183,000	183,000
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4135-210	BOOKS AND SUBSCRIPTIONS	4,676	4,770	1,194	5,000	5,000	5,000	5,000	5,000
10-4135-211	MEMBERSHIPS	0	15	434	500	700	1,000	1,000	1,000
10-4135-215	FILING FEES & COSTS	0	0	0	10	100	100	100	100
10-4135-230	MILEAGE REIMBURSEMENT	183	51	0	-	300	300	300	300
10-4135-240	OFFICE SUPPLIES	188	4	17	150	300	300	300	300
10-4135-264	IT SERVICES AND LICENSES	0	0	0	-	-	100	100	100
10-4135-280	TELEPHONE AIR TIME		0	0	70	500	500	500	500
10-4135-330	EDUCATION & TRAINING	884	684	219	1,500	1,800	2,000	2,000	2,000
10-4135-480	MISC SUPPLIES	70	98	60	250	250	500	500	500
10-4135-650	SPEC. PROJECT	0	122	0	-	-	5,000	5,000	5,000
	SUBTOTAL	6,002	5,744	1,924	7,480	8,950	14,800	14,800	14,800
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL/SPECIAL PROJECTS								
10-4135-740	CAPITAL EQUIPMENT	0	0	0	0	0	0	0	0
	ITEM 1						0	0	0
	ITEM 2					0	0	0	0
	TOTAL CITY ATTORNEY	159,984	164,228	86,912	179,695	178,169	198,400	197,800	197,800

FINANCE
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4140-110	SALARY AND WAGES	184,503	132,172	67,572	150,000	158,751	206,500	200,100	231,400
10-4140-111	OVERTIME PAY	1,374	0	196	1,500	2,000	1,500	1,500	2,000
10-4140-120	PART TIME WAGES	37,838	45,637	21,786	43,000	48,886	56,200	56,200	-
10-4140-130	FICA	16,678	14,994	6,542	15,000	16,000	17,800	17,300	17,700
10-4140-131	RETIREMENT	41,150	34,628	16,374	26,700	34,500	39,400	38,300	39,000
10-4140-132	MEDICAL INSURANCE	39,118	26,052	14,847	43,000	40,000	76,400	69,800	93,100
10-4140-134	LONG TERM DISABILITY	641	491	255	561	561	1,000	1,000	1,100
10-4140-135	WORKERS COMPENSATION	187	317	155	350	360	600	600	600
	SUBTOTAL	321,489	254,291	127,727	280,111	301,058	399,400	384,800	384,900
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4140-200	UNIFORM PURCHASE	0	536.19	0	1,000	1,000	1,000	1,000	1,000
10-4140-210	BOOKS & SUBSCRIPTION	171	0	0	-	-	150	150	150
10-4140-211	MEMBERSHIPS	1,461	1,978	199	900	900	900	1,500	1,500
10-4140-220	PUBLIC NOTICES	87	0	0	-	100	100	100	100
10-4140-230	MILEAGE REIMBURSEMENT	547	691	0	100	500	500	500	500
10-4140-240	OFFICE SUPPLIES	2,894	1,776	841	1,700	3,000	1,500	2,000	2,000
10-4140-241	PRINTING	1,697	1,996	0	750	2,600	2,600	2,600	2,600
10-4140-242	POSTAGE	1,987	2,830	574	2,400	2,200	2,400	2,400	2,400
10-4140-255	VEHICLE MAINTENANCE	511	0	0	-	-	-	-	-
10-4140-260	EQUIP MAINT & SUPPLIES	126	60	0	150	250	250	250	250
10-4140-262	COPIER SUPPLIES	1,444	1,348	1,166	1,400	1,800	1,800	1,800	1,800
10-4140-264	IT SERVICES AND LICENSES	79	154	347	400	600	600	600	600
10-4140-280	TELEPHONE - AIR TIME	770	547	430	900	1,000	1,000	1,000	1,000
10-4140-282	AIR TIME - LAPTOPS	0	0	0	-	-	-	-	-
10-4140-290	GASOLINE	0	0	0	-	-	-	-	-
10-4140-310	PROFESSIONAL SERVICES	642	1,450	85	1,400	1,400	600	1,400	1,400
10-4140-311	RETIREMENT ADMINISTRATION FEES	973	612	570	1,500	2,600	2,600	1,500	1,500
10-4140-312	FINANCE SERVICES - CONTRACT	48,000	48,000	28,180	34,000	30,000	30,000	28,000	28,000
10-4140-313	AUDIT SERVICES	18,110	19,800	16,500	16,500	20,500	20,500	20,500	20,500
10-4140-314	COMPUTER SERVICES	4,578	4,578	2,289	4,578	4,500	4,500	4,600	4,600
10-4140-315	FLEX SPENDING SERVICES	1,260	1,260	500	1,200	1,200	1,200	1,200	1,200
10-4140-320	BANKING SERVICES	10,331	12,433	6,184	15,000	15,000	12,000	15,000	15,000
10-4140-327	CASH BOND INTEREST EXPENSE	2,391	19,444	0	5,000	5,000	5,000	5,000	5,000
10-4140-330	EDUCATION AND TRAINING	4,145	2,841	0	7,500	7,500	7,500	7,500	7,500
10-4140-480	MISC SUPPLIES	1,253	1,238	434	1,500	1,500	800	1,200	1,200
	SUBTOTAL	103,457	123,039	58,299	96,878	103,150	97,500	99,800	99,800
	MANAGEMENT CONTROL ACCOUNTS - INSURANCE								
10-4140-511	INSURANCE - LIABILITY	28,508	24,716	12,919	28,000	28,000	40,000	40,000	40,000
10-4140-515	LIABILITY DEDUCTIBLE	1,074	1,200	0	10,000	5,000	10,000	10,000	10,000
	SUBTOTAL	29,582	25,916	12,919	38,000	33,000	50,000	50,000	50,000
	TOTAL FINANCE	454,527	403,246	198,944	414,989	437,208	546,900	534,600	534,700

ATTORNEY SERVICES
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	MANAGEMENT CONTROL ACCOUNTS								
10-4145-315	PROSECUTING ATTORNEY SERVICE	22,545	16,955	8,367	17,000	20,000	20,000	20,000	20,000
10-4145-320	PUBLIC DEFENDER SERVICES	6,290	3,203	3,587	7,000	5,500	6,000	6,000	6,000
		28,835	20,158	11,954	24,000	25,500	26,000	26,000	26,000

EMERGENCY MANAGEMENT
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	NOTES
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4150-261	EQUIPMENT MAINTENANCE	199	0	0	0	850	250	250	250
10-4150-320	PREP FAIR	11,176	350	0	275	8,113	8,113	8,113	8,113
10-4150-323	WINDSTORM CLEANUP		0	26,676	60,000	10,000	0	0	0
10-4150-325	WINDSTORM REPAIRS		0	91,058	130,000	10,000	0	0	0
10-4150-326	CRF ELIGIBLE EXPENSES	0	334,852	319,470	1,514,517	1,514,517	0	0	0
10-4150-330	EDUCATION & TRAINING	1,255	1,102	11	2,526	1,500	1,500	1,500	1,500
10-4150-350	CITIZEN CORP	0	191	239	500	500	500	500	500
10-4150-480	MISC SUPPLIES	2,701	1,037	1,293	1,448	1,000	2,000	2,000	2,000
	SUBTOTAL	15,331	337,532	438,747	1,709,266	1,546,480	12,363	12,363	12,363
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4150-740	CAPITAL EQUIPMENT/PROJECTS	1,878	2,476	0	557	0	3,000	2,500	2,500
	SUBTOTAL	1,878	2,476	0	557	0	3,000	2,500	2,500
ITEM 1	APX Public Safety Radio Base Station					0	2,500	2,500	2,500
ITEM 2	VHF Neighborhood Network Radio					0	500	0	0
ITEM 3						0	0	0	0
	TOTAL EMERGENCY MANAGEMENT	17,209	340,008	438,747	1,709,823	1,546,480	15,363	14,863	14,863

ELECTIONS
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS								
10-4170-220	PUBLIC NOTICES	0	0	0	0	0			
10-4170-480	SPECIAL DEPT. SUPPLIES - MISC.	9,202	14,467	0	0	0	17,200	17,200	17,200
	SUBTOTAL	9,202	14,467	0	0	0	17,200	17,200	17,200
	TOTAL ELECTIONS	9,202	14,467	0	0	0	17,200	17,200	17,200

YOUTH COUNCIL
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS								
10-4180-480	MISCELLANEOUS	9,202	10,516	0	60	100	6,400	6,400	6,400
10-4180-486	SPRING CONFERENCE	0		0	0	0	2,500	2,500	2,500
10-4180-640	4TH OF JULY	0		0	100	100	100	100	100
10-4180-645	EASTER EGG HUNT	19		0	0	0	0	0	0
	TOTAL YOUTH COUNCIL	9,221	10,516	0	160	200	9,000	9,000	9,000

WHITAKER
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4190-120	PART TIME WAGES	22,919	21,653	12,358	24,061	24,061	25,000	25,000	25,000
10-4190-130	FICA	1,679	1,731	924	1,841	1,841	2,000	2,000	2,000
10-4190-131	RETIREMENT	3,744	3,642	2,224	4,357	4,357	4,600	4,600	4,600
10-4190-135	WORKERS COMPENSATION	252	430	252	450	400	500	500	500
	SUBTOTAL	28,594	27,456	15,758	30,709	30,659	32,100	32,100	32,100
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4190-211	MEMBERSHIPS	123	240	198	398	360	978	978	978
10-4190-240	OFFICE SUPPLIES	530	466	474	650	650	650	650	650
10-4190-310	RECORDING SERVICES	432	267	44	120	800	800	800	800
10-4190-312	PUBLIC RELATIONS	2,637	3,034	516	1,000	1,000	1,000	1,000	1,000
10-4190-316	EVENT SUPPLIES	1,744	1,416	753	1,000	1,000	1,000	1,500	1,500
10-4190-330	EDUCATION & TRAINING	390	0	0	950	950	950	950	950
10-4190-368	KEEPING THE STORIES ALIVE	0	0	0	300	300	300	300	300
10-4190-480	MISC SUPPLIES	457	194	90	200	200	200	200	200
10-4190-487	VOLUNTEER RECOGNITION	0	0	0	-	-	-	-	-
	SUBTOTAL	6,313	5,617	2,075	4,618	5,260	5,878	6,378	6,378
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL/SPECIAL PROJECTS								
10-4135-740	CAPITAL EQUIPMENT/PROJECTS	0	0	3,645	2,780	4,200	1,000	1,000	1,000
ITEM 1	Archive Project					4,200	1,000	1,000	1,000
ITEM 2						0			
	TOTAL CITY WHITAKER	34,907	33,073	21,478	38,107	40,119	38,978	39,478	39,478

FIRE
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	**2021/2022** DEPARTMENT REQUEST	**2021/2022** TENTATIVE	**2021/2022** ADOPTED
SOUTH DAVIS FIRE	$894,321	$893,720	$459,750	$919,500	$919,500	$1,068,870	$1,068,870	$1,068,870
Total Fire	$894,321	$893,720	$459,750	$919,500	$919,500	$1,068,870	$1,068,870	$1,068,870

FIRE SERVICES
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	**2021/2022** DEPARTMENT REQUEST	**2021/2022** TENTATIVE	**2021/2022** ADOPTED
	MANAGEMENT CONTROL ACCOUNTS								
10-4155-323.0	SOUTH DAVIS FIRE DIST. ASSMT	894,321	893,720	459,750	919,500	919,500	1,068,870	1,068,870	1,068,870
	TOTAL FIRE	894,321	893,720	459,750	919,500	919,500	1,068,870	1,068,870	1,068,870

Police
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
POLICE								
PERSONNEL SERVICES	$2,120,166	$2,001,830	$1,243,257	$2,468,825	$2,513,982	$2,838,600	$2,610,400	$2,615,500
OPERATING EXPENDITURES	$264,045	$257,558	$156,324	$291,053	$304,248	$318,604	$318,604	$450,604
CAPITAL OUTLAY	$159,893	$219,681	$12,915	$151,144	$173,900	$267,800	$330,674	$285,200
SUB TOTAL	$2,544,104	$2,479,069	$1,412,496	$2,911,022	$2,992,130	$3,425,004	$3,259,678	$3,351,304
BEER TAX								
PERSONNEL SERVICES	$1,669	$637	$731	$2,190	$7,300	$7,350	$7,350	$7,350
OPERATING EXPENDITURES	$774	$1,034	$635	$1,185	$2,000	$2,000	$2,000	$2,000
CAPITAL OUTLAY	$13,181	$8,972	$0	$0	$10,000	$10,000	$10,000	$10,000
SUB TOTAL	$15,625	$10,643	$1,366	$3,375	$19,300	$19,350	$19,350	$19,350
SCHOOL CROSSING								
PERSONNEL SERVICES	$50,616	$51,327	$21,264	$47,400	$67,158	$68,250	$68,250	$68,250
OPERATING EXPENDITURES	$1,672	$1,768	$479	$1,660	$2,000	$2,000	$2,000	$2,000
CAPITAL OUTLAY	$0	$1,668	$0	$0	$0	$0	$0	$0
SUB TOTAL	$52,288	$54,763	$21,743	$49,060	$69,158	$70,250	$70,250	$70,250
D.A.R.E. PROGRAM								
PERSONNEL SERVICES	$91,570	$68,334	$32,409	$68,342	$80,156	$89,100	$88,300	$88,300
OPERATING EXPENDITURES	$4,463	$3,308	$1,409	$2,300	$5,000	$5,000	$5,000	$5,000
CAPITAL OUTLAY	$0	$0	$0	$0	$0	$0	$0	$0
SUB TOTAL	$96,033	$71,642	$33,818	$70,642	$85,156	$94,100	$93,300	$93,300
K-9 PROGRAM								
OPERATING EXPENDITURES	$2,307	$2,779	$2,260	$4,500	$5,000	$5,500	$5,500	$5,500
CAPITAL OUTLAY	$0	$0	$0	$0	$0	$0	$0	$0
SUB TOTAL	$2,307	$2,779	$2,260	$4,500	$5,000	$5,500	$5,500	$5,500
ANIMAL CONTROL								
OPERATING EXPENDITURES	$32,607	$42,451	$17,397	$47,728	$40,000	$51,350	$51,350	$51,350
CAPITAL OUTLAY	$0	$0	$0	$0	$0	$0	$0	$0
SUB TOTAL	$32,607	$42,451	$17,397	$47,728	$40,000	$51,350	$51,350	$51,350
TOTAL POLICE	$2,742,965	$2,661,346	$1,489,080	$3,086,327	$3,210,744	$3,665,554	$3,499,428	$3,591,054

POLICE DEPARTMENT
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4210-110.0	SALARY AND WAGES	1,235,132	1,142,143	745,608	1,421,154	1,415,201	1,553,300	1,459,200	1,461,900
10-4210-111.0	OVERTIME PAY	18,063	7,745	14,233	11,000	16,000	27,000	27,000	27,000
10-4210-112.0	OVERTIME PAY - WARRANT SERVICE	9,775	8,575	0	0	0	10,300	8,000	8,000
10-4210-115.0	OVERTIME PAY-BAILIFF	9,578	6,641	0	0	0	11,300	11,300	11,300
10-4210-120.0	PART TIME WAGES - RESERVES	14,336	642	2,957	0	0	0	0	0
10-4210-122.0	PART TIME WAGES - OFFICE	52,754	19,305	0	6,770	10,000	0	0	0
10-4210-130.0	FICA	102,570	104,924	56,291	114,000	116,600	118,900	111,700	111,900
10-4210-131.0	RETIREMENT	381,582	360,612	222,921	431,205	471,485	520,900	489,400	491,600
10-4210-132.0	MEDICAL INSURANCE	276,505	315,132	183,881	446,560	446,560	549,600	456,900	456,900
10-4210-134.0	LONG TERM DISABILITY	5,327	5,966	3,211	7,136	7,136	7,600	7,200	7,200
10-4210-135.0	WORKERS COMPENSATION	12,834	28,340	14,155	29,000	29,000	37,700	37,700	37,700
10-4210-137.0	LINE OF DUTY	1,710	1,805	0	2,000	2,000	2,000	2,000	2,000
	SUBTOTAL	2,120,166	2,001,830	1,243,257	2,468,825	2,513,982	2,838,600	2,610,400	2,615,500
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4210-200.0	UNIFORM PURCHASE	16,944	11,872	7,084	11,600	11,600	11,600	11,600	11,600
10-4210-201.0	UNIFORM CLEANING	2,329	1,015	100	1,100	3,000	2,000	2,000	2,000
10-4210-210.0	BOOKS & SUBSCRIPTIONS	241	35	158	170	200	200	200	200
10-4210-211.0	MEMBERSHIPS	1,398	982	0	967	1,000	1,000	1,000	1,000
10-4210-220.0	PUBLIC NOTICES	110	74	0	920	1,000	500	500	500
10-4210-235.0	EVIDENCE SUPPLIES	1,877	1,384	546	1,250	2,200	2,200	2,200	2,200
10-4210-240.0	OFFICE SUPPLIES	5,138	3,821	1,385	3,500	5,700	5,000	5,000	5,000
10-4210-241.0	PRINTING	3,136	3,593	1,902	3,500	3,500	4,250	4,250	4,250
10-4210-242.0	POSTAGE	928	546	247	400	1,300	1,300	1,300	1,300
10-4210-250.0	VEHICLE MAINTENANCE - MISC	9,844	15,234	10,641	23,000	23,000	18,000	18,000	18,000
10-4210-251.0	BICYCLE MAINTENANCE	200	0	0	0	300	300	300	300
10-4210-252.0	VEHICLE MAINTENANCE - BODY RPR	1,000	1,001	0	1,500	4,000	4,000	4,000	4,000
10-4210-253.0	VEHICLE MAINTENANCE - TIRES	5,013	6,242	4,646	6,600	7,000	7,000	7,000	7,000
10-4210-254.0	VEHICLE MAINT - PREVENTATIVE	8,000	10,084	5,406	9,500	9,500	11,500	11,500	11,500
10-4210-255.0	RADAR MAINTENANCE	1,213	1,452	1,000	1,125	1,000	1,000	1,000	1,000
10-4210-260.0	EQUIPMENT MAINTENANCE	8,468	3,351	7,717	10,000	8,000	10,000	10,000	10,000
10-4210-261.0	RADIO MAINTENANCE	1,130	741	2,234	2,630	3,500	3,500	3,500	3,500
10-4210-262.0	COPIER MAINTENANCE	120	243	70	300	550	550	550	550
10-4210-263.0	OFFICE EQUIPMENT MAINTENANCE	449	0	152	355	500	500	500	500
10-4210-264.0	IT SERVICES AND LICENSES	3,366	3,995	4,000	5,000	5,000	5,000	5,000	5,000
10-4210-265.0	CRIME PREVENTION	430	764	732	733	1,000	6,800	6,800	6,800
10-4210-267.0	WEAPONS MAINTENANCE	340	539	98	500	500	3,625	3,625	3,625
10-4210-270.0	TELEPHONE - AIR TIME	9,778	10,030	3,779	9,339	11,500	11,500	11,500	11,500
10-4210-282.0	AIR TIME - LAPTOPS	9,547	10,479	4,404	10,376	10,550	10,550	10,550	10,550
10-4210-290.0	GASOLINE	51,484	46,581	25,018	54,500	54,000	55,000	55,000	57,000
10-4210-310.0	PROFESSIONAL SERVICES	4,938	3,194	3,286	4,000	4,000	4,000	4,000	4,000
10-4210-320.0	POLICE RECORD SOFTWARE	16,400	16,400	8,610	17,220	18,000	18,000	18,000	148,000
10-4210-330.0	EDUCATION & TRAINING	16,562	13,570	7,667	20,500	19,000	21,000	21,000	21,000
10-4210-340.0	LEXIPOL P&P	7,185	7,475	3,849	7,698	7,698	7,929	7,929	7,929
10-4210-480.0	MISC SUPPLIES	4,582	4,785	2,583	4,250	4,750	5,000	5,000	5,000
10-4210-481.0	PHOTOGRAPHY SUPPLIES	1,487	852	120	1,000	1,000	1,000	1,000	1,000
10-4210-482.0	AMMUNITION	4,390	5,502	679	4,850	5,500	8,000	8,000	8,000
10-4210-483.0	INVESTIGATION SUPPLIES	1,837	1,241	1,657	2,750	2,750	3,500	3,500	3,500
10-4210-484.0	MEDICAL SUPPLIES	363	416	126	266	500	500	500	500
10-4210-512.0	INSURANCE - AUTO LIAB.	7,912	13,097	8,195	8,195	10,000	9,000	9,000	9,000
10-4210-730.0	DEER MITIGATION FUNDS	0	881	345	679	1,000	500	500	500
10-4210-610.0	CITIZEN ACADEMY		0	420	420	400	400	400	400
10-4210-620.0	MISCELLANEOUS SERVICE	278	258	179	410	300	450	450	450
10-4210-621.0	METRO TASK FORCE	14,629	14,629	14,629	14,630	14,630	14,630	14,630	14,630
10-4210-623.0	PHYSICAL FITNESS STANDARDS	1,000	0	0	0	0	2,500	2,500	2,500
10-4210-625.0	DISPATCH SERVICES	40,000	41,200	22,660	45,320	45,320	45,320	45,320	45,320
		264,045	257,558	156,324	291,053	304,248	318,604	318,604	450,604
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4210-740.0	CAPITAL EQUIPMENT	140,182	209,562	8,207	146,400	166,400	260,300	323,174	277,700
10-4210-752.0	GRANT/DONATION PURCHASES	19,712	10,119	4,708	4,744	7,500	7,500	7,500	7,500
	SUBTOTAL	159,893	219,681	12,915	151,144	173,900	267,800	330,674	285,200
EQUIPMENT DETAIL									
ITEM 1	4 Vehicles						225,000	225,000	187,800
ITEM 2	Public Order Unit Equip						15,000	15,000	15,000
ITEM 3	40 MM Launchers (9 launchers @ 1100 each)						9,900	9,900	9,900
ITEM 4	Bullet resistant windshield for 4 new patrol cars						5,400	5,400	0
ITEM 5	Laptops						5,000	5,000	5,000
ITEM 6	Staffing Analysis						0	62,874	60,000
ITEM 7									
ITEM 8									
	TOTAL POLICE	2,544,104	2,479,069	1,412,496	2,911,022	2,992,130	3,425,004	3,259,678	3,351,304

BEER TAX
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4218-110.0	SALARY & WAGES *	1,536	500	665	2,000	6,500	6,500	6,500	6,500
10-4218-130.0	FICA	114	102	49	150	700	700	700	700
10-4218-135.0	WORKERS COMPENSATION	19	35	17	40	100	150	150	150
	SUBTOTAL	1,669	637	731	2,190	7,300	7,350	7,350	7,350
	OPERATING EXPENDITURES								
10-4218-310.0	PROF TECH/SERVICES	0	0	0	320	1,500	0	0	0
10-4218-330.0	EDUCATION & TRAINING	594	862	635	865	500	1,500	1,500	1,500
10-4218-480.0	MISC SUPPLIES	181	172	0		0	500	500	500
	SUBTOTAL	774	1,034	635	1,185	2,000	2,000	2,000	2,000
	CAPITAL OUTLAY								
10-4218-740.0	CAPITAL EQUIPMENT	13,181	8,972	0	0	10,000	10,000	10,000	10,000
	SUBTOTAL	13,181	8,972	0	0	10,000	10,000	10,000	10,000
EQUIPMENT DETAIL									
ITEM 1							10,000	10,000	10,000
ITEM 2									
ITEM 3									
	TOTAL LIQUOR LAW	15,625	10,643	1,366	3,375	19,300	19,350	19,350	19,350

* Some Wages reimbursed by State of Utah for DUI check points.

SCHOOL CROSSING PROGRAM
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4219-120.0	PART TIME WAGES	46,553	46,718	19,388	43,000	61,200	62,000	62,000	62,000
10-4219-130.0	FICA	3,562	3,574	1,456	3,300	4,858	4,800	4,800	4,800
10-4219-135.0	WORKERS COMPENSATION	502	1,035	420	1,100	1,100	1,450	1,450	1,450
	SUBTOTAL	50,616	51,327	21,264	47,400	67,158	68,250	68,250	68,250
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4219-271.0	UTILITIES - POWER	801	622	209	460	800	800	800	800
10-4219-480.0	MISC SUPPLIES	870	1,146	270	1,200	1,200	1,200	1,200	1,200
	SUBTOTAL	1,672	1,768	479	1,660	2,000	2,000	2,000	2,000
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4219-740.0	CAPITAL EQUIPMENT	0	1,668	0	0	0	0	0	0
	SUBTOTAL	0	1,668	0	0	0	0	0	0
EQUIPMENT DETAIL									
ITEM 1						0	0	0	0
	TOTAL SCHOOL CROSSING	52,288	53,095	21,743	49,060	69,158	70,250	70,250	70,250

K-9
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4223-310.0	PROFESSIONAL SERVICES	1,252	673	932	1,500	2,000	2,000	2,000	2,000
10-4223-330.0	EDUCATION & TRAINING	420	501	775	1,000	1,000	1,500	1,500	1,500
10-4223-480.0	MISC SUPPLIES	635	1,605	553	2,000	2,000	2,000	2,000	2,000
	SUBTOTAL	2,307	2,779	2,260	4,500	5,000	5,500	5,500	5,500
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4223-740.0	CAPITAL EQUIPMENT	0	0	0	0	0	0	0	0
	SUBTOTAL	0	0	0	0	0	0	0	0
CAPITAL EQUIPMENT DETAIL EQUIPMENT									
Item 1		0	0	0	0	0	0	0	0
	TOTAL K-9	2,307	2,779	2,260	4,500	5,000	5,500	5,500	5,500

D.A.R.E. PROGRAM
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4225-110.0	SALARY & WAGES*	66,674	49,118	21,602	45,832	49,107	53,600	53,600	53,600
10-4225-130.0	FICA	4,978	3,539	1,559	3,500	3,757	4,100	4,100	4,100
10-4225-131.0	RETIREMENT	18,943	14,437	6,880	14,980	16,716	18,800	18,800	18,800
10-4225-132.0	MEDICAL INSURANCE	0	0	1,832	2,600	8,845	10,300	9,500	9,500
10-4225-134.0	LONG TERM DISABILITY	276	212	92	230	231	300	300	300
10-4225-135.0	WORKERS COMPENSATION	699	1,028	444	1,200	1,500	2,000	2,000	2,000
	SUBTOTAL	91,570	68,334	32,409	68,342	80,156	89,100	88,300	88,300
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4225-241.0	PRINTING	524	0	0	0	500	500	500	500
10-4225-330.0	TRAINING & EDUCATION	0	540	0	0	500	500	500	500
10-4225-480.0	MISC SUPPLIES	3,939	2,768	1,409	2,300	4,000	4,000	4,000	4,000
	SUBTOTAL	4,463	3,308	1,409	2,300	5,000	5,000	5,000	5,000
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4225-740.0	CAPITAL EQUIPMENT	0	0	0	0	0	0	0	0
	SUBTOTAL	0	0	0	0	0	0	0	0
CAPITAL EQUIPMENT DETAIL									
EQUIPMENT									
ITEM 1		0	0	0	0	0	0	0	0
	TOTAL D.A.R.E.	96,033	71,642	33,818	70,642	85,156	94,100	93,300	93,300

ANIMAL CONTROL SERVICES
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS								
10-4253-310.0	DAVIS COUNTY SERVICES	32,607	42,451	17,397	47,728	40,000	51,350	51,350	51,350
	TOTAL ANIMAL CONTROL	32,607	42,451	17,397	47,728	40,000	51,350	51,350	51,350

PUBLIC WORKS
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
ADMINISTRATION								
PERSONNEL SERVICES	$282,919	$308,431	$163,168	$409,275	$539,136	$514,200	$602,900	$576,900
OPERATING EXPENDITURES	$16,197	$17,805	$8,407	$32,800	$35,600	$33,600	$33,600	$33,600
CAPITAL OUTLAY	$0	$0	$0	$15,280	$15,000	$74,000	$64,000	$64,000
SUB TOTAL	$299,115	$326,236	$171,575	$457,355	$589,736	$621,800	$700,500	$674,500
STREETS								
PERSONNEL SERVICES	$318,293	$332,559	$184,280	$390,700	$390,643	$492,400	$374,700	$372,600
OPERATING EXPENDITURES	$193,826	$185,179	$47,749	$176,036	$218,250	$254,850	$254,850	$254,850
STREET LIGHTING	$102,328	$97,936	$42,587	$105,000	$108,250	$110,000	$110,000	$110,000
CAPITAL OUTLAY	$308,968	$189,583	$228,499	$329,500	$353,000	$365,330	$117,330	$190,330
SUB TOTAL	$923,415	$805,257	$503,115	$1,001,236	$1,070,143	$1,222,580	$856,880	$927,780
TOTAL STREETS	$923,415	$805,257	$503,115	$1,001,236	$1,070,143	$1,222,580	$856,880	$927,780
GIS								
PERSONNEL SERVICES	$92,226	$97,333	$53,974	$106,880	$108,984	$115,800	$113,600	$113,600
OPERATING EXPENDITURES	$9,878	$9,287	$1,665	$12,711	$13,244	$19,244	$14,244	$14,244
CAPITAL OUTLAY	$459	$0	$0	$0	$0	$30,150	$3,300	$3,300
SUB TOTAL	$102,564	$106,620	$55,639	$119,591	$122,228	$165,194	$131,144	$131,144
ENGINEERING								
OPERATING EXPENDITURES	$70,600	$93,634	$25,855	$64,500	$55,000	$73,000	$73,000	$73,000
TOTAL PUBLIC WORKS	$1,395,694	$1,331,747	$756,184	$1,642,682	$1,837,107	$2,082,574	$1,761,524	$1,806,424

PUBLIC WORKS ADMINISTRATION
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4405-110.0	SALARY AND WAGES	193,258	201,881	108,418	312,000	344,288	316,700	375,400	355,200
10-4405-111.0	OVERTIME PAY	0	3,346	958	2,000	12,000	3,000	3,000	3,000
10-4405-130.0	FICA	14,659	17,841	8,094	16,500	27,257	24,300	28,800	27,200
10-4405-131.0	RETIREMENT	35,039	40,119	19,987	31,500	59,960	60,500	71,300	67,200
10-4405-132.0	MEDICAL INSURANCE	37,119	40,072	23,114	42,300	89,400	101,900	116,300	116,300
10-4405-134.0	LONG TERM DISABILITY	820	911	465	750	1,431	1,500	1,800	1,700
10-4405-135.0	WORKERS COMPENSATION	1,964	4,201	2,132	4,225	4,800	6,300	6,300	6,300
10-4405-142.0	UNIFORM ALLOWANCE	60	60	0	0	0	0	0	0
	SUBTOTAL	282,919	308,431	163,168	409,275	539,136	514,200	602,900	576,900
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4405-200.0	UNIFORM PURCHASE	731	491	818	1,000	1,000	1,200	1,200	1,200
10-4405-210.0	BOOKS & SUBSCRIPTIONS	0	0	0	0	100	100	100	100
10-4405-211.0	MEMBERSHIPS	150	235	0	300	500	500	500	500
10-4405-220.0	PUBLIC NOTICES	0	0	0	100	100	100	100	100
10-4405-230.0	MILEAGE REIMBURSEMENT	0	0	0	0	100	100	100	100
10-4405-240.0	OFFICE SUPPLIES	1,063	1,989	253	1,150	1,200	1,400	1,400	1,400
10-4405-241.0	PRINTING	110	131	0	200	200	200	200	200
10-4405-242.0	POSTAGE	197	73	96	500	500	500	500	500
10-4405-262.0	MAINTENANCE AND SUPPLIES	0	0	0	300	300	300	300	300
10-4405-264.0	IT SERVICES AND LICENSES	0	0	0	0	0	1,500	1,500	1,500
10-4405-280.0	TELEPHONE - AIR TIME	1,527	1,579	365	1,500	2,500	1,500	1,500	1,500
10-4405-310.0	PROFESSIONAL SERVICES	255	299	25	3,750	3,750	400	400	400
10-4405-330.0	EDUCATION AND TRAINING	1,252	1,503	81	4,500	6,500	8,500	8,500	8,500
10-4405-480.0	MISC SUPPLIES	394	130	58	3,250	3,250	1,000	1,000	1,000
10-4405-482.0	TOOLS	7,423	11,028	5,231	14,500	14,500	14,500	14,500	14,500
10-4405-512.0	INSURANCE - AUTO LIABILITY	3,096	347	1,480	1,750	1,100	1,800	1,800	1,800
	SUBTOTAL	16,197	17,805	8,407	32,800	35,600	33,600	33,600	33,600
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4405-740.0	CAPITAL EQUIPMENT	7,145	3,045	0	15,280	15,000	74,000	64,000	64,000
	SUBTOTAL	0	0	0	15,280	15,000	74,000	64,000	64,000
CAPITAL EQUIPMENT DETAIL									
ITEM 1	Iron Worker Tools						4,000	4,000	4,000
ITEM 2	Storage Container						10,000	0	0
ITEM 3	Upgrade Shoplift for Dump Trucks						60,000	60,000	60,000
ITEM 4									
ITEM 5									
	TOTAL PW ADMINISTRATION	299,115	326,236	171,575	457,355	589,736	621,800	700,500	674,500

STREETS
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4410-110.0	SALARY AND WAGES	199,742	203,213	114,671	235,200	233,724	273,600	210,800	209,200
10-4410-111.0	OVERTIME	2,943	8,716	2,668	5,000	7,000	11,000	7,000	7,000
10-4410-130.0	FICA	14,709	17,407	8,468	18,400	18,417	21,000	16,200	16,000
10-4410-131.0	RETIREMENT	36,537	40,339	21,173	43,800	44,488	50,600	39,000	38,700
10-4410-132.0	MEDICAL INSURANCE	60,918	56,534	33,923	81,300	80,087	127,300	93,100	93,100
10-4410-134.0	LONG TERM DISABILITY	852	927	499	1,100	1,127	1,300	1,000	1,000
10-4410-135.0	WORKERS COMPENSATION	2,592	5,423	2,878	5,900	5,800	7,600	7,600	7,600
10-4410-142.0	UNIFORM ALLOWANCE	0		0	0	0	0	0	0
	SUBTOTAL	318,293	332,559	184,280	390,700	390,643	492,400	374,700	372,600
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4410-200.0	UNIFORM PURCHASE	1,859	1,744	1,609	1,800	1,900	1,900	1,900	1,900
10-4410-256.0	VEHICLE MAINTENANCE	61,649	79,110	25,319	43,000	74,000	74,000	74,000	74,000
10-4410-261.0	RADIO MAINTENANCE	45	0	0	100	100	100	100	100
10-4410-265.0	FIRE EXTINGUISHER	0	104	0	200	200	300	300	300
10-4410-280.0	TELEPHONE - AIR TIME	1,261	977	533	1,900	2,000	2,000	2,000	2,000
10-4410-290.0	GASOLINE & DIESEL FUEL	20,767	16,535	4,451	15,000	21,000	21,000	21,000	21,000
10-4410-330.0	EDUCATION & TRAINING	3,810	2,924	0	4,500	6,500	6,500	6,500	6,500
10-4410-479.0	HAULING CONSTRUCTION MATERIAL	2,630	440	1,845	3,500	3,500	3,500	3,500	3,500
10-4410-480.0	MISC SUPPLIES	2,756	3,796	0	5,000	5,000	5,000	5,000	5,000
10-4410-481.0	SNOW REMOVAL	35,309	29,464	6,913	15,000	15,000	48,500	48,500	48,500
10-4410-482.0	ASPHALT	12,159	20,165	0	20,000	20,000	20,000	20,000	20,000
10-4410-483.0	WEED CONTROL	0	0	13	100	100	100	100	100
10-4410-484.0	MEDICAL SUPPLIES	6	0	0	150	150	250	250	250
10-4410-485.0	TOOLS	1,000	1,064	700	1,000	1,000	1,000	1,000	1,000
10-4410-486.0	PAINT STRIPING MATERIALS	9,268	4,027	1,259	18,000	18,000	18,000	18,000	18,000
10-4410-488.0	SIGNS	10,104	14,719	135	10,000	10,000	16,000	16,000	16,000
10-4410-489.0	ROAD BASE	0	1,170	0	2,500	2,500	2,500	2,500	2,500
10-4410-491.0	CURB, GUTTER, SDWK REPAIR	12,780	0	0	0	0	0	0	0
10-4410-494.0	STREET SWEEPING CONTRACT	14,167	608	0	22,500	22,500	30,000	30,000	30,000
10-4410-512.0	INSURANCE	2,712	3,113	3,786	2,786	3,800	4,200	4,200	4,200
10-4410-520.0	MISCELLANEOUS SERVICES	1,545	5,219	1,030	9,000	11,000	0	0	0
	SUBTOTAL	193,826	185,179	47,749	176,036	218,250	254,850	254,850	254,850
	MANAGEMENT CONTROL ACCOUNTS - STREET LIGHTING								
10-4410-610.0	STREET LIGHT POWER	87,559	85,567	36,133	86,000	90,000	90,000	90,000	90,000
10-4410-620.0	STREET LIGHT REPAIRS	14,768	12,369	6,454	19,000	18,000	20,000	20,000	20,000
10-4410-630.0	NEW STREET LIGHTS	0	0	0	0	250	0	0	0
	SUBTOTAL	102,328	97,936	42,587	105,000	108,250	110,000	110,000	110,000
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4410-740.0	CAPITAL EQUIPMENT	308,815	189,008	228,499	329,500	353,000	339,330	91,330	164,330
10-4410-750.0	CAPITAL PROJECT	154	575	0	0	0	26,000	26,000	26,000
	SUBTOTAL	308,968	189,583	228,499	329,500	353,000	365,330	117,330	190,330
CAPITAL EQUIPMENT DETAIL									
ITEM 1	Bobtail W/ Plow - Clean Air Grant						54,330	54,330	54,330
ITEM 2	F-550 Crew Truck w/ plow shared with parks						37,000	37,000	37,000
ITEM 3	Pavement Compactor						73,000	0	73,000
ITEM 4	Front Loader						175,000	0	0
	SUBTOTAL	923,415	805,257	503,115	1,001,236	1,070,143	339,330	91,330	164,330
	STREET PROJECTS								
ITEM 1	Pages Ln Street Signal						26,000	26,000	26,000
ITEM 2									
ITEM 3								0	
	SUBTOTAL	0	0	0	0	0	26,000	26,000	26,000
	TOTAL STREETS	923,415	805,257	503,115	1,001,236	1,070,143	1,222,580	856,880	927,780

GIS DIVISION
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4470-110.0	SALARY AND WAGES	58,598	60,414	34,024	67,000	67,139	69,900	69,900	69,900
10-4470-111.0	OVERTIME PAY	0	0	0	0	500	500	500	500
10-4470-130.0	FICA	4,270	4,924	2,414	5,125	5,136	5,400	5,400	5,400
10-4470-131.0	RETIREMENT	10,873	11,789	6,188	10,910	12,393	12,900	12,900	12,900
10-4470-132.0	MEDICAL INSURANCE	17,626	18,665	10,511	22,220	22,200	25,000	22,800	22,800
10-4470-134.0	LONG TERM DISABILITY	248	265	144	275	316	400	400	400
10-4470-135.0	WORKERS COMPENSATION	611	1,276	693	1,350	1,300	1,700	1,700	1,700
	SUBTOTAL	92,226	97,333	53,974	106,880	108,984	115,800	113,600	113,600
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4470-200.0	UNIFORM PURCHASE	395	400	367	367	400	400	400	400
10-4470-211.0	MEMBERSHIPS	0	0	0	150	150	150	150	150
10-4470-240.0	OFFICE SUPPLIES	1,433	1,501	143	1,000	1,000	2,000	2,000	2,000
10-4470-255.0	VEHICLE MAINTENANCE	92	0	153	350	350	350	350	350
10-4470-262.0	MAINTENANCE & SUPPLIES	0	259	0	500	500	500	500	500
10-4470-280.0	TELEPHONE AIR TIME		0	0	0	500	500	500	500
10-4470-282.0	AIR TIME - GPS	1,244	844	944	1,244	1,244	1,244	1,244	1,244
10-4470-310.0	PROFESSIONAL SERVICES	0	75	0	300	300	300	300	300
10-4470-320.0	SOFTWARE SUPPORT	4,308	4,708	0	5,000	5,000	5,000	5,000	5,000
10-4470-330.0	EDUCATION AND TRAINING	1,464	1,000	0	3,000	3,000	8,000	3,000	3,000
10-4470-480.0	MISC SUPPLIES	943	500	58	800	800	800	800	800
	SUBTOTAL	9,878	9,287	1,665	12,711	13,244	19,244	14,244	14,244
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4470-740.0	CAPITAL EQUIPMENT	459	0	0	0	0	30,150	3,300	3,300
	SUBTOTAL	459	0	0	0	0	30,150	3,300	3,300
CAPITAL EQUIPMENT DETAIL									
ITEM 1	Aerial Imagery						3,300	3,300	3,300
ITEM 2	ARC GIS Server Enterprise Agreement						9,350	0	0
ITEM 3	Dell 4 Core Server/DMS/MS2019 Window Server Star						17,500	0	0
	TOTAL GIS DIVISION	102,564	106,620	55,639	119,591	122,228	165,194	131,144	131,144

ENGINEERING SERVICES
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS								
10-4490-316.0	ENG SERVICES - COMMUNITY DEV.	37,435	29,184	19,053	50,000	25,000	35,000	35,000	35,000
10-4490-317.0	ENG SERVICES - INSPECTION	28,756	54,579	2,024	5,500	25,000	30,000	30,000	30,000
10-4490-319.0	ENG SERVICES - STREETS	0	0	0	0	1,000	0	0	0
10-4490-320.0	ENG SERVICES - STORM DRAINAGE	0	0	0	0	0	0	0	0
10-4490-321.0	ENG SERVICES - PARKS & CEMETERY	0	0	0	0	1,000	1,000	1,000	1,000
10-4490-322.0	ENG SERVICES - MISCELLANEOUS	4,410	9,870	4,778	9,000	3,000	7,000	7,000	7,000
	TOTAL ENGINEERING	70,600	93,634	25,855	64,500	55,000	73,000	73,000	73,000

PARKS & RECREATION
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
PARKS								
PERSONNEL SERVICES	$586,477	$584,833	$302,194	$601,153	$640,149	$721,400	$712,500	$771,700
PARKS OPERATING	$169,181	$182,078	$76,990	$192,807	$197,650	$217,010	$215,010	$215,010
CAPITAL OUTLAY	$65,024	$39,573	$0	$144,000	$144,000	$209,000	$121,500	$121,500
TOTAL	$820,682	$806,484	$379,184	$937,960	$981,799	$1,147,410	$1,049,010	$1,108,210
RECREATION COMMITTEES								
PARKS/TRAILS	$3,895	$2,479	$37	$2,550	$3,180	$1,080	$1,080	$1,080
TOTAL	$3,895	$2,479	$37	$2,550	$3,180	$1,080	$1,080	$1,080
COMMUNITY EVENTS								
COMMUNITY EVENTS	$22,909	$7,052	$364	$30,000	$30,400	$34,640	$34,640	$34,640
TOTAL	$22,909	$7,052	$364	$30,000	$30,400	$34,640	$34,640	$34,640
TOTAL PARKS /RECREATION	$847,485	$816,015	$379,585	$970,510	$1,015,379	$1,183,130	$1,084,730	$1,143,930

PARKS DEPARTMENT
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4510-110.0	SALARY AND WAGES	263,191	285,780	195,804	340,000	296,364	325,300	325,300	325,300
10-4510-111.0	OVERTIME	1,130	5,088	2,734	3,200	1,500	1,500	1,500	1,500
10-4510-120.0	TEMPORARY AND PART TIME WAGE	168,355	131,593	16,218	80,000	146,099	175,000	175,000	230,000
10-4510-130.0	FICA	32,928	35,969	15,773	33,000	35,869	38,400	38,400	42,600
10-4510-131.0	RETIREMENT	50,502	55,219	28,437	55,750	55,353	60,700	60,800	60,800
10-4510-132.0	MEDICAL INSURANCE	64,379	60,664	37,936	80,000	93,010	105,500	96,500	96,500
10-4510-133.0	UNEMPLOYMENT		0	103	103	270	0	0	0
10-4510-134.0	LONG TERM DISABILITY	1,343	1,460	773	1,400	1,384	1,600	1,600	1,600
10-4510-135.0	WORKERS COMPENSATION	4,649	9,060	4,416	7,700	10,300	13,400	13,400	13,400
	SUBTOTAL - PERSONNEL	586,477	584,833	302,194	601,153	640,149	721,400	712,500	771,700
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4510-200.0	UNIFORM PURCHASES	2,976	2,328	1,093	2,500	2,500	2,500	2,500	2,500
10-4510-220.0	PUBLIC NOTICES	0	0	0	0	100	100	100	100
10-4510-240.0	OFFICE SUPPLIES	300	614	0	400	500	500	500	500
10-4510-242.0	POSTAGE	12	21	0	10	50	50	50	50
10-4510-250.0	VEHICLE MAINT & SUPPLIES	11,416	8,125	5,697	10,000	11,500	11,500	11,500	11,500
10-4510-260.0	MISC EQUIPMENT SUPPLIES	4,477	4,406	1,167	5,000	6,000	11,000	11,000	11,000
10-4510-268.0	MOWER MAINTENANCE	7,228	11,777	3,793	12,000	13,000	13,000	13,000	13,000
10-4510-270.0	UTILITIES - WATER WEBER BASIN	17,793	20,376	25,611	25,611	21,000	27,916	27,916	27,916
10-4510-271.0	UTILITIES - DEUEL CREEK WATER	0	12,872	0	14,000	14,000	14,000	14,000	14,000
10-4510-274.0	UTILITIES - POWER	10,815	6,409	5,361	13,000	13,000	13,000	13,000	13,000
10-4510-277.0	UTILITIES - SEWER	990	960	560	1,304	1,400	1,244	1,244	1,244
10-4510-280.0	TELEPHONE AIR TIME	3,602	3,135	854	1,600	3,500	2,400	2,400	2,400
10-4510-290.0	GASOLINE	15,974	16,101	5,777	12,000	14,000	16,500	16,500	16,500
10-4510-310.0	PROFESSIONAL SERVICES	9,525	11,316	860	9,500	9,500	9,500	9,500	9,500
10-4510-330.0	EDUCATION & TRAINING	3,478	3,005	0	2,000	4,000	4,000	4,000	4,000
10-4510-480.0	MISC SUPPLIES	27,256	26,298	8,390	28,000	28,000	28,000	28,000	28,000
10-4510-481.0	FERTILIZERS - WEED CONTROL	22,534	25,776	6,012	23,000	23,000	26,000	26,000	26,000
10-4510-482.0	PLANTINGS	6,500	5,745	2,395	7,000	7,000	10,000	8,000	8,000
10-4510-483.0	SPRINKLER REPAIR	14,982	13,498	2,057	14,000	14,000	14,000	14,000	14,000
10-4510-484.0	HOLIDAY LIGHTING	5,370	6,701	5,581	6,300	6,000	6,000	6,000	6,000
10-4510-485.0	FIELD PREPARATION	1,782	374	0	1,800	1,800	1,800	1,800	1,800
10-4510-486.0	CURB & GUTTER REPAIR	1,052	438	0	2,000	2,000	2,000	2,000	2,000
10-4510-512.0	INSURANCE	1,121	1,803	1,782	1,782	1,800	2,000	2,000	2,000
	SUBTOTAL	169,181	182,078	76,990	192,807	197,650	217,010	215,010	215,010
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4510-740.0	CAPITAL EQUIPMENT	58,416	37,488	0	137,000	137,000	145,000	120,500	120,500
10-4510-750.0	CAPITAL PROJECTS	6,421	0	0	6,500	6,500	63,000	0	0
10-4510-752.0	CITIZEN PARTICIPATION PROJECTS	186	2,085	0	500	500	1,000	1,000	1,000
	SUBTOTAL	65,024	39,573	0	144,000	144,000	209,000	121,500	121,500
CAPITAL DETAIL									
EQUIPMENT									
ITEM 1	1 Ton Flatbed Dump Truck						59,000	59,000	59,000
ITEM 2	F-550 Crew Truck						36,000	36,000	36,000
ITEM 3	Park Utility Vehicle						24,500	0	0
ITEM 4	Backhoe Tradeout						25,500	25,500	25,500
						0	145,000	120,500	120,500
PROJECTS									
ITEM 1	3 Playground surface repair						63,000	0	0
						0	63,000	0	0
	TOTAL PARKS	820,682	806,484	379,184	937,960	981,799	1,147,410	1,049,010	1,108,210

RECREATION COMMITTEES
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	PARKS & RECREATION COMMITTEE								
10-4511-310.0	PROFESSIONAL/RECORDING SERVICES	335	177	37	200	440	440	440	440
10-4511-480.0	MISC SUPPLES	52	0	0	100	100	100	100	100
	SUBTOTAL	387	177	37	300	540	540	540	540
10-4511-750.0	MOVIES IN THE PARK	3,240	2,200	0	2,100	2,100	0	0	0
	SUBTOTAL	3,240	2,200	0	2,100	2,100	0	0	0
	TRAILS COMMITTEE								
10-4512-310.0	RECORDER SERVICES	267	102	0	100	440	440	440	440
10-4512-330.0	EDUCATION & TRAINING	0	0	0	0	0	0	0	0
10-4512-480.0	MISC SUPPLIES	0	0	0	50	100	100	100	100
	SUBTOTAL	267	102	0	150	540	540	540	540
	CAPITAL								
10-4512-740.0	CAPITAL EQUIPMENT	0	0	0	0	0	0	0	0
	SUBTOTAL	0	0	0	0	0	0	0	0
	TOTAL RECREATION COMMITTEES	3,895	2,479	37	2,550	3,180	1,080	1,080	1,080

COMMUNITY EVENTS
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - COMMUNITY EVENTS								
10-4560-482.0	CHRISTMAS LIGHTING	175	585	0	0	400	400	400	400
10-4560-621.0	4th of July Celebration	22,734	6,467	364	30,000	30,000	30,000	30,000	30,000
10-4560-645.0	Easter Egg Hunt	0	0	0	0	0	1,000	1,000	1,000
10-4560-750.0	Movies in the Park	0	0	0	0	0	3,240	3,240	3,240
	TOTAL	22,909	7,052	364	30,000	30,400	34,640	34,640	34,640

PUBLIC BUILDINGS
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
CITY HALL								
PERSONNEL SERVICES	$46,667	$54,638	$30,484	$50,340	$50,340	$44,050	$44,050	$44,050
OPERATING EXPENDITURES	$82,967	$85,574	$44,273	$94,220	$97,330	$91,062	$91,062	$91,062
CAPITAL OUTLAY	$4,181	$5,789	$11,199	$35,000	$41,000	$50,000	$50,000	$50,000
SUB TOTAL	$133,816	$146,001	$85,956	$179,560	$188,670	$185,112	$185,112	$185,112
PUBLIC WORKS FACILITY								
OPERATING EXPENDITURES	$38,201	$48,463	$13,857	$39,569	$50,955	$50,717	$50,717	$50,717
CAPITAL OUTLAY	$5,370	$32,953	$0	$24,700	$24,700	$86,500	$21,500	$21,500
SUB TOTAL	$43,571	$81,416	$13,857	$64,269	$75,655	$137,217	$72,217	$72,217
PUBLIC WORKS STORAGE								
OPERATING EXPENDITURES	$4,141	$5,474	$2,574	$5,840	$6,750	$11,450	$11,450	$11,450
CAPITAL OUTLAY	$0	$0	$0	$0	$0	$0	$0	$0
SUB TOTAL	$4,141	$5,474	$2,574	$5,840	$6,750	$11,450	$11,450	$11,450
PARKS & REC FACILITY								
OPERATING EXPENDITURES	13,333	15,913	4,913	15,183	15,155	15,568	16,568	16,568
CAPITAL OUTLAY	1,818	2,495	0	4,600	4,600	15,000	3,000	3,000
SUB TOTAL	15,151	18,408	4,913	19,783	19,755	$30,568	$19,568	$19,568
WHITAKER HOME								
OPERATING EXPENDITURES	5,737	5,484	1,603	3,521	4,465	4,778	4,778	4,778
CAPITAL OUTLAY	37,503	30,159	286	30,172	36,442	23,550	23,550	24,250
SUB TOTAL	43,240	35,643	1,889	33,693	40,907	$28,328	$28,328	$29,028
TOTAL PUBLIC BUILDINGS	$239,918	$286,942	$109,189	$303,145	$331,737	$392,675	$316,675	$317,375

PARKS & RECREATION FACILITY
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4595-271.0	UTILITIES - POWER	3,076	4,007	1,273	4,000	3,300	3,300	3,300	3,300
10-4595-276.0	UTILITIES - GAS	3,884	3,729	697	3,600	4,600	4,600	4,600	4,600
10-4595-277.0	UTILITIES - SEWER	120	120	60	153	120	153	153	153
10-4595-310.0	PROFESSIONAL SERVICES	2,430	3,867	1,635	3,924	3,000	3,000	4,000	4,000
10-4595-480.0	MISC SUPPLIES	236	507	0	250	250	250	250	250
10-4595-481.0	JANITORIAL SUPPLIES	376	399	50	200	440	440	440	440
10-4595-482.0	MAINTENANCE & REPAIR	2,542	2,604	142	2,000	2,625	2,625	2,625	2,625
10-4595-514.0	INSURANCE	670	680	1,056	1,056	820	1,200	1,200	1,200
	SUBTOTAL	13,333	15,913	4,913	15,183	15,155	15,568	16,568	16,568
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4595-740.0	CAPITAL EQUIPMENT	1,818	1,595	0	4,600	4,600	15,000	3,000	3,000
10-4595-750.0	CAPITAL PROJECT/STORAGE TANK		900	0	0	0	0	0	0
	SUBTOTAL	1,818	2,495	0	4,600	4,600	15,000	3,000	3,000
EQUIPMENT DETAIL									
ITEM 1	Replace equipment lift						12,000	0	0
ITEM 2	Replace 2 garage door openers (2 of 8)						3,000	3,000	3,000
ITEM 3									
CAPITAL PROJECTS DETAIL									
PROJECT 1							0	0	0
	TOTAL PARKS & REC BLDG	15,151	18,408	4,913	19,783	19,755	30,568	19,568	19,568

PUBLIC WORKS FACILITY
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4596-271.0	UTILITIES - POWER	7,761	8,075	3,628	9,000	11,000	11,000	11,000	11,000
10-4596-276.0	UTILITIES - GAS	7,389	7,567	1,207	6,000	8,000	8,000	8,000	8,000
10-4596-277.0	UTILITIES - SEWER	531	246	442	814	900	567	567	567
10-4596-280.0	TELEPHONE SERVICE & EQUIPMENT	9,210	9,210	3,964	11,600	11,600	13,000	13,000	13,000
10-4596-310.0	PROFESSIONAL SERVICES	513	893	285	700	1,000	1,000	1,000	1,000
10-4596-480.0	MISC SUPPLIES	0		0	200	200	200	200	200
10-4596-481.0	JANITORIAL SUPPLIES	1,675	886	463	1,100	1,100	1,100	1,100	1,100
10-4596-482.0	MAINTENANCE & REPAIR	10,993	21,454	3,868	10,000	17,000	15,000	15,000	15,000
10-4596-514.0	INSURANCE	128	132	0	155	155	850	850	850
	SUBTOTAL	38,201	48,463	13,857	39,569	50,955	50,717	50,717	50,717
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4596-740.0	CAPITAL EQUIPMENT	5,370	22,309	0	24,700	24,700	23,500	13,500	13,500
10-4596-750.0	CAPITAL PROJECTS	0	10,644				63,000	8,000	8,000
	SUBTOTAL	5,370	32,953	0	24,700	24,700	86,500	21,500	21,500
EQUIPMENT DETAIL									
ITEM 1	Fuel Management Equipment						10,000	0	0
ITEM 2	Salt Rack						13,500	13,500	13,500
ITEM 3									
PROJECTS									
ITEM 1	Replace South Driveway Concrete						40,000	0	0
ITEM 2	2nd Floor carpet - paint offices						15,000	0	0
ITEM 3	Concrete Replacement Pit						8000	8000	8000
	TOTAL PW BLDG EXPENDITURES	43,571	81,416	13,857	64,269	75,655	137,217	72,217	72,217

CITY HALL 250 NORTH MAIN
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4597-120.0	PART TIME WAGES	38,487	44,335	25,197	41,000	41,000	35,800	35,800	35,800
10-4597-130.0	FICA	2,977	3,734	1,883	3,140	3,140	2,800	2,800	2,800
10-4597-131.0	RETIREMENT	4,792	5,633	2,887	5,250	5,250	4,200	4,200	4,200
10-4597-135.0	WORKERS COMPENSATION	411	936	517	950	950	1,250	1,250	1,250
	SUBTOTAL	46,667	54,638	30,484	50,340	50,340	44,050	44,050	44,050
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4597-230.0	MILEAGE REIMBURSEMENT	0	0	0	25	50	50	50	50
10-4597-271.0	UTILITIES - POWER	26,133	26,814	11,859	26,000	26,000	27,000	27,000	27,000
10-4597-276.0	UTILITIES - GAS	6,796	8,614	2,875	8,000	8,000	8,700	8,700	8,700
10-4597-277.0	UTILITIES - SEWER	480	480	240	612	480	612	612	612
10-4597-280.0	TELEPHONE SERVICE & EQUIPMENT	9,738	9,210	4,037	12,000	12,700	13,000	13,000	13,000
10-4597-310.0	PROFESSIONAL SERVICES	10,759	13,693	3,250	7,800	8,000	10,000	10,000	10,000
10-4597-320.0	ELEVATOR CONTRACT	870	1,575	1,656	4,347	3,700	1,700	1,700	1,700
10-4597-321.0	MECHANICAL SERVICE	9,645	8,386	4,410	10,500	10,000	10,000	10,000	10,000
10-4597-480.0	MISC SUPPLIES	625	395	23	100	800	800	800	800
10-4597-481.0	JANITORIAL SUPPLIES	3,930	3,546	1,713	3,000	4,000	4,000	4,000	4,000
10-4597-482.0	MAINTENANCE & REPAIR	8,784	7,559	7,674	15,300	17,000	8,000	8,000	8,000
10-4597-514.0	INSURANCE	5,207	5,302	6,536	6,536	6,600	7,200	7,200	7,200
	SUBTOTAL	82,967	85,574	44,273	94,220	97,330	91,062	91,062	91,062
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL CITY HALL								
10-4597-740.0	CAPITAL EQUIPMENT	0	0	0	0	0	0	0	0
10-4597-750.0	CAPITAL PROJECTS	4,181	5,789	11,199	35,000	41,000	50,000	50,000	50,000
	SUBTOTAL	4,181	5,789	11,199	35,000	41,000	50,000	50,000	50,000
EQUIPMENT DETAIL									
ITEM 1									
ITEM 2									
ITEM 3									
CAPITAL PROJECTS DETAIL									
ITEM 1	Replace 1 of 2 boilers						20,000	20,000	20,000
ITEM 2	Lobby and Council Chamber changes						30,000	30,000	30,000
	TOTAL CITY HALL	133,816	146,001	85,956	179,560	188,670	185,112	185,112	185,112

PUBLIC WORKS STORAGE/DECANT
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4598-271.0	UTILITIES - POWER	0	0	0	0	0	0	0	0
10-4598-276.0	UTILITIES - GAS	2,334	3,652	452	3,500	4,000	4,000	4,000	4,000
10-4598-480.0	MISC SUPPLIES	0	0	0	0	150	150	150	150
10-4598-482.0	MAINTENANCE & REPAIR	271	218	100	100	500	5,000	5,000	5,000
10-4598-514.0	INSURANCE	1,537	1,604	2,022	2,240	2,100	2,300	2,300	2,300
	SUBTOTAL	4,141	5,474	2,574	5,840	6,750	11,450	11,450	11,450
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4598-740.0	CAPITAL EQUIPMENT	0	0	0	0	0	0	0	0
	SUBTOTAL	0	0	0	0	0	0	0	0
	TOTAL MAINT BLDG EXPENDITURES	4,141	5,474	2,574	5,840	6,750	11,450	11,450	11,450

WHITAKER HOME
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4599-270.0	UTILITIES - DEUEL CREEK	0	0	0	275	275	275	275	275
10-4599-271.0	UTILITIES - POWER	967	860	351	1,000	1,300	1,300	1,300	1,300
10-4599-276.0	UTILITIES - GAS	673	638	108	600	800	800	800	800
10-4599-277.0	UTILITIES - SEWER	90	120	60	153	120	153	153	153
10-4599-318.0	CUSTODIAL SUPPLIES	500	500	52	450	500	700	700	700
10-4599-482.0	BUILDING MAINT & REPAIR	3,011	2,848	409	420	850	850	850	850
10-4599-514.0	INSURANCE - PROPERTY	496	518	623	623	620	700	700	700
	SUBTOTAL	5,737	5,484	1,603	3,521	4,465	4,778	4,778	4,778
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4599-740.0	CAPITAL EQUIPMENT	8,839	4,045	0	3,522	5,442	0	0	0
10-4599-750.0	CAPITAL PROJECTS	28,664	26,114	286	26,650	31,000	23,550	23,550	24,250
	SUBTOTAL	37,503	30,159	286	30,172	36,442	23,550	23,550	24,250
	TOTAL MAINT BLDG EXPENDITURES	43,240	35,643	1,889	33,693	40,907	28,328	28,328	29,028

COMMUNITY DEVELOPMENT
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
PLANNING & ZONING ADMINISTRATION								
PERSONNEL SERVICES	$271,724	$289,276	$154,305	$273,665	$307,118	$332,700	$328,100	$328,100
OPERATING EXPENDITURES	$7,772	$10,955	$5,627	$14,250	$14,250	$15,840	$15,840	$15,840
CAPITAL	$0	$1,481	$0	$1,500	$1,500	$104,000	$84,000	$115,600
TOTAL	$279,496	$301,712	$159,932	$289,415	$322,868	$452,540	$427,940	$459,540
BOARDS & COMMISSIONS								
PLANNING COMMISSION	$8,038	$4,920	$2,504	$6,500	$9,400	$9,400	$9,400	$9,400
BOARD OF ADJUSTMENT	$0	$180	$0	$0	$450	$450	$450	$450
LANDMARK COMMISSION	$211	$3,999	$0	$0	$500	$500	$500	$500
TOTAL	$8,249	$9,099	$2,504	$6,500	$10,350	$10,350	$10,350	$10,350
BUILDING INSPECTION								
OPERATING EXPENDITURES	$58,143	$51,536	$21,760	$0	$35,550	$55,550	$36,550	$36,550
CAPITAL	$250	$0	$0	$0	$0	$0	$0	$0
TOTAL	$58,393	$51,536	$21,760	$0	$35,550	$55,550	$36,550	$36,550
TOTAL COMMUNITY SERVICES	$337,888	$353,248	$181,692	$289,415	$368,768	$518,440	$474,840	$506,440

COMMUNITY DEVELOPMENT
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - PERSONNEL								
10-4610-110.0	SALARY & WAGES	184,274	191,815	102,907	171,800	202,876	214,900	214,900	214,900
10-4610-111.0	OVERTIME PAY	236	970	0	0	800	1,000	1,000	1,000
10-4610-130.0	FICA	14,223	16,286	7,462	13,500	15,581	16,600	16,600	16,600
10-4610-131.0	RETIREMENT	33,174	36,768	18,650	36,400	38,000	40,300	40,300	40,300
10-4610-132.0	MEDICAL INSURANCE	37,606	39,481	23,236	48,050	45,650	54,600	50,000	50,000
10-4610-134.0	LONG TERM DISABILITIES	725	849	437	815	961	1,100	1,100	1,100
10-4610-135.0	WORKERS COMPENSATION	1,485	3,107	1,613	3,100	3,250	4,200	4,200	4,200
	SUBTOTAL - PERSONNEL	271,724	289,276	154,305	273,665	307,118	332,700	328,100	328,100
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4610-210.0	BOOKS & SUBSCRIPTIONS	138	0	92	200	200	200	200	200
10-4610-211.0	MEMBERSHIPS	955	575	0	1,000	1,000	1,000	1,000	1,000
10-4610-220.0	PUBLIC NOTICES	114	169	156	800	800	800	800	800
10-4610-240.0	OFFICE SUPPLIES	836	1,004	184	750	750	1,000	1,000	1,000
10-4610-241.0	PRINTING	178	381	0	500	500	500	500	500
10-4610-242.0	POSTAGE	1,500	982	191	1,000	1,000	1,000	1,000	1,000
10-4610-246.0	IT SERVICES AND LICENSES	0	0	0	0	0	4,500	4,500	4,500
10-4610-260.0	VEHICLE MAINTENCE	79.23	148	83	300	300	300	300	300
10-4610-262.0	EQUIPMENT MAINT & SUPPLIES	1,394	1,228	360	1,500	1,500	1,500	1,500	1,500
10-4610-280.0	TELEPHONE - AIR TIME	259	0	0	1,000	1,000	840	840	840
10-4610-290.0	GASOLINE	94	66	61	200	200	200	200	200
10-4610-315.0	PROFESSIONAL SERVICES - PLANNING	0	4,500	4,500	4,500	4,500	1,500	1,500	1,500
10-4610-330.0	EDUCATION & TRAINING	2,225	1,902	0	2,500	2,500	2,500	2,500	2,500
	SUBTOTAL	7,772	10,955	5,627	14,250	14,250	15,840	15,840	15,840
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4610-740.0	CAPITAL EQUIPMENT	0	1,481	0	1,500	1,500	0	0	0
10-4610-752.0	CAPITAL PROJECTS	0	0	0	0	0	104,000	84,000	115,600
	SUBTOTAL	0	1,481	0	1,500	1,500	104,000	84,000	115,600
PROJECTS									
PROJECT 1	General Plan Update					0	100,000	80,000	80,000
PROJECT 2	Building Permit Online						4,000	4,000	4,000
PROJECT 3	City Hall Complex Plan						0	0	31600
	TOTAL	279,496	301,712	159,932	289,415	322,868	452,540	427,940	459,540
TOTAL COMMUNITY DEVELOPMENT ADMINISTRATION		279,496	301,712	159,932	289,415	322,868	452,540	427,940	459,540

BOARDS & COMMISSIONS
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
PLANNING COMMISSION									
10-4611-305.0	MEMBER ATTENDANCE	4,565	3,700	1,795	5,100	6,000	6,000	6,000	6,000
10-4611-310.0	RECORDER SERVICES	3,080	1,220	709	1,200	3,000	3,000	3,000	3,000
10-4611-330.0	EDUCATION & TRAINING	393	0	0	200	400	400	400	400
	TOTAL PLANNING COMMISSION	8,038	4,920	2,504	6,500	9,400	9,400	9,400	9,400
BOARD OF ADJUSTMENT									
10-4612-305.0	MEMBER ATTENDANCE	0	75	0	0	300	300	300	300
10-4612-310.0	RECORDER SERVICES	0	105	0	0	150	150	150	150
	TOTAL BOARD OF ADJUSTMENT	0	180	0	0	450	450	450	450
LANDMARKS COMMISSION									
10-4613-310.0	RECORDER SERVICES	124	77	0	0	500	500	500	500
10-4613-485.0	SPECIAL PROJECTS	87	2,422	0	0	0	0	0	0
10-4613-750.0	STATE GRANT PROJECT	0	1,500	0	0	0	0	0	0
	TOTAL LANDMARK COMMISSION	211	3,999	0	0	500	500	500	500
TOTAL BOARDS & COMMISSIONS		8,249	9,099	2,504	6,500	10,350	10,350	10,350	10,350

BUILDING & ZONING INSPECTION
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	MANAGEMENT CONTROL ACCOUNTS - OPERATING								
10-4650-210.0	BOOKS & SUBSCRIPTIONS	1,000		0		200	1,200	1,200	1,200
10-4650-211.0	MEMBERSHIPS	135	135	145		150	150	150	150
10-4650-260.0	EQUIPMENT MAINTENANCE	200		0		200	200	200	200
10-4650-316.0	BUILDING INSPECTION SERVICES	56,808	51,401	21,615		35,000	54,000	35,000	35,000
	SUBTOTAL	58,143	51,536	21,760	0	35,550	55,550	36,550	36,550
	MANAGEMENT CONTROL ACCOUNTS - CAPITAL								
10-4650-740.0	CAPITAL EQUIPMENT	250	0	0	0	0	0	0	0
EQUIPMENT DETAIL									
ITEM 1							0	0	0
	TOTAL INSPECTIONS	58,393	51,536	21,760	0	35,550	55,550	36,550	36,550

TRANSFERS-NON DEPARTMENTAL
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

			2020/2021			2021/2022		
	2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
DEBT SERVICE	$0	$0	$0	$0	$0	$0	$0	$0
CAPITAL IMPROVEMENT/OTHER FUNDS	$719,726	$672,341	$338,354	$556,695	$556,695	$415,592	$415,592	$415,592
MONUMENTS FEES - PCF	$0	$20,000	$0	$0	$0	$0	$0	$0
WHITAKER TRUST	$43,765	$44,500	$0	$0	$0	$0	$0	$0
RDA INCREMENT	$0	$0	$0	$0	$0	$0	$0	$0
RECREATION	$41,000	$73,000	$23,000	$23,000	$23,000	$41,000	$41,000	$41,000
SANITATION	$0	$0	$0	$0	$0	$0	$0	$0
NON-DEPARTMENTAL	$68,307	$53,107	$2,912	$58,650	$58,650	$55,000	$60,000	$62,123
TOTAL	$872,798	$862,948	$364,266	$638,345	$638,345	$511,592	$516,592	$518,715

TRANSFER - NON-DEPARTMENTAL
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
CAPITAL IMPROVEMENT/OTHER FUNDS									
10-4710-950.0	UTOPIA	304,134	256,749	130,558	141,103	141,103	0	0	0
10-4710-952.0	TRANSPORATION FUND	415,592	415,592	207,796	415,592	415,592	415,592	415,592	415,592
	SUBTOTAL CAPITAL IMPROVEMENTS	719,726	672,341	338,354	556,695	556,695	415,592	415,592	415,592
OTHER GOVERNMENTAL									
10-4710-810.0	TRANSFERS TO OTHER FUNDS	0	20,000	0	0	0	0	0	0
10-4710-820.0	TRANSFER TO RECREATION FUND	41,000	73,000	23,000	23,000	23,000	41,000	41,000	41,000
10-4710-970.0	TRANSFER WHITAKER HOME TRUST	43,765	44,500	0	0	0	0	0	0
	SUBTOTAL GOVERNMENTAL	84,765	137,500	23,000	23,000	23,000	41,000	41,000	41,000
NON - DEPARTMENTAL									
10-4710-980.0	CONTRIB. FUND BAL/DEBT REDUCT	0	0	0	0	0	0	0	0
10-4710-990.0	CONTINGENCY - PERSONNEL ADJUSTMENTS	68,307	53,107	2,912	58,650	58,650	55,000	60,000	62,123
	SUBTOTAL NON-DEPARTMENTAL	68,307	53,107	2,912	58,650	58,650	55,000	60,000	62,123
	TOTAL TRANSFERS NON-DEPART.	872,798	862,948	364,266	638,345	638,345	511,592	516,592	518,715

RECREATION FUND
SUMMARY BY DEPARTMENT
FY 2021/22 BUDGET

			2020/2021			2021/2022		
	2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
SUMMER RECREATION								
REVENUES	$68,993	$4,580	$1,092	$3,000	$60,000	$72,375	$72,375	$72,375
EXPENDITURES	$113,970	$68,851	$11,843	$38,859	$105,713	$113,436	$113,436	$113,436
OFF SEASON RECREATION								
REVENUES	12,859	12,726	0	0	14,500	13,500	13,500	13,500
EXPENDITURES	12,645	10,825	0	0	14,500	13,500	13,500	13,500
YOUTH BASEBALL								
REVENUES	$44,935	$10,970	$6,872	$46,000	$55,100	$45,100	$45,100	$45,100
EXPENDITURES	$46,542	$26,199	$4,957	$14,250	$33,250	$45,039	$45,039	$45,039
CONCESSION - COMMUNITY PARK								
REVENUES	$16,573	$2,573	$0	$20,000	$25,500	$20,950	$20,950	$20,950
EXPENDITURES	$20,239	$2,684	$613	$24,637	$24,637	$20,950	$20,950	$20,950
OTHER REVENUES	$41,000	$73,000	$23,000	$23,000	$23,000	$41,000	$41,000	$41,000
PROGRAM REVENUES	$143,360	$30,849	$7,964	$69,000	$155,100	$151,925	$151,925	$151,925
TOTAL EXPENDITURES	$193,611	$110,460	$17,413	$77,746	$178,100	$192,925	$192,925	$192,925
REV. OVER/UNDER EXP.	-$9,250	-$6,611	$13,551	$14,254	$1	$1	$1	$1

RECREATION FUND
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	REVENUES								
25-34-100000	SUMMER RECREATION FEES	68,993	4,580	1,092	3,000	60,000	72,375	72,375	72,375
25-34-400000	YOUTH BASEBALL/SOFTBALL FEES	44,935	10,970	6,872	36,500	55,000	45,000	45,000	45,000
25-34-300000	OFF SEASON RECREATION FEES	12,645	10,825	0	0	14,500	13,500	13,500	13,500
25-36-000000	CONCESSION SALES	16,573	2,573	0	20,000	25,500	20,950	20,950	20,950
25-39-100000	TRANSFER FROM GENERAL FUND	41,000	73,000	23,000	23,000	23,000	41,000	41,000	41,000
25-38-750000	BASEBALL DONATIONS & FUNDRAISER	12,688	10,913	0	9,500	100	100	100	100
	Use of Fund Balance	0				0			
	TOTAL REVENUE	196,834	112,861	30,964	92,000	178,100	192,925	192,925	192,925
	EXPENDITURES								
	MANAGEMENT CONTROL ACCOUNTS - SUMMER RECREATION								
25-4000-120.0	PART TIME WAGES	66,996	35,532	7,580	22,479	65,000	67,000	67,000	67,000
25-4000-130.0	FICA	4,364	3,885	627	1,720	4,973	5,200	5,200	5,200
25-4000-131.0	RETIREMENT	5,269	5,336	1,381	4,000	5,140	5,600	5,600	5,600
25-4000-135.0	WORKERS COMPENSATION	827	563	173	250	1,200	830	830	830
25-4000-220.0	PUBLIC NOTICES	1,030	0	0	0	1,000	1,000	1,000	1,000
25-4000-230.0	MILEAGE REIMBURSEMENT	453	337	81	250	500	500	500	500
25-4000-240.0	GENERAL OFFICE SUPPLIES	28	82	0	0	300	300	300	300
25-4000-260.0	EQUIP MAINT & SUPPLIES MISC.	0	0	0	0	100	100	100	100
25-4000-262.0	COPIER SUPPLIES	439	0	91	180	500	500	500	500
25-4000-280.0	TELEPHONE - AIR TIME	624	438	0	80	500	420	420	420
25-4000-310.0	MEDICAL EXAMS	70	770	50	100	1,000	800	800	800
25-4000-311.0	INSTRUCTORS	14,606	15,035	845	1,600	15,000	15,000	15,000	15,000
25-4000-314.0	COMPUTER SERVICES	3,188	2,894	0	3,200	3,200	3,200	3,200	3,200
25-4000-330.0	EDUCATION & TRAINING	-108	0	0	0	300	300	300	300
25-4000-480.0	MISC SUPPLIES	13,884	3,979	1,015	5,000	7,000	12,686	12,686	12,686
25-4000-740.0	CAPITAL EQUIPMENT	2,300	0	0	0	0	0	0	0
	SUBTOTAL - SUMMER REC	113,970	68,851	11,843	38,859	105,713	113,436	113,436	113,436
	MANAGEMENT CONTROL ACCOUNTS - OFF SEASON RECREATION								
25-4200-310.0	INSTRUCTORS	8,930	8,250	0	0	10,500	9,000	9,000	9,000
25-4200-480.0	MISC SUPPLIES	3,929	4,476	0	0	4,000	4,500	4,500	4,500
	SUBTOTAL - OFF SEASON REC	12,859	12,726	0	0	14,500	13,500	13,500	13,500
	MANAGEMENT CONTROL ACCOUNTS BASEBALL								
25-4300-120.0	PART TIME WAGES	1,952	140	0	3,000	3,000	2,000	2,000	2,000
25-4300-130.0	FICA	564	49	35	250	250	689	689	689
25-4300-135.0	WORKERS COMPENSATION	112	3	10	200	200	200	200	200
25-4300-220.0	PUBLIC NOTICES	120	0	0	0	500	150	150	150
25-4300-260.0	EQUIP MAINT & SUPPLIES	0	0	0	1,000	1,000	1,000	1,000	1,000
25-4300-310.0	UMPIRES	6,858	789	768	5,000	7,000	7,000	7,000	7,000
25-4300-311.0	PROFESSIONAL SERVICES	1,207	967	1,805	2,400	1,300	2,000	2,000	2,000
25-4300-480.0	MISC SUPPLIES	35,730	24,251	2,339	2,400	20,000	32,000	32,000	32,000
	SUBTOTAL - YOUTH BASEBALL	46,542	26,199	4,957	14,250	33,250	45,039	45,039	45,039
	MANAGEMENT CONTROL ACCOUNTS - CONCESSIONS								
25-4900-120.0	PART TIME WAGES	9,645	819	0	11,000	11,000	10,000	10,000	10,000
25-4900-130.0	FICA	647	154	0	650	650	765	765	765
25-4900-135.0	WORKERS COMPENSATION	135	21	0	187	187	135	135	135
25-4900-260.0	EQUIP MAINT & SUPPLIES	0	43	0	300	300	50	50	50
25-4900-310.0	PROFESSIONAL SERVICES	1,960	1,542	613	1,500	1,500	2,000	2,000	2,000
25-4900-480.0	MISC SUPPLIES	7,852	105	0	11,000	11,000	8,000	8,000	8,000
25-4900-740.0	CAPITAL EQUIPMENT	0	0	0	0	0	0	0	0
	SUBTOTAL - CONCESSIONS	20,239	2,684	613	24,637	24,637	20,950	20,950	20,950
	TOTAL RECREATION EXPEND.	193,611	110,460	17,413	77,746	178,100	192,925	192,925	192,925
	EXCESS REVENUES OVER (UNDER) EXPENDITURES	3,223	2,401	13,551	14,254	1	1	1	1

RAP TAX
FUND SUMMARY
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	**2021/2022** DEPARTMENT REQUEST	**2021/2022** TENTATIVE	**2021/2022** ADOPTED
RAP TAX								
REVENUES	$417,232	$451,513	$236,711	$468,000	$422,000	$473,000	$473,000	$496,000
CAPITAL EXPENDITURES	$404,635	$420,818	$223,969	$422,000	$422,000	$473,000	$473,000	$496,000
SUB TOTAL - EXPENDITURES	$404,635	$420,818	$223,969	$422,000	$422,000	$473,000	$473,000	$496,000
TOTAL REVENUES	$417,232	$451,513	$236,711	$468,000	$422,000	$473,000	$473,000	$496,000
TOTAL EXPENDITURES	$404,635	$420,818	$223,969	$422,000	$422,000	$473,000	$473,000	$496,000

RAP TAX
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	FUND BALANCE								
27-31-350000	RAP TAX	407,708	445,999	235,757	458,000	420,000	471,000	471,000	485,000
27-36-100000	INTEREST INCOME	9,524	5,514	954	10,000	2,000	2,000	2,000	11,000
	TOTAL REVENUES	417,232	451,513	236,711	468,000	422,000	473,000	473,000	496,000
	EXPENDITURES								
	GRANTS/PROJECTS	404,635	420,818	223,969	422,000	422,000	473,000	473,000	496,000
	TOTAL EXPENDITURES	404,635	420,818	223,969	422,000	422,000	473,000	473,000	496,000
Transfers/Grants detail									
27-5000-710.0	Parks (85%+interest income)	351,048	369,810	200,393	399,300	359,000	402,350	402,350	423,250
27-5000-720.0	Natural Park 100 S	1,945	0	0	0	0	0	0	0
27-5000-750.0	Whitaker (5%)	20,650	21,754	11,788	22,900	21,000	23,550	23,550	24,250
27-5000-800.0	DCPA (5%)	20,650	21,754	11,788	22,900	21,000	23,550	23,550	24,250
27-5000-850.0	TBD (5%) - Transfer to Parks	10,342	7,500	0	22,900	21,000	23,550	23,550	24,250
	SUBTOTAL	404,635	420,818	223,969	468,000	422,000	473,000	473,000	496,000

CEMETERY PERPETUAL CARE FUND
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	REVENUE								
	Use of Fund Balance	0	0	0	28,000	28,000	0	0	0
30-34-820000	PERPETUAL CARE FEE	39,100	31,450	15,700	31,000	30,000	30,000	30,000	30,000
30-34-821000	MONUMENT PERMIT FEE	4,600	3,400	1,600	3,200	3,000	3,000	3,000	3,000
30-36-100000	INTEREST INCOME	1,090	834	114	200	800	800	1,100	1,100
30-39-200000	TRANSFERS FROM OTHER FUNDS	34,160	0	0		0	0	0	0
	TOTAL REVENUES	78,950	35,684	17,414	62,400	61,800	33,800	34,100	34,100
	EXPENDITURES								
	Transfer to GF for Cemetery Maintenance	0	0	0	27,520	27,040	27,040	27,280	27,280
	Purchase of Cemetery Utility Vehicle	0	0	0	24,079	28,000	0	0	0
	Contribution to Cemetery Perpetual Care Fund I	0	0	0	10,201	6,760	6,760	6,820	6,820
	TOTAL EXPENDITURES	0	0	0	61,800	61,800	33,800	34,100	34,100

DEBT SERVICE FUND
SUMMARY BY FUND
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	2021/2022 DEPARTMENT REQUEST	TENTATIVE	ADOPTED
SALES TAX REVENUE BONDS - 2009								
REVENUE	$592,838	$592,963	$0	$593,163	$593,163	$0	$0	$0
SUB TOTAL	$592,838	$592,963	$0	$593,163	$593,163	$0	$0	$0
EXPENDITURES	$592,342	$592,363	$10,089	$593,163	$593,163	$0	$0	$0
SUB TOTAL	$592,342	$592,363	$10,089	$593,163	$593,163	$0	$0	$0
TOTAL REVENUES	$592,838	$592,963	$0	$593,163	$593,163	$0	$0	$0
TOTAL EXPENDITURES	$592,342	$592,363	$10,089	$593,163	$593,163	$0	$0	$0
REV. OVER/UNDER EXP.	$496	$600	-$10,089	$0	$0	$0	$0	$0

DEBT SERVICE
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
35-39-500000	TRANSFER FROM RDA	592,838	592,963	0	593,163	593,163	0	0	0
35-36-900000	CONTRIBUTIONS - OTHER	0	0	0	0	0	0	0	0
	TOTAL REVENUE	592,838	592,963	0	593,163	593,163	0	0	0
35-4000-910.0	INTEREST	59,842	39,863	10,089	20,663	20,663	0	0	0
35-4000-920.0	PRINCIPAL	530,000	550,000	0	570,000	570,000	0	0	0
35-4000-900.0	ADMINISTRATIVE CHARGES	2,500	2,500	0	2,500	2,500	0	0	0
	TOTAL	592,342	592,363	10,089	593,163	593,163	0	0	0
	EXCESS REVENUES OVER (UNDER) EXPENDITURES	496	600	-10,089	0	0	0	0	0

CAPITAL IMPROVEMENT FUNDS
SUMMARY BY FUND
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
PARK CIF								
REVENUE	$384,606	$2,947,631	$607,968	$895,058	$770,500	$466,900	$470,500	$492,100
SUB TOTAL - SOURCES	$384,606	$2,947,631	$607,968	$895,058	$770,500	$466,900	$470,500	$492,100
EXPENDITURES	$320,659	$2,899,965	$0	$725,652	$725,652	$466,900	$470,500	$492,100
SUB TOTAL	$320,659	$2,899,965	$0	$725,652	$725,652	$466,900	$470,500	$492,100
CITY CIF								
REVENUE	$0	$0	$0	$0	$0	$0	$0	$0
SUB TOTAL - SOURCES	$0	$0	$0	$0	$0	$0	$0	$0
EXPENDITURES	$0	$0	$0	$0	$0	$0	$0	$0
SUB TOTAL	$0	$0	$0	$0	$0	$0	$0	$0
TRANSPORTATION PROJECTS								
REVENUE	$1,450,186	$1,623,388	$742,636	$1,501,985	$1,432,592	$1,580,592	$1,598,592	$1,638,592
SUB TOTAL - SOURCES	$1,450,186	$1,623,388	$742,636	$1,501,985	$1,432,592	$1,580,592	$1,598,592	$1,638,592
EXPENDITURES	$1,217,516	$1,597,707	$101,563	$1,482,092	$1,432,592	$1,580,592	$1,598,592	$1,638,592
SUB TOTAL	$1,217,516	$1,597,707	$101,563	$1,482,092	$1,432,592	$1,580,592	$1,598,592	$1,638,592
UTOPIA PROJECT FUND								
REVENUE	$482,460	$492,927	$250,558	$501,951	$501,951	$511,137	$511,137	$511,137
SUB TOTAL - SOURCES	$482,460	$492,927	$250,558	$501,951	$501,951	$511,137	$511,137	$511,137
EXPENDITURES	$482,459	$491,289	$250,558	$501,951	$501,951	$511,137	$511,137	$511,137
SUB TOTAL	$482,459	$491,289	$250,558	$501,951	$501,951	$511,137	$511,137	$511,137
TOTAL SOURCES	$2,317,251	$5,063,947	$1,601,162	$2,898,994	$2,705,043	$2,558,629	$2,580,229	$2,641,829
TOTAL EXPENDITURES	$2,020,634	$4,988,961	$352,120	$2,709,695	$2,660,195	$2,558,629	$2,580,229	$2,641,829
SOURCES OVER/UNDER	$296,618	$74,985	$1,249,041	$189,299	$44,848	$0	$0	$0

PARK FUND
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	REVENUES								
45-34-700000	PARK IMPACT FEES	31,559	77,463	57,384	70,000	40,000	40,000	40,000	40,000
45-34-800000	TRANSFER IN - GENERAL FUND	0	20,000	0	0	0	0	0	0
45-34-920000	TRANSFER IN - RAP TAX	351,048	369,810	200,393	422,200	380,000	425,900	425,900	447,500
45-33-700000	GRANT REVENUE	0	575,745		52,358	0	0	0	0
45-36-100000	INTEREST INCOME	1,999	4,613	191	500	500	1,000	4,600	4,600
45-38-700000	TRANSFER IN - RDA	0	0	350,000	350,000	350,000	0	0	0
45-38-703000	PARK DEBT FINANCING	0	1,900,000	0	0	0	0	0	0
TOTAL REVENUE		384,606	2,947,631	607,968	895,058	770,500	466,900	470,500	492,100
	EXPENDITURES								
45-4000-760.0	COMMUNITY PARK -PHASE II	77,852	0	0	0	0	0	0	0
45-4000-762.0	COMMUNITY PARK -PHASE III	48,512	0	0	0	0	0	0	0
	OTHER PARK EXPENDITURES								
45-4810-100.0	CAPITAL PROJECTS	380	0	0	0	0	78,063	81,663	103,263
45-4810-120.0	SMITH PARK	0	0	0	350,000	350,000	0	0	0
45-4810-180.0	REC DISTRICT LEASE PAYMENT	100,000	109,361	0	108,000	108,000	107,000	107,000	107,000
	CAPITAL PROJECTS								
45-4860-180.0	ISLAND VIEW REMODEL	93,914	2,790,604	0	267,652	267,652	281,837	281,837	281,837
TOTAL EXPENDITURES		320,659	2,899,965	0	725,652	725,652	466,900	470,500	492,100
	REVENUE OVER EXPENDITURES	63,947	47,666	607,968	169,406	44,848	0	0	0

Fund 47 - CAPITAL PROJECTS
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	REVENUES								
47-34-800000	TRANSFER IN - GENERAL FUND	0	0	0	0	0	0	0	0
47-36-100000	INTEREST INCOME	0	0	0	0	0	0	0	0
	USE OF FUND BALANCE	0	0	0	0	0	0	0	0
TOTAL REVENUE		0	0	0	0	0	0	0	0
	EXPENDITURES								
47-4000-740.0	CAPITAL EQUIPMENT	0	0	0	0	0	0	0	0
47-4000-750.0	CAPITAL PROJECTS	0	0	0	0	0	0	0	0
47-4710-830.0	TRANSFER TO GF	0	0	0	0	0	0	0	0
TOTAL EXPENDITURES		0	0	0	0	0	0	0	0
	REVENUE OVER EXPENDITURES	0	0	0	0	0	0	0	0

TRANSPORTATION PROJECTS
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	REVENUES								
	Use of Fund BalanceUse of Fund Balance	0				0			
48-31-300000	SALES TAX	336,622	396,803	211,432	420,000	337,000	400,000	400,000	400,000
48-33-430000	CLASS C ROADS	664,141	648,173	320,205	640,000	665,000	650,000	650,000	690,000
48-33-450000	GRANTS	0	100,000		0	0	100,000	100,000	100,000
48-36-100000	INTEREST	32,965	22,820	3,204	23,000	15,000	15,000	33,000	33,000
48-34-800000	TRANSFER - GENERAL FUND	415,592	415,592	207,796	415,592	415,592	415,592	415,592	415,592
48-38-450000	CONTRIBUTIONS	866	40,000		3,393	0	0	0	0
TOTAL REVENUE		1,450,186	1,623,388	742,636	1,501,985	1,432,592	1,580,592	1,598,592	1,638,592
	EXPENDITURES								
48-4000-310.0	PROFESSIONAL SERVICES	4,000	0	7,000	14,000	12,000	12,000	12,000	12,000
48-4000-316.0	ENGINEERING - GENERAL	10,919	47,359	34,277	70,000	35,000	35,000	35,000	35,000
48-4000-710.0	CAPITAL PROJECTS	0	109,186	96,500	1,382,092	1,285,592	1,383,592	1,401,592	1,441,592
48-4000-720.0	1250 WEST (QUESTAR)	1,575							
48-4000-735.0	1250 WEST SIDEWALK PROJECT	2,272							
48-4000-740.0	FRONTAGE ROAD BIKE LANE PROJECT	0	242						
48-4000-750.0	FRONTAGE ROAD OVERLAY	16,590							
48-4000-760.0	JENNINGS LANE - 130 E TO 150 E	6,457	13,150						
48-4000-765.0	100 SOUTH STREET REBUILD	14,825	194,484						
48-4000-770.0	600 SOUTH TO 650 SOUTH REBUILD	11,291	266,156						
48-5000-800.0	SIDEWALK REPAIR / ACTIVE TRANSPORTATION		150,842	5,063	100,000	100,000	150,000	150,000	150,000
48-5000-710.0	2017 STREET & SLURRY	0							
48-5000-720.0	2018 STREET & SLURRY	1,111,092							
48-5000-730.0	STREET OVERLAY PROJECTS 2019	53,413	816,289						
TOTAL EXPENDITURES		1,217,516	1,597,707	101,563	1,482,092	1,432,592	1,580,592	1,598,592	1,638,592
	REVENUE OVER EXPENDITURES	232,670	25,682	641,073	19,893	0	0	0	0

CAPITAL PROJECTS - UTOPIA
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	REVENUES								
49-34-700000	TRANSFER IN - TRANSPORTATION	0							
	TRANSFER IN - UTOPIA REBATE			0	120,844	120,848	123,137	123,137	123,137
49-34-800000	TRANSFER IN - GENERAL FUND	304,134	256,749	130,558	149,888	141,103	0	0	0
49-34-850000	TRANSFER - TAX INCREMENT	178,326	236,178	120,000	231,219	240,000	388,000	388,000	388,000
	USE OF FUND BALANCE								
	USE OF RESTRICTED FUND BALANCE								
TOTAL REVENUE		482,460	492,927	250,558	501,951	501,951	511,137	511,137	511,137
	EXPENDITURES								
49-4000-800.0	PLEDGE PAYMENTS	482,459	491,289	250,558	501,951	501,951	511,137	511,137	511,137
TOTAL EXPENDITURES		482,459	491,289	250,558	501,951	501,951	511,137	511,137	511,137
	REVENUE OVER EXPENDITURES	1	1,638	0	0	0	0	0	0

Enterprise Funds
Summary of Funds
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
WATER FUND								
REVENUES	$2,911,399	$2,960,599	$1,461,063	$3,198,144	$2,972,500	$2,995,500	$2,995,500	$2,995,500
TOTAL SOURCES OF FUNDS	$2,911,399	$2,960,599	$1,461,063	$3,198,144	$2,972,500	$2,995,500	$2,995,500	$2,995,500
PERSONNEL SERVICES	$508,299	$528,150	$284,636	$409,060	$448,131	$472,700	$463,700	$463,700
OPERATING EXPENDITURES	$939,987	$1,099,530	$635,319	$1,515,586	$1,532,405	$1,660,410	$1,628,609	$1,620,109
DEBT/DEPRECIATION	$489,720	$704,815	$492,060	$741,067	$741,067	$747,067	$747,067	$747,067
CAPITAL OUTLAY	$46,662	$61,886	$40,014	$82,700	$82,700	$191,200	$191,200	$191,200
WATERLINE PROJECTS	$63,770	$1,104,654	$328,309	$637,197	$637,197	$399,123	$439,924	$448,424
TOTAL EXPENDITURES	$1,605,466	$3,031,428	$1,545,838	$3,385,610	$2,972,500	$2,995,500	$3,470,500	$3,470,500
(note less depreciation)	$442,971	$467,607	$234,500	$469,000	$469,000	$475,000	$475,000	$475,000
SANITATION FUND								
REVENUES	$1,036,198	$1,186,461	$599,515	$1,207,064	$1,202,044	$1,231,106	$1,213,262	$1,215,812
TOTAL	$1,036,198	$1,186,461	$599,515	$1,207,064	$1,202,044	$1,231,106	$1,213,262	$1,215,812
COLLECTION	$259,405	$261,059	$131,171	$262,000	$528,000	$529,000	$265,000	$265,000
DISPOSAL/TIPPING FEE	$346,080	$469,411	$237,405	$475,000	$460,000	$475,000	$475,000	$475,000
CAPITAL	$0	$0	$0	$0	$0	$0	$0	$0
OPERATING	$430,713	$455,990	$230,939	$470,064	$214,044	$227,106	$473,262	$475,812
TOTAL EXPENDITURES	$1,036,198	$1,186,461	$599,515	$1,207,064	$1,202,044	$1,231,106	$1,213,262	$1,215,812
DRAINAGE UTILITY								
REVENUES	$1,323,022	$1,317,285	$642,227	$1,327,000	$1,312,000	$1,312,000	$1,330,000	$1,330,000
TOTAL	$1,323,022	$1,317,285	$642,227	$1,327,000	$1,312,000	$1,312,000	$1,330,000	$1,330,000
EXPENDITURES	$644,395	$1,182,411	$485,456	$1,936,628	$1,312,000	$1,311,999.53	$1,440,000	$1,440,000
(note less depreciation)	$109,127	$106,354	$55,000	$110,000	$110,000	$110,000	$110,000	$110,000
TELECOMMUNICATIONS UTILITY								
REVENUES	$232,808	$234,058	$118,149	$240,100	$250,200	$250,200	$250,200	$250,200
TOTAL	$232,808	$234,058	$118,149	$240,100	$250,200	$250,200	$250,200	$250,200
EXPENDITURES	$227,072	$233,618	$100,259	$240,100	$250,200	$250,200	$250,200	$250,200
TOTAL REVENUES	$5,503,427	$5,698,403	$2,820,953	$5,972,308	$5,736,744	$5,788,806	$5,788,962	$5,791,512
TOTAL EXPENDITURES	$2,961,032	$5,059,957	$2,441,568	$6,190,402	$5,157,744	$5,203,805	$5,788,962	$5,791,512
REV. OVER/UNDER EXP.	$2,542,395	$638,446	$379,386	-$218,094	$579,000	$585,001	$0	$0

WATER FUND
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	REVENUES								
51-34-400000	WATER IMPACT FEES	74,776	40,523	18,742	110,000	60,000	60,000	60,000	60,000
51-34-450000	WATERLINE CONST FEES - NEW SUB.	204,748	117,658	3,039	262,439	75,000	75,000	75,000	75,000
51-36-100000	BANKING & INVEST. - INTEREST	8,203	10,744	1,215	6,000	6,000	6,000	6,000	6,000
51-36-110000	IMPACT FEE INTEREST INCOME	518	0	0	0	0	0	0	0
51-37-110000	WATER SALES	2,586,384	2,760,728	1,425,022	2,800,000	2,800,000	2,800,000	2,800,000	2,800,000
51-37-130000	WATER YOKES AND METERS	13,151	12,891	8,175	10,500	10,000	10,000	10,000	10,000
51-37-160000	HYDRANT WATER SALES	8,495	672	2,056	4,100	3,500	3,500	3,500	3,500
51-37-200000	DELINQUENT PENALTY	11,328	15,746	1,709	4,000	12,000	12,000	12,000	12,000
51-37-300000	GAIN ON SALE OF FIXED ASSET	3,797	1,637	1,105	1,105	6,000	29,000	29,000	29,000
	TOTAL REVENUE	2,911,399	2,960,599	1,461,063	3,198,144	2,972,500	2,995,500	2,995,500	2,995,500
	EXPENDITURES								
	PERSONNEL SERVICES								
51-4000-110.0	SALARY AND WAGES	308,853	322,124	171,391	240,000	258,251	262,200	262,200	262,200
51-4000-111.0	OVERTIME PAY	22,328	18,128	8,669	5,000	5,000	5,000	5,000	5,000
51-4000-120.0	TEMPORARY & PART-TIME WAGES	6,445	5,368	571	1,000	20,000	20,000	20,000	20,000
51-4000-130.0	FICA	25,361	29,347	13,800	27,047	19,756	22,000	22,000	22,000
51-4000-131.0	RETIREMENT	71,525	54,273	33,501	42,000	43,984	49,500	49,500	49,500
51-4000-132.0	MEDICAL INSURANCE	68,153	90,528	52,128	85,000	93,700	104,500	95,500	95,500
51-4000-134.0	LONG TERM DISABILITY	1,478	1,352	783	1,543	1,240	1,400	1,400	1,400
51-4000-135.0	WORKERS COMPENSATION	3,869	6,708	3,793	7,470	6,200	8,100	8,100	8,100
51-4000-142.0	UNIFORM ALLOWANCE	286	322	0	0	0	0	0	0
	SUBTOTAL	508,299	528,150	284,636	409,060	448,131	472,700	463,700	463,700
	OPERATING EXPENDITURES								
51-4000-200.0	UNIFORM PURCHASE	2,674	2,661	2,491	2,650	2,650	2,650	2,650	2,650
51-4000-205.0	BANK PROCESSING CHARGES -XPRESS	21,897	22,720	11,694	23,000	23,000	23,000	23,000	23,000
51-4000-210.0	BOOKS - MEMBERSHIPS	200	0	74	300	300	300	300	300
51-4000-211.0	MEMBERSHIPS	2,156	1,899	49	2,600	2,600	2,600	2,600	2,600
51-4000-220.0	PUBLIC NOTICES	266	0	0	500	500	500	500	500
51-4000-240.0	OFFICE SUPPLIES	789	1,006	586	1,200	1,200	1,200	1,200	1,200
51-4000-241.0	PRINTING	6,973	7,424	2,598	9,500	9,500	9,500	9,500	9,500
51-4000-242.0	POSTAGE	12,365	12,203	4,220	11,500	11,500	11,500	11,500	11,500
51-4000-250.0	VEHICLE MAINT & SUPPLIES	15,729	13,409	8,465	19,000	19,000	19,000	19,000	19,000
51-4000-260.0	LAND USE AGREEMENT - FOREST SERVICE		0	12	1,300	1,300	1,350	1,350	1,350
51-4000-261.0	EQUIPMENT MAINTENANCE - RADIO	500	450	60	500	500	500	500	500
51-4000-263.0	EQUIPMENT MAINTENANCE - OFFICE	500	0	0	500	500	500	500	500
51-4000-265.0	FIRE EXTINGUISHER	0	352	0	267	400	400	400	400
51-4000-266.0	METER READING MAINTENANCE	2,200	2,200	0	2,300	2,300	2,300	2,300	2,300
51-4000-275.0	UTILITIES - PUMPS AND WELLS	56,990	58,526	23,062	62,000	62,000	67,000	67,000	67,000
51-4000-280.0	AIR TIME	1,478	1,374	392	1,700	2,000	2,500	2,500	2,500
51-4000-286.0	TELEMETERING	17,000	18,397	618	17,000	17,000	17,000	17,000	17,000
51-4000-290.0	GASOLINE & DIESEL SERVICES	13,408	13,729	4,658	14,000	17,000	17,000	17,000	17,000
51-4000-310.0	PROFESSIONAL SERVICES	2,275	5,921	7,750	26,000	26,000	26,000	26,000	26,000
51-4000-314.0	COMPUTER SUPPORT	5,200	4,578	2,289	6,800	6,800	6,800	6,800	6,800
51-4000-316.0	ENGINEER	1,208	1,155	2,415	20,000	20,000	5,000	5,000	5,000
51-4000-330.0	EDUCATION AND TRAINING	9,876	7,583	1,140	9,200	9,500	9,500	9,500	9,500
51-4000-340.0	CERTIFICATIONS - EXAMS	843	780	650	1,500	1,500	1,500	1,500	1,500
51-4000-478.0	COMMERCIAL WATER METERS	2,885	3,920	0	7,500	7,500	7,500	7,500	7,500
51-4000-479.0	HAULING CONSTRUCTION MATERIAL	2,427	375	0	0	3,000	3,000	3,000	3,000
51-4000-480.0	MISC SUPPLIES	38,549	28,246	10,878	40,000	40,000	40,000	40,000	40,000
51-4000-481.0	METER REPAIRS	8,206	8,855	4,037	9,000	9,000	9,000	9,000	9,000
51-4000-496.0	BACKFLOW PROGRAM	-783	624	630	900	900	900	900	900
51-4000-484.0	WATER MAIN SUPPLIES	38,130	32,829	16,214	39,000	39,000	39,000	39,000	39,000
51-4000-485.0	BLUE STAKES	6,089	6,307	1,802	6,400	6,700	6,700	6,700	6,700
51-4000-486.0	ASPHALT	2,610	4,523	4,017	15,000	15,000	15,000	15,000	15,000
51-4000-487.0	ROAD BASE	2,483	3,833	0	2,622	4,000	4,000	4,000	4,000
51-4000-488.0	SAND	2,000	900	9	10	2,000	2,000	2,000	2,000
51-4000-489.0	CHLORINE	9,744	12,317	2,206	12,000	13,000	13,500	13,500	13,500
51-4000-490.0	WEBER BASIN PURCHASES	94,105	102,303	54,050	108,000	108,000	123,508	123,508	123,508
51-4000-491.0	INSTALL LATERALS	6,042	0	0	0	5,500	5,500	5,500	5,500
51-4000-492.0	FLOURIDATION	33,122	31,080	4,269	35,000	35,000	35,000	35,000	35,000
51-4000-493.0	NEW METERS	18,637	17,615	10,896	19,000	19,000	19,000	19,000	19,000
51-4000-495.0	WATER RIGHTS	811	1,875	0	2,000	2,000	2,000	2,000	2,000
51-4000-510.0	UNSCHEDULED WATER REPAIRS	0	23,889	0	0	0	20,000	20,000	20,000
51-4000-511.0	INSURANCE - LIABILITY	13,356	12,000	8,526	12,500	12,500	13,750	13,750	13,750

51-4000-512.0	INSURANCE - AUTO LIABILITY	1,144	432	168	350	350	350	350	350
51-4000-513.0	INSURANCE - WELLS & PUMPS	1,302	1,569	1,982	1,982	1,900	2,100	2,100	2,100
51-4000-621.0	WATER TESTING	9,484	23,497	5,221	15,000	15,000	15,000	15,000	15,000
51-4000-630.0	UNCOLLECTABLE ACCOUNTS	69	0	12	1,000	1,000	1,000	1,000	1,000
51-4000-640.0	GENERAL FUND ADMIN. SERVICE	475,046	606,174	437,179	955,005	955,005	1,055,002	1,023,201	1,014,701
	SUBTOTAL	939,987	1,099,530	635,319	1,515,586	1,532,405	1,660,410	1,628,609	1,620,109
51-4000-810.0	SERIES 2012 REVENUE BONDS	0							
51-4000-850.0	UWFA - BOND PAYMENT	46,749	237,208	257,560	272,067	272,067	272,067	272,067	272,067
51-4000-910.0	DEPRECIATION EXPENSE	442,971	467,607	234,500	469,000	469,000	475,000	475,000	475,000
	SUBTOTAL	489,720	704,815	492,060	741,067	741,067	747,067	747,067	747,067
	CAPITAL OUTLAY								
51-5154-740.0	CAPITAL EQUIPMENT	46,662	61,886	40,014	82,700	82,700	191,200	191,200	191,200
51-5154-750.0	CAPITAL PROJECTS	63,770	1,104,654	328,309	637,197	637,197	399,123	439,924	448,424
	SUBTOTAL	209,066	1,166,540	368,323	719,897	719,897	590,323	631,124	639,624
EQUIPMENT DETAIL									
ITEM 1	New truck to replace truck #101						42,000	42,000	42,000
ITEM 2	New truck to replace truck #107						42,000	42,000	42,000
ITEM 3	Tetemetery upgrade and equipment change out						18,000	18,000	18,000
ITEM 4	Computer change out						2,000	2,000	2,000
ITEM 5	Backhoe trade out						30,000	30,000	30,000
ITEM 6	Battery change out for SCADA systems						4,000	4,000	4,000
ITEM 7	Generator						25,000	25,000	25,000
ITEM 8	Chlorine equuipment change out and upgrade						5,200	5,200	5,200
ITEM 9	Load test generators						5,000	5,000	5,000
ITEM 10	Earthquake ramps for fire hose 2 of 3						4,000	4,000	4,000
ITEM 11	Earthquake initiative fire hose 3 of 3						10,000	10,000	10,000
ITEM 12	Chaninsaw style pipe saw						4,000	4,000	4,000
						0			
PROJECTS DETAIL									
PROJECT 1	Energy upgrade						5,000	5,000	5,000
PROJECT 2	Moving meters to curb						10,000	10,000	10,000
PROJECT 3	PRV change out						10,000	10,000	10,000
PROJECT 4	Duncan Spring filtration plant						60,000	60,000	60,000
PROJECT 5	Meter change out						50,000	50,000	50,000
PROJECT 6	Painting fire hydrants						15,000	15,000	15,000
PROJECT 7	City Projects						219,123	259,924	268,424
PROJECT 8	Oakridge Resevoir design						30,000	30,000	30,000
PROJECT 9									
						0	399,123	439,924	448,424
	TOTAL WATER EXPENDITURES	2,147,071	3,499,035	1,780,338	3,385,610	3,441,500	3,470,500	3,470,500	3,470,500
	* NOTE: DEPRECIATION	-442,971	-467,607	-234,500	-469,000	-469,000	-475,000	-475,000	-475,000
	MEMO - WATER FUND REVENUES:	2,911,399	2,960,599	1,461,063	3,198,144	2,972,500	2,995,500	2,995,500	2,995,500
	FUND BALANCE/RESERVE/OTHER	0							
	EXCESS REVENUES OVER EXPEN.	1,207,299	-70,829	-84,775	281,534	0	0	0	0

SANITATION FUND
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	REVENUES								
	Use of Fund Balance				9944	9,944	33,006	15,162	17,712
52-36-100000	INTEREST INCOME	408	854	190	320	900	900	900	900
52-36-200000	FALL CLEANUP REVENUE	140	440	0	0	200	200	200	200
52-37-100000	REFUSE COLLECTION CHARGES	689,396	810,484	410,276	820,000	815,000	820,000	820,000	820,000
52-37-200000	RECYCLING REVENUES	201,741	203,684	102,804	204,000	203,000	204,000	204,000	204,000
52-37-250000	GREEN WASTE CHARGES	139,924	163,850	83,827	168,000	163,000	168,000	168,000	168,000
52-37-300000	CONTAINER ADVANCE LEASE PAYMT	4,589	7,149	2,418	4,800	10,000	5,000	5,000	5,000
	TOTAL REVENUE	1,036,198	1,186,461	599,515	1,207,064	1,202,044	1,231,106	1,213,262	1,215,812
	EXPENDITURES								
52-4000-205.0	BANKING & INV/INTEREST EXPENSE	5004	5004	2525	5,004	5050	5,050	5,050	5,050
52-4000-241.0	PRINTING	3,249	3,410	1,100	2,922	3,211	3,200	3,200	3,200
52-4000-242.0	POSTAGE	5,508	5,597	1,880	5,242	5,500	6,000	6,000	6,000
52-4000-314.0	COMPUTER SUPPORT	4,849	5,577	2,289	4,500	4,600	4,500	4,500	4,500
52-4000-320.0	GREEN WASTE COLLECTION	86,837	87,456	44,685	89,000	88,000	89,000	89,000	89,000
52-4000-321.0	COLLECTION	259,405	261,059	131,171	262,000	265,000	265,000	265,000	265,000
52-4000-322.0	DISPOSAL & TIPPING FEES	346,080	469,411	237,405	475,000	460,000	475,000	475,000	475,000
52-4000-324.0	RECYCLING COLLECTION	171,451	173,352	87,314	175,000	175,000	175,000	175,000	175,000
52-4000-480.0	MISC SUPPLIES	0	0	0	300	100	100	100	100
52-4000-486.0	SPRING CLEANUP	5,013	0	0	15,000	20,000	20,000	20,000	20,000
52-4000-510.0	GENERAL LIABILITY INSURANCE	3,440	2,700	3,321	3,321	4,500	3,900	3,900	3,900
52-4000-640.0	GF ADMIN SERVICES	92,522	124,763	74,091	161,083	161,083	174,356	156,512	159,062
52-4000-750.0	CONTAINERS	15,754	15,608	0	17,935	10,000	10,000	10,000	10,000
	TOTAL SANITATION EXPEND.	999,113	1,153,938	585,781	1,216,307	1,202,044	1,231,106	1,213,262	1,215,812
	CONTRIBUTION TO FUND BALANCE	37,085	32,523	13,734	-9,243	0	0	0	0

DRAINAGE UTILITY
FY 2021/22 BUDGET

		2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	2021/2022 DEPARTMENT REQUEST	2021/2022 TENTATIVE	2021/2022 ADOPTED
	REVENUES								
53-34-400000	IMPACT FEE	26,503	23,931	0	30,000	30,000	30,000	30,000	30,000
53-36-100000	INTEREST INCOME	33,792	29,444	4,391	30,000	15,000	15,000	33,000	33,000
53-36-101000	IMPACT FEE INTEREST INCOME	41	0		0	0	0	0	0
53-37-100000	DRAINAGE CHARGES	805,174	804,351	408,353	807,000	807,000	807,000	807,000	807,000
53-37-300000	SUB DRAIN CHARGES	457,512	459,559	229,483	460,000	460,000	460,000	460,000	460,000
	TOTAL REVENUE	1,323,022	1,317,285	642,227	1,327,000	1,312,000	1,312,000	1,330,000	1,330,000
	EXPENDITURES								
	PERSONNEL SERVICESPERSONNEL SERVICES								
53-4000-110.0	SALARY & WAGES	59,242	46,510	24,184	50,410	48,340	54,100	54,100	54,100
53-4000-111.0	OVERTIME PAY	0	1,361	0	0	500	500	500	500
53-4000-130.0	FICA	4,341	3,893	1,789	4,525	3,698	4,200	4,200	4,200
53-4000-131.0	RETIREMENT	13,737	7,908	4,598	9,021	8,919	10,100	10,100	10,100
53-4000-132.0	MEDICAL INSURANCE	17,561	16,903	11,290	22,400	19,000	25,000	22,800	22,800
53-4000-134.0	LONG TERM DISABILITY	266	185	107	210	232	300	300	300
53-4000-135.0	WORKERS COMPENSATION	663	876	516	1,011	850	1,100	1,100	1,100
	Subtotal Personnel	95,810	77,636	42,484	87,577	81,539	95,300	93,100	93,100
	OPERATING								
53-4000-200.0	UNIFORM PURCHASE	382	380	376	376	425	425	425	425
53-4000-205.0	BANKING & INV/INTEREST EXPENSE	5,004	5,004	2,525	5,050	5,050	5,050	5,050	5,050
53-4000-220.0	PUBLIC NOTICES	0	80	0	200	200	200	200	200
53-4000-240.0	OFFICE SUPPLIES	254	28	227	268	300	300	300	300
53-4000-241.0	PRINTING	3,192	3,161	1,042	3,200	3,200	3,200	3,200	3,200
53-4000-242.0	POSTAGE	5,508	5,693	1,880	5,500	5,500	5,500	5,500	5,500
53-4000-250.0	VEHICLE MAINTENANCE	1,864	1,141	823	1,000	1,000	1,000	1,000	1,000
53-4000-270.0	WEBER BASIN WATER	4,521	3,825	0	4,000	4,000	4,000	4,000	4,000
53-4000-280.0	TELEPHONE - AIR TIME	0	0	0	500	500	500	500	500
53-4000-286.0	TELEMETERING	0	0	0	1,500	1,500	1,500	1,500	1,500
53-4000-290.0	GASOLINE	1,296	851	378	1,500	1,500	1,500	1,500	1,500
53-4000-314.0	COMPUTER SUPPORT	4,578	4,578	2,289	3,700	3,700	3,700	3,700	3,700
53-4000-310.0	PROFESSIONAL SERVICES	972	3,593	7,000	17,200	17,200	17,200	17,200	17,200
53-4000-316.0	ENGINEERING	21,419	30,264	29,821	15,000	15,000	35,000	35,000	35,000
53-4000-322.0	DAVIS COUNTY STORM WATER	4,500	4,677	1,750	4,800	4,800	4,800	4,800	4,800
53-4000-330.0	EDUCATION & TRAINING	1,391	778	130	600	1,600	1,600	1,600	1,600
53-4000-352.0	FRONTAGE ROAD SWALE - Transfer to GF	57,000	60,000	30,000	60,000	60,000	60,000	60,000	60,000
53-4000-353.0	STREET SWEEPING	22,000	28,919	7,989	22,000	22,000	30,000	30,000	30,000
53-4000-368.0	VIDEO INSPECTION	0	0	3,643	0	0	0	0	0
53-4000-375.0	CONTRACT MAINTENANCE	149,166	143,465	19,058	150,000	150,000	165,000	165,000	165,000
53-4000-371.0	UTILITIES-FRONTAGE ROAD PUMP	201	639	350	2,000	2,000	800	800	800
53-4000-480.0	MISC SUPPLIES	5,036	3,725	1,746	4,000	6,000	4,000	4,000	4,000
53-4000-510.0	GENERAL LIABILITY INSURANCE	24,504	14,297	13,937	21,200	21,200	23,400	23,400	23,400
53-4000-515.0	LIABILITY RESERVE	0	5,000	1,383	5,000	5,000	10,000	10,000	10,000
53-4000-640.0	GF ADMINISTRATIVE SERVICES	199,894	257,281	199,418	450,810	450,810	488,752	461,404	460,728
53-4000-740.0	DEBT SERVICE	13,097	77,919	72,645	79,546	79,546	79,546	79,546	79,546
53-4000-900.0	DEPRECIATION EXPENSES	109,127	106,354	55,000	110,000	110,000	110,000	110,000	110,000
	Subtotal operations	634,906	761,652	453,410	968,950	972,031	1,056,973	1,029,625	1,028,949
	Capital								
53-4000-745.0	CAPITAL EQUIPMENT	7,200	2,499	39,342	46,101	51,000	0	0	0
53-4000-750.0	CAPITAL PROJECTS	15,606	446,978	5,220	834,000	317,430	269,727	317,275	317,951
	Subtotal Capital	22,806	449,477	44,562	880,101	368,430	0 269,727	317,275	317,951
CAPITAL PROJECTS DETAIL									
ITEM 1	Grate Retrofit						70,000	70,000	70,000
ITEM 2	Curb and Gutter Replacements						10,000	10,000	10,000
ITEM 3	Drainage Projects TBD						189,727	237,275	237,951
	TOTAL DRAINAGE UTILITY	753,522	1,288,765	540,456	1,936,628	1,422,000	1,422,000	1,440,000	1,440,000
	ADD BACK DEPRECIATION	109,127				0	110,000	110,000	110,000
	EXCESS REVENUES OVER (UNDER) EXPENDITURES	678,627				0	0	0	0

TELECOMMUNICATIONS UTILITY
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	REVENUES								
	Use of retained earnings								
54-36-100000	INTEREST INCOME	278	195	38	100	200	200	200	200
54-37-100000	UTILITY SERVICE CHARGES	232,531	233,863	118,110	240,000	250,000	250,000	250,000	250,000
	TOTAL REVENUE	232,808	234,058	118,149	240,100	250,200	250,200	250,200	250,200
	EXPENDITURES								
54-4000-320.0	CONTRACT SERVICES - UIA	227,072	228,335	100,259	230,100	240,200	240,200	240,200	240,200
54-4000-640.0	ADMINISTRATIVE SERVICES	0	5,283	0	10,000	10,000	10,000	10,000	10,000
	Subtotal operations	227,072	233,618	100,259	240,100	250,200	250,200	250,200	250,200

RDA
SUMMARY BY FUND
FY 2021/22 BUDGET

	2018/2019 ACTUAL	2019/20 ACTUAL	2020/2021 6 MONTH ACTUAL	2020/2021 12 MONTH ESTIMATE	2020/2021 BUDGET	**2021/2022** DEPARTMENT REQUEST	**2021/2022** TENTATIVE	**2021/2022** ADOPTED
REDEVELOPMENT AGENCY								
REVENUES	$1,508,867	$1,812,328	$18,688	$2,167,461	$2,209,000	$1,943,600	$1,951,600	$1,951,600
OPERATING EXPENDITURES	$486,415	$663,322	$295,751	$993,079	$1,025,837	$998,600	$1,006,600	$1,006,600
CAPITAL EXPENDITURES	$0	$0	$500	$0	$0	$557,000	$557,000	$557,000
SUB TOTAL - EXPENDITURES	$486,415	$663,322	$296,251	$993,079	$1,025,837	$1,555,600	$1,563,600	$1,563,600
TOTAL REVENUES	$1,508,867	$1,812,328	$18,688	$2,167,461	$2,209,000	$1,943,600	$1,951,600	$1,951,600
TOTAL EXPENDITURES	$486,415	$663,322	$296,251	$993,079	$1,025,837	$1,555,600	$1,563,600	$1,563,600

REDEVELOPMENT AGENCY
FY 2021/22 BUDGET

				2020/2021			2021/2022		
		2018/2019 ACTUAL	2019/20 ACTUAL	6 MONTH ACTUAL	12 MONTH ESTIMATE	BUDGET	DEPARTMENT REQUEST	TENTATIVE	ADOPTED
	USE OF FUND BALANCE				350,000	350,000			
20-31-100000	TAX INCREMENT - PARRISH LANE	889,607	1,038,410	0	1,027,901	1,050,000	1,300,000	1,300,000	1,300,000
20-31-150000	TAX INCREMENT - LEGACY XING	244,738	309,425	0	345,842	314,000	350,000	350,000	350,000
20-31-160000	TAX INCREMENT - BARNARD CREEK	89,499	141,660	0	191,399	144,000	200,000	200,000	200,000
20-36-100000	MISCELLANEOUS REVENUE	5,945	4,729	17,234	18,400	6,000	3,600	3,600	3,600
20-38-750000	BASE RENT PAYMENT	97,767	81,926	1,455	2,700	105,000	90,000	98,000	98,000
20-31-200000	PROPERTY TAX - ADDITIONAL	181,313	236,178	0	231,219	240,000	0	0	0
	TOTAL RDA REVENUES	1,508,867	1,812,328	18,688	2,167,461	2,209,000	1,943,600	1,951,600	1,951,600
	EXPENDITURES								
20-4000-210.0	PUBLIC NOTICES	0	0	0	0	100	100	100	100
20-4000-310.0	PROFESSIONAL SERVICES	8,039	11,686	10,054	27,106	27,000	27,000	27,000	27,000
20-4000-315.0	TRF - ELIGIBLE EXPENSES	0	15,155	163,346	163,549	102,000	1,000	1,000	1,000
20-4000-316.0	ENGINEERING	5,420	0	0	0	7,500	1,000	1,000	1,000
20-4000-420.0	OTHER OBLIGATIONS	1,807	8,300	0	132,932	268,476	259,478	229,063	224,393
20-4000-423.0	CONTRACTUAL - DAYTON WEST	96,381	124,952	0	121,335	128,500	128,500	128,500	128,500
20-4000-425.0	CONTRACTUAL - LAND ROVER	33,387	39,943	0	0	0	0	0	0
20-4000-430.0	CONTRACTUAL - LEGACY CROSSING	153,331	176,328	0	203,867	175,000	175,000	210,000	210,000
20-4000-435.0	CONTRACTUAL - RIMINI	0	0	0	20,041	0	23,000	23,000	23,000
20-4000-440.0	CONTRACTUAL - BARNARD CREEK	29,544	33,930	0	36,526	32,000	32,000	38,000	38,000
20-4000-445.0	CONTRACTUAL - H S LLC	15,346	18,149	0	18,711	18,500	18,500	19,000	19,000
20-4000-480.0	MISC SUPPLIES	4,923	817	0	0	5,000	5,000	5,000	5,000
20-4000-511.0	INSURANCE - LIABILITY AND PROPERTY	13,708	15,614	21,251	21,251	14,000	22,000	22,000	22,000
20-4710-810.0	AFFORDABLE HOUSING TRANSFER TO GF	0	32,436	0	33,336	33,336	35,000	35,000	35,000
20-4000-620.0	ADMINISTRATIVE SERVICES	124,531	186,011	101,100	214,425	214,425	271,022	267,937	272,607
	SUBTOTAL	486,415	663,322	295,751	993,079	1,025,837	998,600	1,006,600	1,006,600
	20-4710								
TRANSFER TO OTHER FUND									
20-4710-830.0	TRANSFER - ADDITIONAL INCREM	178,326	236,178	120,000	231,219	240,000	388,000	388,000	388,000
20-4710-840.0	TRANSFER - DEBT RETIREMENT	592,383	592,963	10,089	593,163	593,163	0	0	0
20-4710-860.0	TRANSFER - PARK	0	0	350,000	350,000	350,000	0	0	0
	SUBTOTAL	770,709	829,141	480,089	1,174,382	1,183,163	388,000	388,000	388,000
	20-5000								
CAPITAL PROJECTS									
20-5000-100.0	TRAFFIC SIGNAL - MARKETPLACE and 400 W		0	0	0	0	487,000	487,000	487,000
20-5000-150.0	RDA IMPROVEMENTS - Economic Development		0	500	0	0	70,000	70,000	70,000
	SUBTOTAL	0	0	500	0	0	557,000	557,000	557,000
	TOTAL RDA EXPENDITURES	1,257,124	1,492,463	776,340	2,167,461	2,209,000	1,943,600	1,951,600	1,951,600
	EXCESS REVENUES OVER (UNDER) EXPENDITURES	251,743	319,865	-757,652	0	0	0	0	0

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 6.

Short Title: Public Hearing - Zoning Map Amendment - Randall Property

Initiated By: Bruce Cox, Parks Director

Staff Representative: Mackenzie Wood, City Planner

SUBJECT

Consider the proposed Zoning Map Amendment for property located at approximately 285 North 100 East from Residential-Medium (R-M) to Public Facilities-Medium (PF-M) - Ordinance No. 2021-05

RECOMMENDATION

Approve Ordinance No. 2021-05 amending the Centerville Zoning Map for property located at approximately 285 North 100 East from Residential-Medium (R-M) to Public Facilities-Medium (PF-M).

BACKGROUND

On May 12, 2021, the Planning Commission reviewed and recommended approval of the proposed rezone of the subject property from Residential-Medium (R-M) to Public Facilities-Medium (PF-M). The Staff Transmittal Report for this application is attached.

ATTACHMENTS:

Description

- 06-01-2021 CC Transmittal Report Zone Map Amendment 285 N 100 E
- 05-12-21 PC Staff Report Zone Map Amendment 285 N 100 E
- Ordinance No. 2021-05 - Randall Rezone

CENTERVILLE CITY
COMMUNITY DEVELOPMENT DEPARTMENT
655 North 1250 West, Centerville, Utah 84014
(801)292-8232

CITY COUNCIL TRANSMITTAL REPORT

PROPERTY OWNER:	**CENTERVILLE CITY**
PROPERTY LOCATION:	**285 NORTH 100 EAST**
PARCEL SIZE:	**0.56 ACRES**
ZONING DISTRICT:	**RESIDENTIAL-MEDIUM**
APPLICATION:	**ZONING MAP AMENDMENT TO PUBLIC FACILIITES-MEDIUM**
RECOMMENDATION:	**APPROVAL (7-0)**

BACKGROUND

The City recently acquired the former Randall home located at 285 N 100 E, and Staff instigated a zone map amendment to bring it into harmony with the surrounding City properties (William R. Smith Park and the City Hall Complex). The Planning Commission reviewed the proposal in regards to the General Plan and applicable City Ordinances.

PLANNING STAFF RECOMMENDATIONS

On May 12, 2021, the Planning Commission voted to RECOMMEND APPROVAL of the Zone Map Amendment for Parcel 02-099-0005, as presented to the City, to Public Facilities-Medium, with the following reasons for action (findings):

SUGGESTED REASONS FOR ACTION:

a. *The Planning Commission finds that there has been a sufficient review and consideration of the criteria found in CZC Section 12.21.080(e).*
b. *The Planning Commission finds that the zone map amendment is substantially consistent with the goals of the General Plan, as described in the staff report.*

c. *The Planning Commission finds the request for Public Facilities-Medium Zoning designation is appropriate.*

PLANNING COMMISSION VOTE (5-0)

COMMISSIONER	YES	NO	ABSENT
Daly (Chair)	X		
Hayman	X		
Kjar	X		
Shegrud	X		
Summerhays (Vice Chair)			X
Wilcox	X		
Wright			X

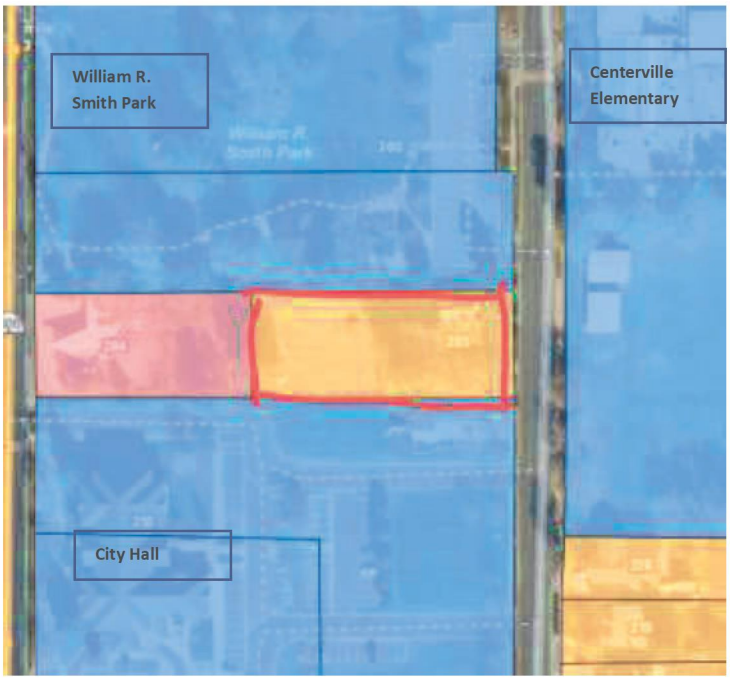
CENTERVILLE CITY
COMMUNITY DEVELOPMENT DEPARTMENT
655 North 1250 West, Centerville, Utah 84014
(801)292-8232

STAFF REPORT
AGENDA: ITEM 1

PROPERTY OWNER:	**CENTERVILLE CITY**
APPLICANT:	**CENTERVILLE CITY** **c/o BRUCE COX** **250 NORTH MAIN STREET** **CENTERVILLE, UT 84014**
PROPERTY LOCATION:	**285 N 100 E**
PARCEL SIZE:	**0.56 ACRES**
ZONING DISTRICT:	**RESIDENTIAL-MEDIUM**
APPLICATION:	**ZONING MAP AMENDMENT**

BACKGROUND

The City recently acquired the property at 285 North 100 East, near the City Hall complex and across from Centerville Elementary School. The City wishes to add the parcel to the William R. Smith Park and City Hall complex.



CODE REQUIREMENTS

Centerville Zoning Code section 12.21.080(e) details the four approval factors for a zoning map amendment as follows:

1. Whether the proposed Zoning Map amendment is consistent with goals, objectives and policies of the General Plan;
2. Whether the proposed Zoning Map amendment is harmonious with the overall character of existing development in the vicinity of the subject property;
3. The extent to which the proposed Zoning Map amendment may adversely affect adjacent property; and
4. The adequacy of facilities and services intended to serve the subject property, including, but not limited to, roadways, parks and recreation facilities, police and fire protection, schools, stormwater drainage systems, water supplies, and waste water and refuse collection.

Staff Response:

1. The property is located in Neighborhood 1, Southeast Centerville, City Hall & Founders Park Small Master Plan area. The General Plan Section 12-480-2 discusses preferred uses in the area, namely low-density single-family dwellings and a discussion on the City Hall and Founders Park (now William R. Smith Park) plan. The City approved a plan by James Glascock in 2001 with the intention of acquiring the properties between City Hall and William R. Smith Park. Staff finds that rezoning parcel 02-099-0005 from Residential-Medium to Public Facilities-Medium in compliance with section 12-480-2 of the Centerville City General Plan.
2. The property in question is currently bounded on three sides by parcels in the Public Facilities-Medium Zone. Rezoning the property to Public Facilities-Medium will create a cohesive block of public uses.
3. Staff finds that rezoning the property will benefit the three public facilities parcels (William R. Smith Park, Centerville Elementary, and City Hall Complex) and not affect the Commercial-Medium parcel directly to the west of the property.
4. While the future plan for this parcel will be discussed in an upcoming City Council meeting, the current plan is for it to be merged with the William R. Smith Park and not add any buildings to this site. There are adequate roadways, fire, and police protection to meet the needs of this parcel. In addition, while they might not be used at present, culinary and sewer and power services are all available.

PLANNING STAFF RECOMMENDATIONS

I hereby make a motion for the Planning Commission to recommend for APPROVAL of the Zone Map Amendment for Parcel 02-099-0005, as presented to the City, to Public Facilities-Medium, with the following reasons for action (findings):

SUGGESTED REASONS FOR ACTION:

a. *The Planning Commission finds that there has been a sufficient review and consideration of the criteria found in CZC Section 12.21.080(e).*

b. *The Planning Commission finds that the zone map amendment is substantially consistent with the goals of the General Plan, as described in the staff report.*
c. *The Planning Commission finds the request for Public Facilities-Medium Zoning designation is appropriate.*

ORDINANCE NO. 2021-05

AN ORDINANCE AMENDING THE CENTERVILLE CITY ZONING MAP BY CHANGING THE ZONING OF APPROXIMATELY 0.56 ACRES OF CERTAIN REAL PROPERTY LOCATED AT APPROXIMATELY 285 NORTH 100 EAST FROM RESIDENTIAL-MEDIUM (R-M) TO PUBLIC FACILITY-MEDIUM (PF-M)

WHEREAS, the City is authorized to enact a zoning map consistent with the purposes set forth in the Utah Land Use Development and Management Act, as more particularly provided in *Utah Code Ann.* §§ 10-9a-101, *et seq*., as amended, and the City is further authorized to make amendments to such zoning map in accordance with procedures set forth in *Utah Code Ann.* § 10-9a-503, as amended; and

WHEREAS, in accordance with applicable provisions of Utah law and the goals of the Centerville City General Plan for the subject property, the City Council desires to amend the Centerville City Zoning Map to rezone the subject property from Residential-Medium (R-M) to Public Facility-Medium (PF-M) as more particularly provided herein; and

WHEREAS, the proposed amendments to the Centerville City Zoning Map as set forth herein have been reviewed by the Planning Commission and the City Council and all appropriate public noticing and hearings have been provided and held in accordance with Utah law to obtain public input regarding the proposed revisions to the City Zoning Map.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, AS FOLLOWS:

Section 1. **Zone Map Amendment.** The real property located at approximately 285 North 100 East in Centerville City consisting of approximately 0.56 acres, as more particularly described in **Exhibit A**, attached hereto and incorporated herein by this reference, is hereby rezoned from Residential-Medium (R-M) to Public Facility-Medium (PF-M) and the Centerville City Zoning Map is correspondingly amended as described herein.

Section 2. **Findings**. The rezone of the subject property from Residential-Medium (R-M) to Public Facility-Medium (PF-M) and corresponding amendment to the Centerville Zoning Map is based on the following findings:

(1) The proposed Zone Map Amendment meets the goals and objectives of the General Plan concerning the subject property; and
(2) The proposed Zone Map Amendment is deemed consistent or adequate with the review requirements listed in CZC 12.21.080(e), as reviewed in the applicable Staff Report.

Section 3. **Severability**. If any section, part or provision of this Ordinance is held invalid or unenforceable by a court of competent jurisdiction, such invalidity or unenforceability shall not affect any other portion of this Ordinance, and all sections, parts and provisions of this Ordinance shall be severable.

Section 4. **Effective Date.** This Ordinance shall become effective upon publication or posting, or thirty (30) days after passage, whichever occurs first.

PASSED AND ADOPTED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, THIS 1st DAY OF JUNE, 2021.

ATTEST: **CENTERVILLE CITY**

_____ By: _____
Jennifer Hansen, City Recorder Mayor Clark A. Wilkinson

Voting by the City Council:

	"AYE"	"NAY"	"ABSENT"
Councilmember Fillmore	_____	_____	_____
Councilmember Ince	_____	_____	_____
Councilmember Ivie	_____	_____	_____
Councilmember McEwan	_____	_____	_____
Councilmember Mecham	_____	_____	_____

CERTIFICATE OF PASSAGE AND PUBLICATION OR POSTING

According to the provisions of the U.C.A. § 10-3-713, as amended, I, the municipal recorder of Centerville City, hereby certify that foregoing ordinance was duly passed by the City Council and published, or posted at: (1) 250 North Main; (2) 655 North 1250 West; and (3) RB's Gas Station, on the foregoing referenced dates.

_____ DATE: _____
JENNIFER HANSEN, City Recorder

RECORDED this ____ day of _____, 2021.

PUBLISHED OR POSTED this ____ of _____, 2021.

EXHIBIT A

Property Description

Parcel No. 02-099-0005
Centerville, Utah

BEG 17 1/2 RODS N & 200 FT E FR SW COR LOT 7, BLK D, PLAT BC, CENTERVILLE TS SURVEY, N 99.25 FT, E 246 FT, M/L, TO W LINE 3RD STR, S ALG W LINE 99.25 FT, W 246 FT, M/L, TO BEG. CONT. 0.56 ACRES.

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 7.

Short Title: Public Hearing - Zoning Code Amendments - Newspaper Noticing Amendments

Initiated By: Lisa Romney, City Attorney

Staff Representative: Lisa Romney, City Attorney

SUBJECT

Consider amendments to the Centerville Zoning Code and Subdivision Ordinance regarding newspaper noticing in accordance with recent State law amendments adopted with SB 201 - Ordinance No. 2021-10

RECOMMENDATION

Adopt Ordinance No. 2021-10 amending various provisions of the Centerville Zoning Code and Subdivision Ordinance regarding newspaper noticing in accordance with recent State law amendments adopted with SB 201.

BACKGROUND

The Utah State Legislature adopted SB 201 during the 2021 General Session eliminating many newspaper noticing requirements. Based on these amendments to State law, Staff has prepared Ordinance No. 2021-10 amending various provisions of the Centerville Zoning Code and Subdivision Ordinance eliminating newspaper notice requirements where applicable to be consistent with State law. Not all State law newspaper noticing requirements were eliminated by SB 201, but newspaper notice is no longer required for notice of General Plan, Zoning Code, Zoning Map, and other subdivision amendments. On April 28, 2021, the Planning Commission reviewed and recommended approval of the proposed Zoning Code amendments regarding newspaper notice.

ATTACHMENTS:

Description

- Ordinance No. 2021-10 - Newspaper Noticing

ORDINANCE NO. 2021-10

AN ORDINANCE AMENDING VARIOUS SECTIONS OF THE CENTERVILLE ZONING CODE AND SUBDIVISION ORDINANCE REGARDING NEWSPAPER NOTICING REQUIREMENTS BASED ON STATE LAW CHANGES ADOPTED WITH SB 201 IN THE 2021 LEGISLATIVE SESSION

WHEREAS, the City Council of Centerville City has previously adopted various provisions of the Centerville Zoning Code and Subdivision Ordinance regarding statutorily required newspaper notice; and

WHEREAS, based on changes adopted in SB 201 by the Utah Legislature in the 2021 General Session, many newspaper notice requirements have been eliminated; and

WHEREAS, the City Council desires to amend various sections of the Centerville Zoning Code and Subdivision Ordinance to eliminate statutorily required newspaper notice in accordance with the amendments set forth in SB 201; and

WHEREAS, the City Council finds that the proposed amendments to the Centerville Zoning Code and Subdivision Ordinance as more particularly set forth herein are in the best interest of the public to provide ordinances and noticing consistent with State law.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, AS FOLLOWS:

Section 1. **Amendment**. Section 12.21.050 of the Centerville Zoning Code regarding Public Hearings and Public Meetings is hereby amended to read in its entirety as follows:

12.21.050 Public Hearings and Public Meetings

Any public hearing or public meeting required under this Title, as the case may be, shall be scheduled and held subject to the requirements of this Section.

(a) Scheduling a Public Hearing or Public Meeting. An application requiring a public hearing or public meeting shall be scheduled within a reasonable time following receipt of a complete application. The amount of time between receipt of an application and holding a public hearing or public meeting regarding the application shall be considered in light of:
    (1) The complexity of the application submitted;
    (2) The number of other applications received which require a public hearing or public meeting;
    (3) Available staff resources; and
    (4) Applicable public notice requirements.

(b) Notice of Public Meeting. In accordance with the Utah Open and Public Meetings Act, as set forth in Utah Code §§ 52-4-101, et seq., the applicable land use authority shall provide public notice of its public meetings in accordance with Utah Code § 52-4-202.

(1) Annual Meeting Schedule. The applicable land use authority shall give public notice at least once each year of its annual meeting schedule specifying the date, time, and place of such meetings.

(2) Individual Meeting. The applicable land use authority shall also provide not less than 24 hours public notice of the agenda, date, time, and place of each of its meetings in accordance with Utah Code § 52-4-202.

(3) Public Notice Required. For purposes of Subsection (1) and (2), public notice of meetings and annual schedule shall be satisfied by:

A. Posting written notice at City Hall (except for an electronic meeting held without an anchor location pursuant to Utah Code § 52-4-207);

B. Publishing notice on the Utah Public Notice Website ~~created under Utah Code § 63F-1-701~~;

C. Publishing notice on the City~~'s~~ website; and

D. Providing notice to at least one newspaper of general circulation within the geographic area of the City or a local media correspondent in accordance with Utah Code § 52-4-202.

(4) Emergency Meetings. When because of unforeseen circumstances it is necessary for the applicable land use authority to hold an emergency meeting to consider matters of an emergency or urgent nature, the noticing requirements set forth herein may be disregarded and the best notice practical will be given in accordance with the Utah Open and Public Meetings Act, as set forth in Utah Code §§ 52-4-101, et seq.

(c) Notice of Public Hearing. When this Title or any S~~s~~tate statute requires a public hearing for any land use application, permit, or matter governed by this Title, notice of the public hearing regarding such matter shall be provided in accordance with the provisions set forth herein.

(1) Contents. Public notice of the public hearing should include the following information:

A. A statement summarizing the substance of the application;

B. The date, time, and place of the public hearing; and

C. The place where the application may be inspected by the public or the person to contact for further information.

(2) Notice for First Public Hearing. Public notice of the first public hearing on an application shall be provided at least 10 calendar days before the public hearing. Such notice shall be:

A. Published on the Utah Public Notice Website ~~created under Utah Code § 63F-1-701~~;

B. Posted on the City~~'s official~~ website;

C. For the first public hearing for General Plan enactment or amendment, Zoning Code enactment or amendment, and Zoning Map enactment or amendment, notice shall be ~~published at least 10 calendar days before the hearing in a newspaper of general circulation in the area and~~ mailed to each affected entity (as defined in Utah Code § 10-9a-103); and

D. For the first public hearing regarding a Zoning Map enactment or amendment, the City shall send a courtesy notice at least 10 calendar days prior to the hearing to each owner of private real property whose property is located entirely or partially within the proposed Zoning Map amendment in accordance with Utah Code § 10-9a-205.

(3) Notice for Subsequent Public Hearings. Public notice of any additional or subsequent public hearing on an application shall be provided at least three ~~10~~ calendar days before the public hearing by:

A. Publishing notice on the Utah Public Notice Website ~~created under Utah Code § 63F-1-701~~; and

B. Posting notice on the City website.

(d) Applicant Notice. For each land use application filed in accordance with the provisions of this Title, the City shall notify the applicant of the date, time, and place of each public hearing and public meeting to consider the application. The City shall provide each applicant a copy of each staff report regarding the applicant or the pending application at least three business days before the public hearing or public meeting, subject to the waiver provisions of Utah Code § 10-9a-202. Such notice may be provided by mail, email, or other electronic means to the designated contact and mailing address or email address provided by the applicant in accordance with CZC 12.21.040. The City shall also provide the applicant notice of any final action on a pending application in accordance with the provisions of Subsection (o~~l~~).

(e) Notice of Intent to Prepare General Plan Amendment. Before preparing a proposed General Plan enactment or amendment, the City shall provide 10 calendar days notice of its intent to prepare a proposed General Plan enactment or amendment to the following listed entities or persons. Such notice shall comply with the requirements of Utah Code § 10-9a-203. Notice of intent shall be provided to:

(1) Each affected entity (as defined in Utah Code § 10-9a-103);

(2) The Automated Geographic Reference Center (as defined in Utah Code § 63F-1-506);

(3) The Wasatch Front Regional Council (as the association of governments of which the City is a member); and

(4) The Utah Public Notice Website ~~created under Utah Code § 63F-1-701~~.

(f) Posting Notice On-Site. In addition to public notice of a public hearing as provided in this Section, the City shall post on-site notice of the first public hearing regarding a proposed Zoning Map amendment, conditional use permit, or conceptual site plan application at least five ~~10~~ calendar days before the public hearing. Such notice should include the information set forth in Subsection (c)(1). Applications that involve multiple parcels need not have notice posted on each individual parcel, but shall be posted in a location or locations representative of the proposed project area.

(1) The Zoning Administrator may provide additional notice of any application, including, but not limited to, direct mailings to neighboring property owners.

(2) Any on-site posting, direct mailing, or other notice provided under this Subsection (f) is intended as a courtesy only.

(3) Any error or failure on the part of the City to provide on-site posting or other courtesy notice shall not affect the adequacy or sufficiency of published and/or posted notice of the meeting or hearing as required by law.

(g) High Priority Transportation Corridors Notice. When required by law under Utah Code § 10-9a-206 and specifically requested in writing, the City may be required to provide the Utah Department of Transportation with electronic notice of any land use application received by the City that may adversely impact the

development of any designated high priority transportation corridor within the City. When required by law under Utah Code § 10-9a-206 and specifically requested in writing, the City may be required to provide a large public transit district with electronic notice of any land use application received by the City that may impact the development of a major transit investment corridor.

(h) Illuminated Sign Regulation Notice. Prior to any public hearing or public meeting to consider a proposed land use regulation or land use application modifying sign regulations for an illuminated sign within a unified commercial development or a planned unit development, the City shall provide written notice in accordance with Utah Code § 10-9a-213.

(i) Standards and Specifications Notice. Prior to implementing an amendment to adopted standards and specifications for public improvements that apply to subdivisions or development within the City, the City shall give 30 days mailed notice and an opportunity to comment to anyone who has requested such notice in writing pursuant to Utah Code § 10-9a-212.

~~(g)~~(j) Challenge of Notice. Pursuant to Utah Code § 10-9a-209, if notice required by this Section or any other applicable provision of this Title is not challenged in accordance with applicable appeal procedures within 30 days from the date of the hearing or meeting for which notice was given, the notice shall be considered adequate and proper.

~~(h)~~(k) Examination of Application. Upon reasonable request during normal business hours, any person may examine an application and materials submitted in support of or in opposition to an application in accordance with the Utah Government Records Access Management Act, as set forth in Utah Code §§ 63G-2-101, et seq. Copies of such materials shall be made available at reasonable cost in accordance with the City Fee Schedule.

~~(i)~~(l) Public Hearing and Public Meeting Procedures. An application shall be considered pursuant to policies and procedures established by the decision-making body or official for the conduct of its meetings.

~~(j)~~(m) Withdrawal of Application. An applicant may withdraw an application at any time prior to action on the application by the decision-making body or official. Application fees shall not be refundable if prior to withdrawal:

(1) A staff review of the application has been undertaken; or

(2) Notice for a public hearing or meeting on the application has been mailed, posted, or published.

~~(k)~~(n) Record of Public Hearing or Public Meeting.

(1) Except as provided by law, written minutes and a recording shall be kept of all open meetings. Written minutes of an open meeting shall include:

A. The date, time, and place of the meeting;

B. The names of members present and absent;

C. The substance of all matters proposed, discussed, or decided, and a record, by individual member, of votes taken;

D. The names of each person who provides testimony or comments to the public body and the substance in brief of their testimony or comments; and

E. Any other information that is a record of the proceedings of the meeting that any member requests be entered in the minutes or recording.

(2) The minutes, recordings, all applications, exhibits, papers, and reports submitted in any proceeding before the decision-making body or official,

and the decision of the decision-making body or official, shall constitute the record thereof. The record shall be made available for public examination as provided in Subsection (k~~l~~).

~~(l)~~(o) Final Action Notification. Notice of any final action or decision on a pending application by the decision-making body or official shall be provided to the ~~an~~ applicant within a reasonable time. Such notice shall be provided by mail, email, or other electronic means to the designated contact and mailing address or email address provided by the applicant in accordance with CZC 12.21.040.

Section 2. **Amendment**. Section 15.01.130 of the Centerville Municipal Code regarding Public Hearings and Meetings for subdivision applications is hereby amended to read in its entirety as follows:

15.01.130 Public Hearings and Public Meetings

Any public hearing or public meeting required under this Title, as the case may be, shall be scheduled and held subject to the requirements of this S~~s~~ection.

(a) Scheduling a Public Hearing or Public Meeting. An application requiring a public hearing or public meeting shall be scheduled within a reasonable time following receipt of a complete application. The amount of time between receipt of an application and holding a public hearing or public meeting regarding the application shall be considered in light of:
  (1) The complexity of the application submitted;
  (2) The number of other applications received which require a public hearing or public meeting;
  (3) Available staff resources; and
  (4) Applicable public notice requirements.

(b) Notice of Public Meeting. In accordance with the Utah Open and Public Meetings Act, as set forth in Utah Code §§ 52-4-1, et seq., the applicable land use authority designated to act upon a subdivision application shall provide public notice of its meetings.
  (1) Annual Meeting Schedule. The applicable land use authority shall give public notice at least once each year of its annual meeting schedule specifying the date, time, and place of such meetings.
  (2) Individual Meeting. The applicable land use authority shall also provide not less than 24 hours public notice of the agenda, date, time, and place of each of its meetings in accordance with Utah Code § 52-4-202.
  ~~(2)~~(3) Public Notice Required. For purposes of Subsection (1) and (2), p~~P~~ublic notice of meetings and annual schedule shall be satisfied by:
    A. Posting written notice at City Hall (except for an electronic meeting held without an anchor location pursuant to Utah Code § 52-4-207) ~~notice in at least three public locations within the City, including City Hall~~;
    ~~A.~~B. Publishing notice on the Utah Public Notice Website; and
    ~~B.~~C. Providing notice to at least one newspaper of general circulation within the geographic area of the City or a local media correspondent.
  ~~(3)~~(4) Emergency Meetings. When because of unforeseen circumstances it is necessary for the applicable land use authority to hold an emergency meeting to consider matters of an emergency or urgent nature, the noticing

requirements set forth herein may be disregarded and the best notice practical will be given in accordance with the Utah Open and Public Meetings Act, as set forth in Utah Code §§ 52-4-1, et seq.

(c) Notice of Public Hearing. When this Title or any State statute requires a public hearing for any proposed subdivision, amendment to a subdivision, or any other land use application governed by this Title, notice of the first public hearing regarding such matter shall be provided in accordance with the provisions set forth herein.

(1) Contents. Public notice of the public hearing should include the following information:

A. A statement summarizing the substance of the application;

B. The date, time, and place of the public hearing; and

C. The place where the application may be inspected by the public or the person to contact for further information.

(2) Notice for First Public Hearing. Public notice of the first public hearing on an application shall be provided at least three calendar days before the public hearing. Such notice shall be:

A. Published on the Utah Public Notice Website;

B. Posted on the City website;

C. Mailed to each affected entity (as defined in Utah Code § 10-9a-103); and

D. P~~p~~osted on the property proposed for subdivision, in a visible location, with a sign of sufficient size, durability, and print quality that is reasonably calculated to give notice to passers-by.

(3) Notice for Subsequent Public Hearings. Public notice of any additional or subsequent public hearings on an application shall be provided at least three calendar days before the public hearing by:

A. Publishing notice on the Utah Public Notice Website; and

~~D.~~B. Posting on the City website.

~~(2)~~(4) Multi-Unit Residential, Commercial or Industrial Project Notice. Notice of the first public hearing to consider a preliminary plat describing a multi-unit residential development or a commercial or industrial development shall be mailed to each affected entity (as defined in Utah Code § 10-9a-103~~CMC 15.01.040~~).

~~(3)~~(5) Vacation of Public Street Notice. Notice of any subdivision or plat amendment that involves a vacation, alteration, or amendment of a street shall be provided in accordance with Utah Code § 10-9a-208.

(d) Applicant Notice. For each land use application filed in accordance with the provisions of this Title, the City shall notify the applicant of the date, time, and place of each public hearing and public meeting to consider the application. The City shall provide each applicant a copy of each staff report regarding the application at least three business days before the public hearing or public meeting, subject to the waiver provisions of Utah Code § 10-9a-202. Such notice may be provided by mail, email, or other electronic means to the designated contact and mailing address or email address provided by the applicant. The City shall also provide the applicant notice of any final action on a pending application in accordance with the provisions of Subsection (m~~k~~).

(e) Additional Notice. In addition to public notice of a public hearing as provided in this Section, the Zoning Administrator, in his or her sole discretion, may provide additional notice of any application, including, but not limited to, direct mailings

to neighboring property owners. Any direct mailing, or other notice provided under this Subsection is intended as a courtesy only. Any error or failure on the part of the City to provide such courtesy notice shall not affect the adequacy or sufficiency of posted notice of the meeting or public hearing as required by law.

(f) High Priority Transportation Corridors Notice. When required by law under Utah Code § 10-9a-206 and specifically requested in writing, the City may be required to provide the Utah Department of Transportation with electronic notice of any land use application received by the City that may adversely impact the development of any designated high priority transportation corridor within the City. When required by law under Utah Code § 10-9a-206 and specifically requested in writing, the City may be required to provide a large public transit district with electronic notice of any land use application received by the City that may impact the development of a major transit investment corridor.

(g) Standards and Specifications Notice. Prior to implementing an amendment to adopted standards and specifications for public improvements that apply to subdivisions or development within the City, the City shall give 30 days mailed notice and an opportunity to comment to anyone who has requested such notice in writing pursuant to Utah Code § 10-9a-212.

~~(f)~~(h) Challenge of Notice. If notice required by this Section or any other applicable provision of this Title is not challenged in accordance with applicable appeal procedures within 30 days from the date of the hearing or meeting for which notice was given, the notice shall be considered adequate and proper.

~~(g)~~(i) Examination of Application. Upon reasonable request during normal business hours, any person may examine an application and materials submitted in support of or in opposition to an application in accordance with the Utah Government Records Access and Management Act, as set forth in Utah Code §§ 63G-2-101, et seq., as amended. Copies of such materials shall be made available at reasonable cost in accordance with the City Fee Schedule.

~~(h)~~(j) Public Hearing and Public Meeting Procedures. An application shall be considered pursuant to the provisions of this Title and any policies and procedures established by the decision-making body or official for the conduct of its meetings.

~~(i)~~(k) Withdrawal of Application. An applicant may withdraw an application at any time prior to action on the application by the decision-making body or official. Application fees shall not be refundable if prior to withdrawal:

(1) A staff review of the application has been undertaken; or

(2) Notice for a public hearing or public meeting on the application has been mailed, posted, or published.

~~(j)~~(l) Record of Public Hearing or Public Meeting.

(1) Written minutes and a recording shall be kept of all public hearings and public meetings. Written ~~Such~~ minutes ~~and digital or tape recording~~ shall include:

A. The date, time, and place of the meeting;

B. The names of members present and absent;

C. The substance of all matters proposed, discussed, or decided, and a record, by individual member, of votes taken;

D. The names of each person ~~all citizens~~ who provides testimony or comments to the public body ~~appeared~~ and the substance in brief of their testimony or comments; and

E. Any other information that is a record of the proceedings of the

meeting that any member requests be entered in the minutes or recording.

(2) The minutes, recordings, ~~all~~ applications, exhibits, papers, and reports submitted in any proceeding before the decision-making body or official, and the decision of the decision-making body or official, shall constitute the record thereof. The record shall be made available for public examination as provided in Subsection (i~~g~~).

~~(k)~~(m) Notification of Final Action. Notice of any final action or decision on a pending application by the decision-making body or official shall be provided to the ~~an~~ applicant within a reasonable time. Such notice shall be provided by mail, email, or other electronic means to the designated contact and mailing address or email address provided by the applicant.

Section 3. **Amendment**. Section 15.09.040 of the Centerville Municipal Code regarding Plat Amendments is hereby amended to read in its entirety as follows:

15.09.040 Notice Requirements

(a) The City shall provide notice of public meetings and public hearings regarding a petition for plat amendment in accordance with the provisions of CMC 15.01.130 regarding public hearings and public meetings.

(b) In addition to the notice requirements set forth in CMC 15.01.130, notice of all plat amendments shall be provided in accordance with Utah Code § 10-9a-207. Pursuant to Section 10-9a-207, the City is required to provide notice of the date, time, and place of at least one public meeting regarding the proposed plat amendment, which notice shall be provided at least 10 calendar days before the public meeting and shall be:

(1) Mailed and addressed to the record owner of each parcel within 300 feet of the property proposed for subdivision plat amendment; or

(2) Posted on the property proposed for subdivision plat amendment in a visible location with a sign of sufficient size, durability, and print quality that is reasonably calculated to give notice to passers-by.

(c) In addition to the notice requirements set forth in this Section, notice of all plat amendments involving a vacation or amendment to a public street, right-of-way, or easement shall be provided in accordance with Utah Code § 10-9a-208. Pursuant to Section 10-9a-208, the City is required to provide notice of the date, time, and place of the public hearing regarding a plat amendment involving the vacation or amendment to a public street, right-of-way, or easement at least 10 days before the public hearing, which notice shall be:

(1) Mailed to the record owner of each parcel that is accessed by the public street, right-of-way, or easement;

(2) Mailed to each affected entity;

(3) Posted on or near the street, right-of-way, or easement in a manner that is calculated to alert the public;

(4) Published on the City website until the public hearing concludes; ~~in a newspaper of general circulation in the City;~~ and

(5) Published on the Utah Public Notice Website ~~created pursuant to Utah Code § 63F-1-701~~.

(d) Pursuant to Utah Code § 10-9a-608, the City shall provide notice of all plat amendment petitions by mail, email, or other effective means to each affected

entity that provides a service to an owner of record of the portion of the plat that is being vacated or amended at least 10 calendar days before the City Council may approve the vacation or amendment of the plat.

Section 4. **Severability.** If any section, part or provision of this Ordinance is held invalid or unenforceable, such invalidity or unenforceability shall not affect any other portion of this Ordinance, and all sections, parts and provisions of this Ordinance shall be severable.

Section 5. **Effective Date.** This Ordinance shall become effective on May 5, 2021, subject to posting requirements under State law.

PASSED AND ADOPTED BY THE CITY OUNCIL OF CENTERVILLE CITY, STATE OF UTAH, THIS 1st DAY OF JUNE, 2021.

CENTERVILLE CITY

ATTEST:

_____ By: _____

Jennifer Hansen, City Recorder Mayor Clark A. Wilkinson

Voting by the City Council:

	"AYE"	"NAY"	"ABSENT"
Councilmember Fillmore	_____	_____	_____
Councilmember Ince	_____	_____	_____
Councilmember Ivie	_____	_____	_____
Councilmember McEwan	_____	_____	_____
Councilmember Mecham	_____	_____	_____

CERTIFICATE OF PASSAGE AND PUBLICATION OR POSTING

According to the provisions of the U.C.A. § 10-3-713, as amended, I, the municipal recorder of Centerville City, hereby certify that foregoing ordinance was duly passed by the City Council and published or posted at: (1) 250 North Main; (2) 655 North 1250 West; and (3) RB's Gas Station, on the foregoing referenced dates.

_____ DATE: _____

JENNIFER HANSEN, City Recorder

RECORDED this ____ day of _____, 2021.

PUBLISHED OR POSTED this ____ of _____, 2021.

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 8.

Short Title: UDOT Outside Engineering Services Reimbursement Agreement

Initiated By: Kevin Campbell, City Engineer

Staff Representative: Kevin Campbell, City Engineer

SUBJECT

Consider UDOT Outside Engineering Services Reimbursement Agreement in connection with the construction of the West Davis Corridor and its impact on identified City owned facilities in the project area

RECOMMENDATION

Approve UDOT Outside Engineering Services Reimbursement Agreement in connection with the construction of the West Davis Corridor and its impact on identified City owned facilities in the project area.

BACKGROUND

UDOT is constructing the West Davis Corridor in Davis County. The West Davis Corridor project will impact some existing City owned facilities in the project area requiring relocation of such facilities. UDOT will allow the City to hire outside engineering services to perform engineering, coordination, review, and inspection of the utility work for relocation of City owned facilities. UDOT will also reimburse the City for such outside engineering services costs incurred by the City as more particularly provided in the Outside Engineering Services Reimbursement Agreement. Staff recommends approval of the Reimbursement Agreement.

ATTACHMENTS:

Description

- UDOT Outside Engineering Services Reimbursement Agreement - West Davis Corridor

OUTSIDE ENGINEERING SERVICES REIMBURSEMENT AGREEMENT

Centerville City

THIS OUTSIDE ENGINEERING SERVICES REIMBURSEMENT AGREEMENT, by and between the Utah Department of Transportation ("UDOT"), and Centerville City, a Political Subdivision of the State of Utah ("City"). Each as party, ("Party") and together as parties, ("Parties").

RECITALS

WHEREAS, UDOT awarded a contract for the highway project identified as West Davis Highway (SR-177) in DAVIS County, Utah ("Project"); and

WHEREAS, UDOT has identified City owned facilities within the limits of the Project; and

WHEREAS, Project construction necessitates relocating the City's utility facilities and includes protection in place, adjustment of the facilities, and/or relocation of the City's facilities.

WHEREAS, the City desires to hire a consultant to perform engineering, coordination, review, and inspection of the Utility Work on behalf of the City ("Outside Engineering Services"); and

WHEREAS, UDOT will allow the City to hire Outside Engineering Services upon the terms and conditions of this agreement.

THIS AGREEMENT is made to set out the terms and conditions where under the utility work shall be performed.

AGREEMENT

Now therefore, the parties agree as follows:

1. Contact Information

UDOT's Resident Engineer is Trent Beck, telephone number (435) 327-1185, and e-mail tbeck@utah.gov, or their designated representative, as assigned.

UDOT's Region Utility Leader is J Tucker Doak telephone number (801) 620-1660, email jdoak@utah.gov.

City's contact person is Kevin Campbell, telephone number (801) 263-1752, and e-mail kevin.campbell@esieng.com.

2. Scope of Utility Work

The City will hire Outside Engineering Services for the reviews of the designs for the Utility Work. UDOT will reimburse the City for the actual cost incurred for Outside Engineering Services. The estimated cost and scope of Outside Engineering Services is attached as Exhibit "A" that is incorporated by

reference. This is an estimate only. Total payment to the City by UDOT is based on the actual costs incurred as determined after completion of the Utility Work.

Estimated Cost for Labor	$119,352.00
Estimated Cost for Direct Expenses	$ 2,656.50
Total Estimated Cost for Outside Engineering Services	$132,018.50

3. Project Specific Special Provisions

In the event there are changes in the scope of the Outside Engineering Services covered by this Agreement, a modification to this Agreement in writing by the Parties is required prior to the start of Outside Engineering Services on the changes and additions.

4. Performance of Utility Work

UDOT and the City will enter into a separate agreement covering the construction costs of the relocation.

5. Conformance with Utah Administrative Code R930-7

The design and construction of the Utility Work, access for future maintenance and servicing of City's property located on the right of way of the Project, will be in conformance with Utah Administrative Code R930-7, and any supplements or amendments.

6. Billing and Payment

The City shall submit itemized bills covering its actual costs incurred for performing the Outside Engineering Services to:

UDOT's Construction Division
Attention: Contracts, Estimates, and Agreements Manager
4501 South 2700 West
Salt Lake City, Utah 84114-8220

Itemized bills shall bear the Project and Agreement numbers, supporting sheets, and a complete billing statement of all actual costs incurred, following the order of the items in the detailed estimates contained in this Agreement, and be submitted to UDOT within **60 days** following completion of Outside Engineering Services for the City on the Project. Otherwise, previous payments to the City may be considered final, except as agreed to between the Parties in advance.

UDOT will reimburse the City within **60 days** after receipt of the billings, but only for items complying fully with the provisions of Utah Administrative Code R930-8. Failure on the part of the City to submit final billings within **6 months** of the completion of Outside Engineering Services will result in UDOT's disallowance of that portion of Outside Engineering Services performed by the City.

7. Right to Audit

UDOT and/or the Federal Highway Administration shall have the right to audit all cost records and accounts of the City pertaining to this Project in accordance with the auditing procedure of the Federal Highway Administration and 23 C.F.R. §645, subpart A. Should this audit disclose that the City has

been underpaid, the City will be reimbursed by UDOT upon submission of additional billing to cover the underpayment. Should this audit disclose that the City has been overpaid, the City will reimburse UDOT in the amount of the overpayment. For purpose of audit the City is required to keep and maintain its records of Utility Work covered herein for a minimum of 3 years after final payment is received by the City from UDOT.

8. Miscellaneous

a. Each Party agrees to undertake and perform all further acts that are reasonably necessary to carry out the intent and purpose of this Agreement at the request of the other Party.

b. This Agreement in no way creates any type of agency relationship, joint venture, or partnership between UDOT and City.

c. The failure of either Party to insist upon strict compliance of any of the terms and conditions, or failure or delay by either Party to exercise any rights or remedies provided in this Agreement, or by law, will not release either Party from any obligations arising under this Agreement.

d. This Agreement shall be deemed to be made under and shall be governed by the laws of the State of Utah in all respects. Each person signing this Agreement warrants that the person has full legal capacity, power and authority to execute this Agreement for and on behalf of the respective Party and to bind such Party.

e. If any provision or part of a provision of this Agreement is held invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision. Each provision shall be deemed to be enforceable to the fullest extent under applicable law.

f. This Agreement may be executed in one or more counterparts, each of which shall be an original, with the same effect as if the signatures were made upon the same instrument. This Agreement may be delivered by facsimile or electronic mail.

g. This Agreement shall constitute the entire agreement and understanding of the Parties with respect to the subject matter hereof, and shall supersede all offers, negotiations and other agreements with respect thereto. Any amendment to this Agreement must be in writing and executed by authorized representatives of each Party.

h. The date of this Agreement is the date this Agreement is signed by the last Party.

****

IN WITNESS WHEREOF, the Parties hereto have caused these presents to be executed by their duly authorized officers.

Attest

_____

Title: _____

Date: _____

Centerville City

_____

Title: _____

Date: _____

(IMPRESS SEAL)

. . . . . .

Recommended for Approval

_____

Title: Utility and Railroad Leader

Date: _____

Utah Department of Transportation

_____

Title: Project Director

Date: _____

UDOT Comptroller Office

_____

Title: Contract Administrator

Date: _____

Exhibit A
Estimated Cost and Scope of Work

WEST DAVIS CORRIDOR: FRONTAGE ROAD - CENTERVILLE
Project No.: S-R199(229) (CENT CITY #21-058)
PIN: 11268
Project Description: ROADWAY RECONSTRUCTION & UTILITY RELOCATION
Frontage Road Centerville City

Executive Summary:

Brief Description:
ESI Engineering, Inc. will provide construction engineering management for roadway reconstruction and utility relocaton project for Centerville City in accordance with current UDOT policies, procedures, and standards. Project is located on Frontage Road in Centervile City. The work will include construction engineering management, quality control and review, field inspection, and 3rd party material testing. Scope of the project is to remove and rebuild new frontage road with new curb and gutter, sidwalk and park strip along east edge of roadway and update signing and striping. Utility replacement will include new 10" PVC Water line, valves, fire hydrants and connections. Four new 36" storm drian pipes will constructed crossing frontage road at various locations.

Prime and Subs:
ESI Engineering, Inc. will be Prime.
GeoStrata will be sub.

Assumptions:
1. PI will be performed by a third party.
2. ROW clearance has been provided to meet design for construction.
3. Drainage structure and piping improvements are part of the scope of this project.
4. Centerville City utility improvements are included in design and scope for this portion of the project.
5. Weekly Utility/Contractor coordination meetings will take place for project status.

Phasing:
There will be no phasing.

Fee Type:
Cost plus fixed fee

Other Direct Costs:
Mileage, GPS, and Testing

WEST DAVIS CORRIDOR: FRONTAGE ROAD - CENTERVILLE
Project No.: S-R199(229) (CENT CITY #21-058)
PIN: 16937
Project Description: Roadway Reconstruction & Utility Relocation
Scope of Work

PROJECT TASKS	Employee Name							Total Number of Hours
	Brian Campbell (Resident Engineer)	Cody Pedersen (Resident Engineer)	Kevin Campbell (Quality Assurance)	Kyle Kump (Inspector)	Brian Naylor (Inspector)	Cameron Koller (Inspector)	0	
85C - Preconstruction Activities	10	0	40	0	0	0	0	50
87C - Construction Engineering Management	80	20	20	0	16	0	0	136
89C - Project Administration	0	16	0	0	0	0	0	16
91C - Field Inspection	16	0	32	280	280	60	0	668
93C - Materials Testing	16	0	0	20	20	20	0	76
97C - QC/QA Control	16	0	16	0	0	0	0	32
99C - Construction Closeout	60	0	16	0	0	0	0	76
Summary of Hours	198	36	124	300	316	80	0	1054

ESI ENGINEERING, INC.

CONSULTANT COST PROPOSAL
WEST DAVIS CORRIDOR: FRONTAGE ROAD - CENTERVILLE

DIRECT LABOR EXPENSES

LABOR DESCRIPTION	HOURS	PROPOSAL RATE $/HR.	AMOUNT $
Brian Campbell (Resident Engineer)	198	$140.00	$27,720.00
Cody Pedersen (Resident Engineer)	36	$140.00	$5,040.00
Kevin Campbell (Quality Assurance)	124	$140.00	$17,360.00
Kyle Kump (Inspector)	300	$102.00	$30,600.00
Brian Naylor (Inspector)	316	$102.00	$32,232.00
Cameron Koller (Inspector)	80	$80.00	$6,400.00
0	0	$0.00	$0.00
SUBTOTAL	**1054**		**$119,352.00**
		Total Labor	**$119,352.00**

DIRECT EXPENSES

DESCRIPTION	QUANTITY	RATE	AMOUNT $
Mileage	4620	$0.575	$2,656.50
			$0.00
			$0.00
			$0.00
		Direct Expenses	**$2,656.50**

SUBCONSULTANT(S) EXPENSE

GeoStrata (Material Testing and Laboratory)	$10,010.00
	$0.00
Total Subconsultant	**$10,010.00**
TOTAL COSTS	**$132,018.50**

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 9.

Short Title: City Standards and Specifications and Detail Drawings

Initiated By: Kevin Campbell, City Engineer

Staff Representative: Kevin Campbell, City Engineer

SUBJECT

Consider adoption of Resolution No. 2021-09 updating and amending the City Standards and Specifications, including Detail Drawings

RECOMMENDATION

Recommend approval of Resolution No. 2021-09 amending the City Standards and Specifications, including Detail Drawings.

BACKGROUND

The City Engineer has prepared updated Standards and Specifications, including Detail Drawings, governing construction of public improvements within the City. Staff recommends approval of the updated Standards and Specifications and Detail Drawings.

ATTACHMENTS:

Description

- Resolution No. 2021-09 - Standards and Specifications
- Detail Drawings
- Standards and Specifications

RESOLUTION NO. 2021-09

A RESOLUTION UPDATING AND AMENDING THE CENTERVILLE CITY STANDARDS AND SPECIFICATIONS AND DETAIL DRAWINGS REGARDING THE CONSTRUCTION AND DEVELOPMENT OF PUBLIC IMPROVEMENTS WITHIN THE CITY.

WHEREAS, Centerville City has previously established standards and specifications, including detail drawings, regarding the construction and development of public improvements within the City; and

WHEREAS, the City Council desires to update and amend such standards and specifications, including detail drawings, as recommended by the City Engineer in order to provide more current provisions regarding the same.

NOW THEREFORE, IT IS HEREBY RESOLVED BY THE CITY COUNCIL OF CENTERVILLE, UTAH, AS FOLLOWS:

Section 1. Amendment. The City Council hereby adopts the updated and amended Centerville City Standard Specifications and Detail Drawings as more particularly set forth in **Exhibit A,** attached hereto and incorporated herein by this reference.

Section 2. Severability. If any section, clause, or portion of this Resolution is declared invalid by a court of competent jurisdiction, the remainder shall not be affected thereby and shall remain in full force and effect.

Section 3. Effective Date. This Resolution shall become effective immediately.

PASSED AND ADOPTED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH, ON THIS 1st DAY OF JUNE, 2021.

CENTERVILLE CITY

By: _____
Mayor Clark A. Wilkinson

ATTEST:

_____
Jennifer Hansen, City Recorder

CERTIFICATE OF PASSAGE AND EFFECTIVE DATE

According to the provisions of the U.C.A. § 10-3-719, as amended, resolutions may become effective without publication or posting and may take effect on passage or at a later date as the governing body may determine; provided, resolutions may not become effective more than three months from the date of passage. I, the municipal recorder of Centerville City, hereby certify that foregoing resolution was duly passed by the City Council and became effective upon passage or a later date as the governing body directed as more particularly set forth below.

_____ DATE: _____

JENNIFER HANSEN, City Recorder

EFFECTIVE DATE: ____ day of _____, 2021.

EXHIBIT A

CENTERVILLE CITY
STANDARDS AND SPECIFICATIONS AND DETAIL DRAWINGS

Standards and Specifications and Detail Drawings for the Construction and Development of Public Improvements within Centerville City

SUBDIVISION TITLE

A SUBDIVISION OF THE _____ QUARTER OF SECTION __, T_N, R_E/W, SLB & M
CENTERVILLE CITY, DAVIS COUNTY, UTAH

NOTES:

1. PROVIDE U.S. STATE PLAN 1983 (NAD83), UTAH NORTH ZONE 4301 COORDINATES AT ALL SECTIONS CORNERS AND EXTERIOR BOUNDARY CORNERS SHOWN ON THE PLAT, PLEASE CONTACT THE DAVIS COUNTY SURVEYOR FOR POSSIBLE PUBLISHED COORDINATES AND BEARINGS. PLEASE PROVIDE A SCALE FACTOR TO CONVERT THE COORDINATES FROM GRID DISTANCE TO GROUND DISTANCE. IF THIS IS AN AMENDMENT OF A PLAT PREVIOUSLY FILED THAT REFERENCES THE OLD DAVIS COUNTY COORDINATE SYSTEM, PLEASE PROVIDE THE ROTATION FACTOR FROM DAVIS COUNTY COORDINATES TO STATE PLANE COORDINATES NOTING THE BASIS OF BEARING MONUMENTS USED FOR THE ROTATION.
2. APPROVAL OF THIS DEVELOPMENT PLAT BY CENTERVILLE CITY DOES NOT CONSTITUTE ANY REPRESENTATION AS TO THE ADEQUACY OF SUB-SURFACE SOIL CONDITION NOR THE LOCATION OR DEPTH OF GROUNDWATER TABLES.
3. ALL SIDE AND REAR YARD EASEMENTS SHOWN ARE TYPICAL 7' WIDE PUBLIC UTILITY EASEMENTS (P.U.E.) UNLESS OTHERWISE NOTED.



SHOW ON PLAT

1) ALL MONUMENTS
2) BASIS OF BEARING
3) DAVIS COUNTY COORDINATES ON ALL MONUMENTS & BOUNDARY CORNERS
4) ADJACENT SUBDIVISIONS
5) SQUARE FOOTAGE TO NEAREST FOOT AND ACRES TO NEAREST THOUSANDTH OF LOTS
6) ADDRESSES FOR LOTS AND STREETS

SCALE: VARIES, NOT LARGER THAN 1" = 100'



VICINITY MAP

N.T.S.

OWNER:
NAME
ADDRESS
PHONE NUMBER
EMAIL

SURVEYOR'S CERTIFICATE

I, _____, DO HEREBY CERTIFY THAT I AM A PROFESSIONAL LAND SURVEYOR, AND THAT I HOLD LICENSE NUMBER _____, AS PRESCRIBED UNDER THE LAWS OF THE STATE OF UTAH. I FURTHER CERTIFY THAT BY THE AUTHORITY OF THE OWNER(S) I HAVE MADE A SURVEY OF THE TRACT OF LAND SHOWN ON THIS PLAT AND DESCRIBED HEREON (RECORD OF SURVEY ON FILE AT THE DAVIS COUNTY SURVEYOR'S OFFICE AS ENTRY NO. _____), AND HAVE SUBDIVIDED SAID TRACT OF LAND INTO LOTS AND STREETS, TOGETHER WITH EASEMENTS, HEREAFTER TO BE KNOWN AS "_____". AND THAT THE SAME HAS BEEN CORRECTLY SURVEYED AND MONUMENTED ON THE GROUND AS SHOWN ON THIS PLAT.

_____ "SIGNED SEAL"
DATE

BOUNDARY DESCRIPTION

BEGINNING AT A POINT ..... TO THE POINT OF BEGINNING.

CONTAINS 0.000 ACRES, MORE OR LESS
0000 LOTS

OWNERS DEDICATION

KNOW ALL MEN BY THESE PRESENTS THAT WE THE UNDERSIGNED ARE THE OWNERS OF THE ABOVE DESCRIBED TRACT OF LAND, AND HEREBY CAUSED THE SAME TO BE DIVIDED INTO LOTS, PARCELS AND STREETS, TOGETHER WITH EASEMENTS AS SET FORTH TO BE HEREAFTER KNOW AS,

AND DO HEREBY DEDICATE FOR THE PERPETUAL USE OF THE PUBLIC ALL ROADS AND OTHER AREAS SHOWN ON THIS PLAT AS INTENDED FOR PUBLIC USE. THE UNDERSIGNED OWNERS ALSO HEREBY CONVEY TO ANY AND ALL PUBLIC UTILITY COMPANIES A PERPETUAL, NON-EXCLUSIVE EASEMENT OVER THE PUBLIC UTILITY EASEMENTS SHOWN ON THIS PLAT, THE SAME TO BE USED FOR THE INSTALATION, MAINTENANCE AND OPERATION OF UTILITY LINES AND FACILITIES, THE UNDERSIGNED OWNERS ALSO HEREBY CONVEY ANY OTHER EASEMENTS AS SHOWN ON THIS PLAT TO THE PARTIES INDICATED AND FOR THE PURPOSES SHOWN HEREON. IN WITNESS WE / I HAVE HEREUNTO SET OUR HAND THE DAY OF_____A.D. 20__ .

_____ _____
(OWNER) (OWNER)

ACKNOWLEDGEMENT

STATE OF UTAH }
COUNTY OF DAVIS } S.S.

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS _____DAY OF _____, 20 __ . THERE PERSONALLY APPERED BEFORE ME,

_____

MY COMMISSION EXPIRES:_____ COMMISSION NUMBER:_____

_____ _____
NOTARY PUBLIC (PRINT NAME) NOTARY PUBLIC (SIGNATURE)

A NOTARY PUBLIC COMISSIONED IN UTAH

RECOMMENDED FOR APPROVAL

ON THIS _____ DAY OF _____ A.D. 20 __

_____
CITY ATTORNEY

RECOMMENDED FOR APPROVAL

ON THIS _____ DAY OF _____ A.D. 20 __

_____
CITY ENGINEER

RECOMMENDED FOR APPROVAL

ON THIS _____ DAY OF _____ A.D. 20 __
BY THE CENTERVILLE CITY PLANNING COMMINSON

_____
CHAIRMAN PLANNING COMMISSION

CITY COUNCIL'S APPROVAL

PRESENTED TO THE CITY COUNCIL OF CENTERVILLE, UTAH
THIS _____ DAY OF _____ A.D. 20 ___, AT WHICH
TIME THIS SUBDIVISION WAS APPROVED AND ACCEPTED

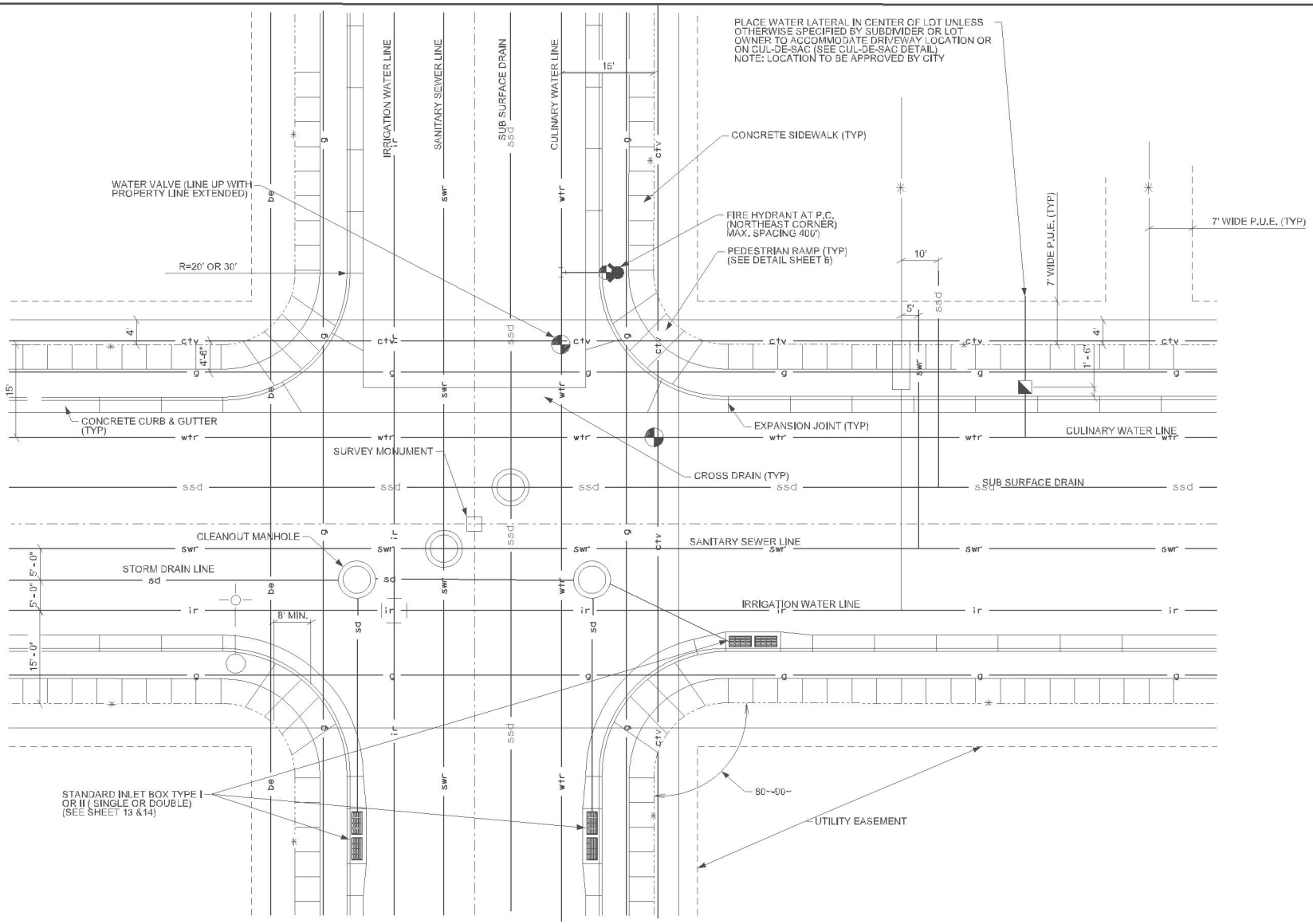
MAYOR: _____

CITY RECORDER ATTEST: _____

COUNTY RECORDER

ENTRY NO. _____ FEE PAID _____
FILED FOR RECORD AND RECORDED THIS _____
DAY OF _____ A.D. 20 ___ AT _____
IN BOOK _____ OF _____

_____
COUNTY RECORDER
BY: _____ DEPUTY



REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/22/2021

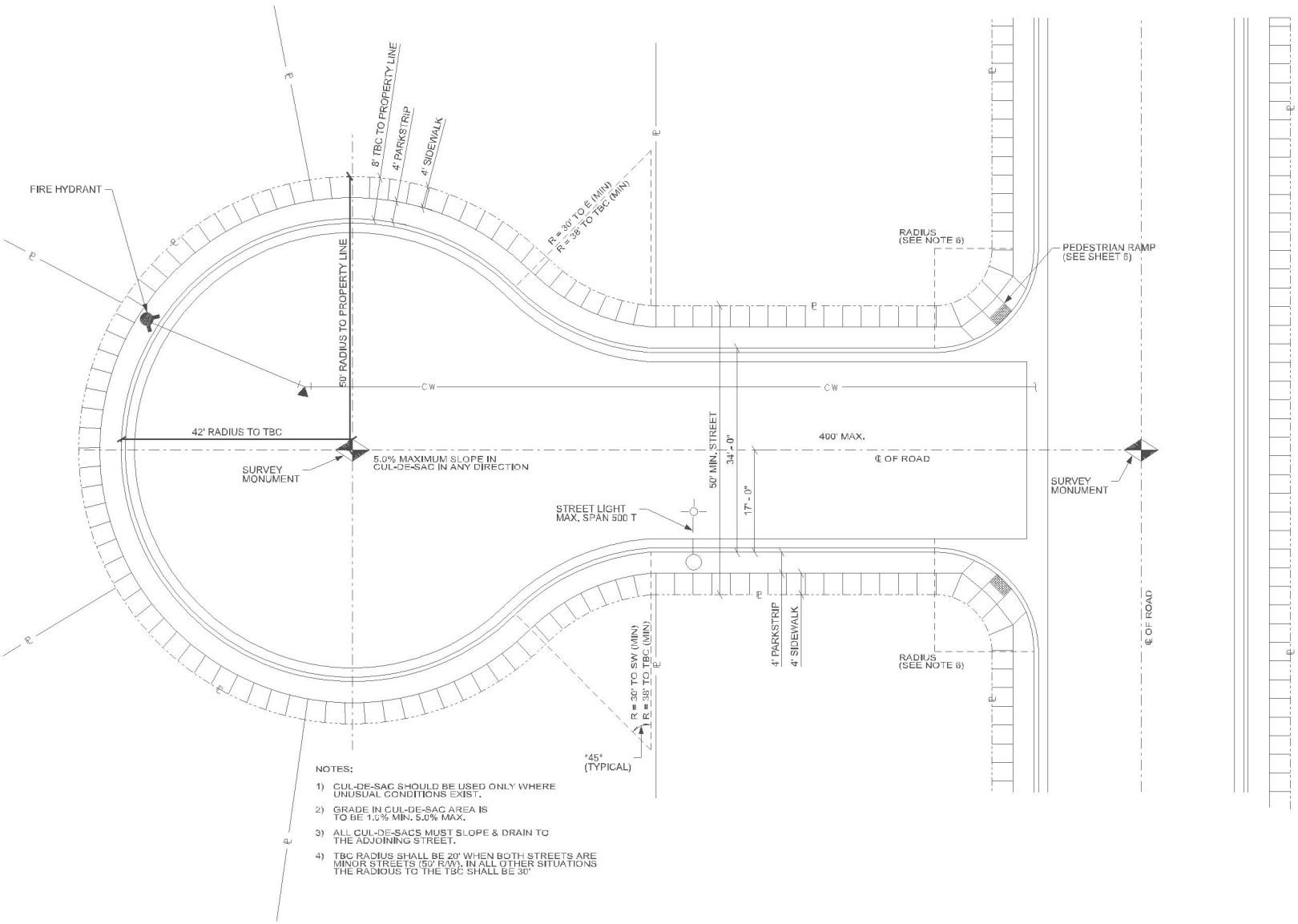
STREET INTERSECTION UTILITY LINE LOCATION, SURVEY MONUMENT AND VALVE BOX

CENTERVILLE CITY
STANDARD DETAILS

ESI ENGINEERING
CONSULTING ENGINEERS AND LAND SURVEYORS
3500 SOUTH MAIN STREET, SUITE 208
SALT LAKE CITY, UTAH 84115
TEL: (801) 263-1752

SHEET 2 OF 26

PROJECT NO. 21-017



NOTES:

1) CUL-DE-SAC SHOULD BE USED ONLY WHERE UNUSUAL CONDITIONS EXIST.
2) GRADE IN CUL-DE-SAC AREA IS TO BE 1.0% MIN. 5.0% MAX.
3) ALL CUL-DE-SACS MUST SLOPE & DRAIN TO THE ADJOINING STREET.
4) TBC RADIUS SHALL BE 20' WHEN BOTH STREETS ARE MINOR STREETS (50' R/W). IN ALL OTHER SITUATIONS THE RADIOUS TO THE TBC SHALL BE 30'

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/22/2021

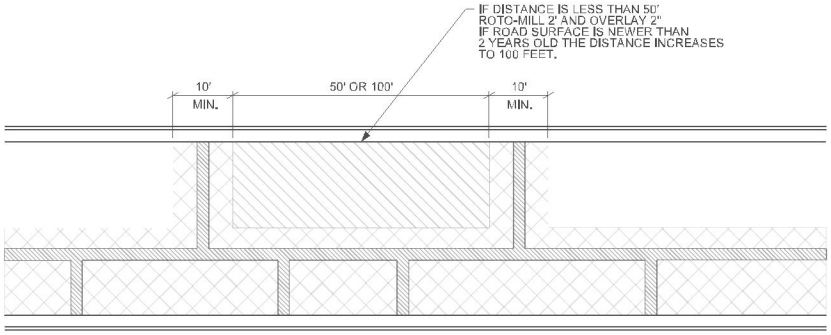
CUL-DE-SAC DETAILS

CENTERVILLE CITY
STANDARD DETAILS

ESI ENGINEERING
CONSULTING ENGINEERS AND LAND SURVEYORS
3500 SOUTH MAIN STREET, SUITE 208
SALT LAKE CITY, UTAH 84115
TEL: (801) 263-1752

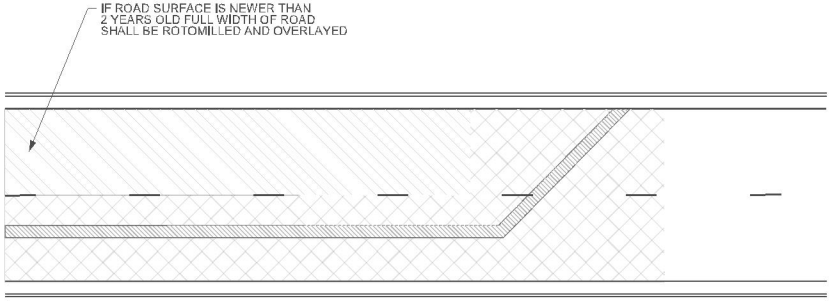
SHEET 3
OF 26

PROJECT NO.
21-017



MULTIPLE EXCAVATIONS AND RESTORATION IN ASPHALT

NOTE:
RESTORATION MUST BE A MINIMUM OF 10' CURB
LENGTH BY THE WIDTH OF EACH LANE EXCAVATED

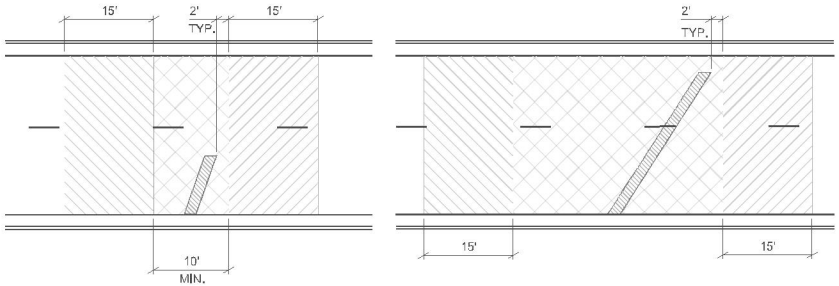


LONGITUDINAL EXCAVATION AND RESTORATION IN CONCRETE

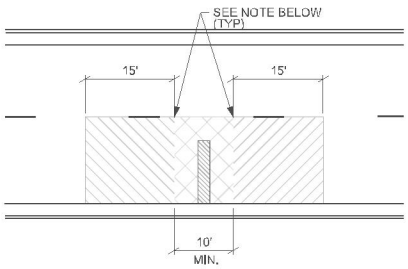
AREA OF EXCAVATION

LIMITS OF RESTORATION OF EQUIVALENT ROAD SURFACE
(ROAD SURFACE OLDER THAN 2 YEARS)

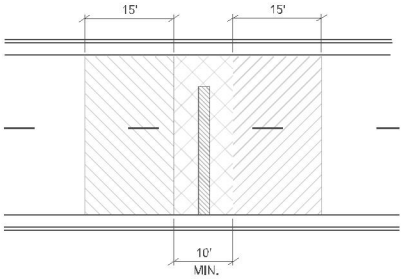
LIMITS OF RESTORATION OF EQUIVALENT ROAD SURFACE
(ROAD SURFACE NEWER THAN 2 YEARS)



TRANSVERSE EXCAVATION AND RESTORATION



SINGLE LANE EXCAVATION AND RESTORATION



DOUBLE LANE EXCAVATION AND RESTORATION

AREA OF EXCAVATION

LIMITS OF RESTORATION

LIMITS OF OVERLAY AREA
(2 YEARS OR NEWER)

NOTE:
IF ROAD SURFACE IS 2 YRS. OR NEWER,
CONTRACTOR SHALL ROTO-MILL EXISTING
ROADWAY DOWN 2" & DO A 2" OVERLAY
ON SAID AREA

REVISION	DATE	BY	DESCRIPTION

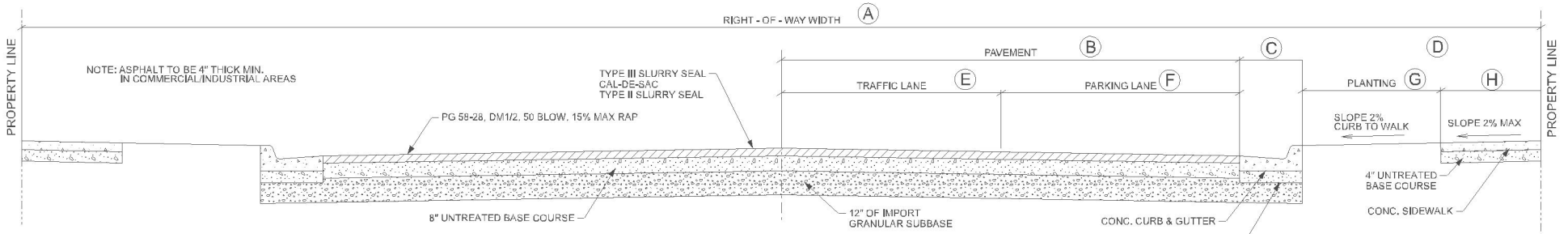
DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/12/2021

STREET REPAIR REQUIREMENTS

CENTERVILLE CITY
STANDARD DETAILS

ESI ENGINEERING
CONSULTING ENGINEERS AND LAND SURVEYORS
3500 SOUTH MAIN STREET, SUITE 208
SALT LAKE CITY, UTAH 84115
TEL: (801) 263-1752

PROJECT NO.
21-017



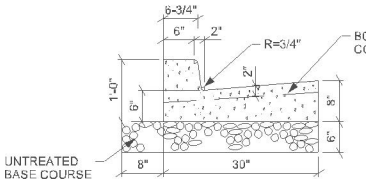
NOTE:
THIS SECTION IS THE MINIMUM STRUCTURAL SECTION ALLOWED IN THE CITY, UNLESS FIELD TESTS ARE MADE AND ANOTHER SECTION IS RECOMMENDED BY A QUALIFIED SOILS ENGINEER, AND ACCEPTED BY THE CITY ENGINEER. MINIMUM AXIAL LOAD FOUR 18,000 LBS. PER DAY.

STANDARD ROADWAY SECTION

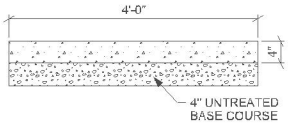
N. T. S.

NOTE: MINIMUM SLOPE OF CURB & GUTTER, CROSS DRAINS, AND STREETS - 0.50%

STREET DESIGNATION	A	B	C	D	E	F	G	H
MINOR	50'	14.5'	2.5'	8'	14.5'	–	4'	4'
MINOR COLLECTOR	60'	18.5'	2.5'	9'	11.0'	7.5'	5'	4'
MAJOR COLLECTOR	66'	21.5'	2.5'	9'	14.0'	7.5'	6'	4'
MINOR ARTERIAL	80'	28.5'	2.5'	9'	21.0'	7.5'	6'	4'
BUSINESS	50'	19.5'	2.5'	3'	12.0'	7.5'	3'	0'

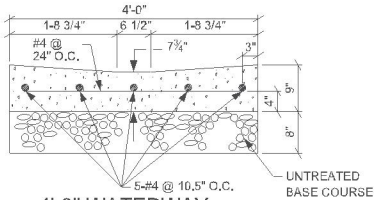


STANDARD CURB & GUTTER SECTION

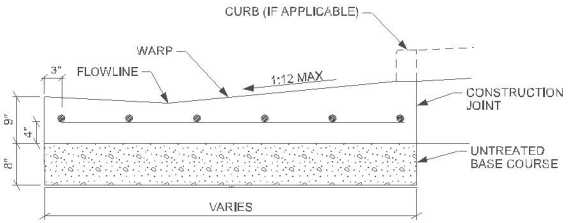


SIDEWALK SECTION

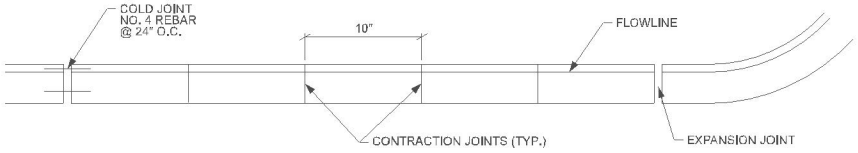
NOTE: SIDEWALK TO BE 6" THICK AT DRIVEWAY



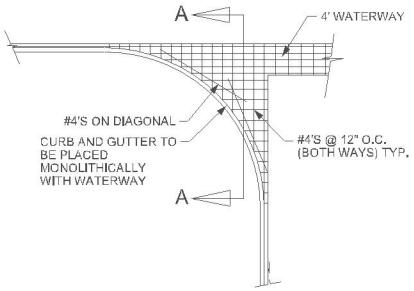
4'-0" WATERWAY



SECTION A-A



CURB AND GUTTER JOINT DETAIL



TYPICAL WATERWAY TRANSITION

N.T.S.

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/02/2021

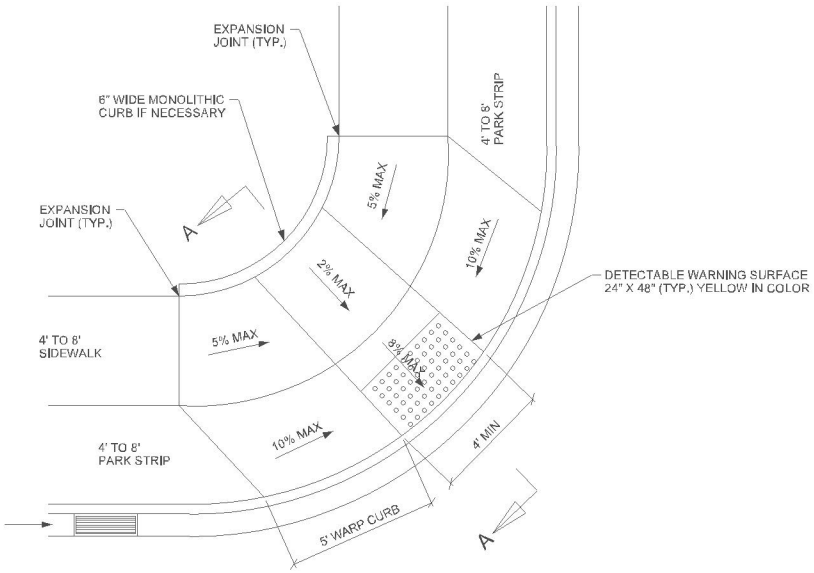
STREET CROSS SECTION CURB, SIDEWALK & DRIVE APPROACH

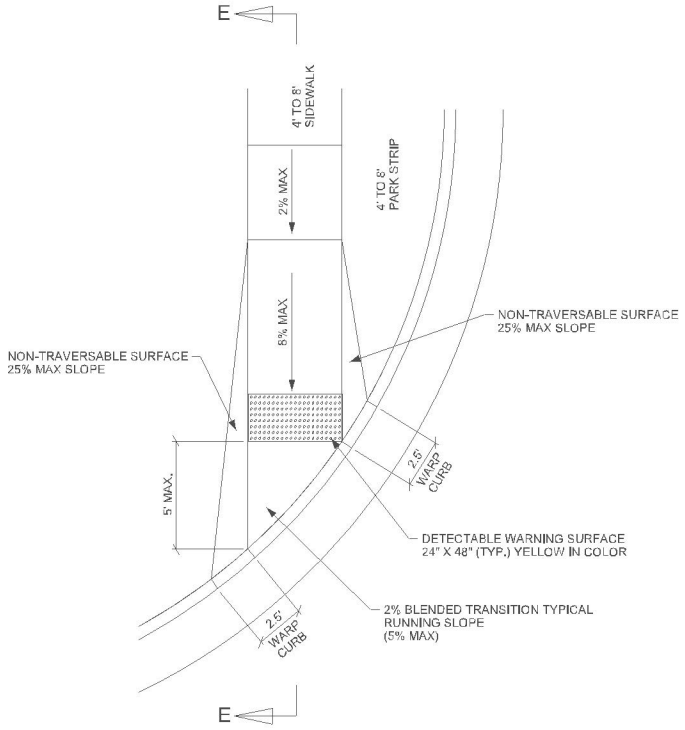
CENTERVILLE CITY
STANDARD DETAILS

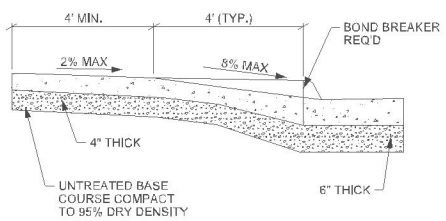
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3500 SOUTH MAIN STREET, SUITE 208
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TEL: (801) 263-1752

SHEET 5 OF 26

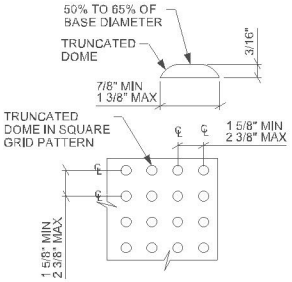
PROJECT NO. 21-017



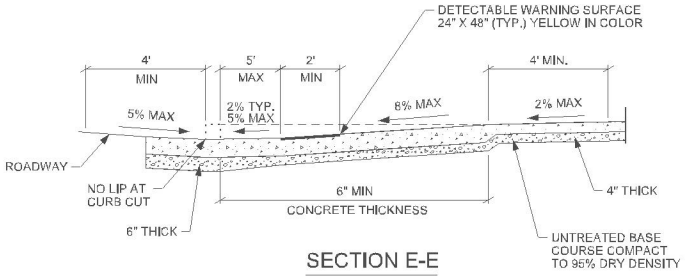




SECTION TYPE A



PEDESTRIAN RAMP DETAILS



SECTION E-E

CORNER PEDESTRIAN RAMP DETAIL

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/12/2021

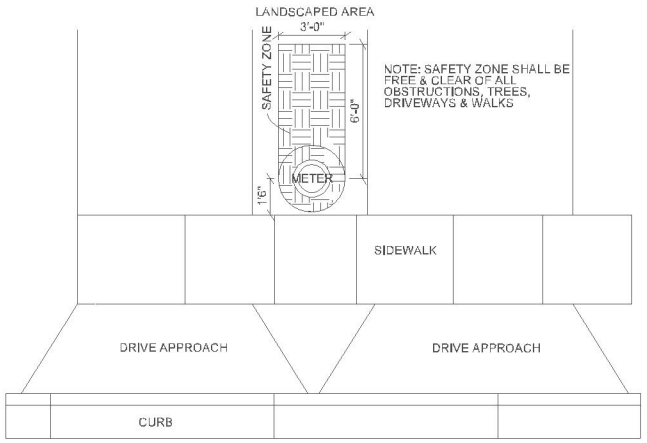
TYPICAL PEDESTRIAN RAMP AND CORNER PEDESTRIAN RAMP

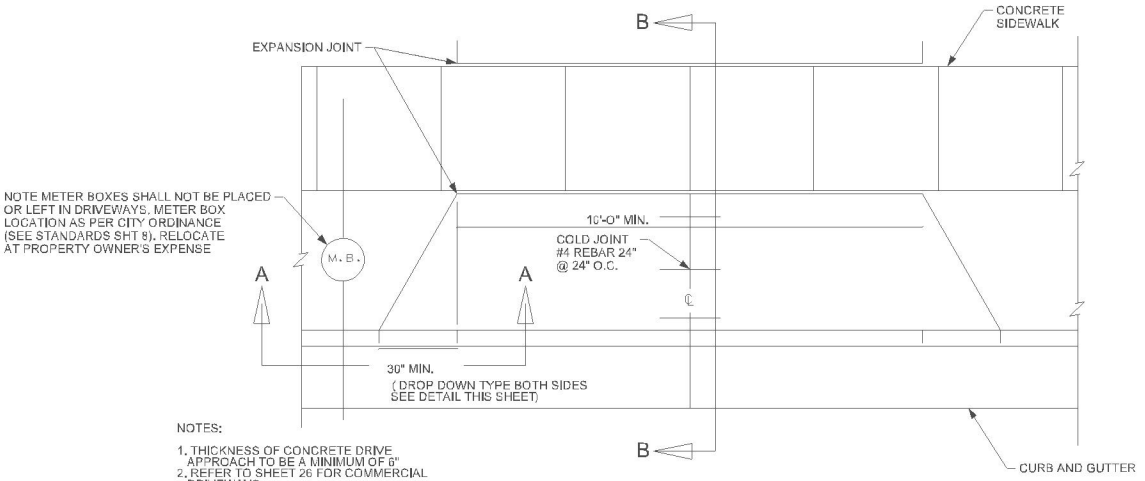
CENTERVILLE CITY STANDARD DETAILS

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3500 SOUTH MAIN STREET, SUITE 208
SALT LAKE CITY, UTAH 84115
TEL: (801) 263-1752

SHEET 6 OF 26

PROJECT NO. 21-017

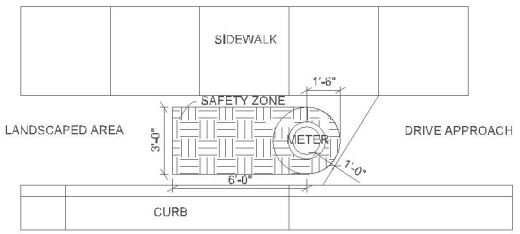




NOTES:

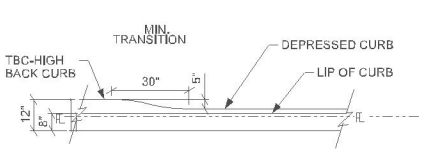
1. THICKNESS OF CONCRETE DRIVE APPROACH TO BE A MINIMUM OF 6"
2. REFER TO SHEET 26 FOR COMMERCIAL DRIVEWAYS
3. FIRE HYDRANTS TO BE A MIN. OF 3' FROM TOP OF WING OF APPROACH

RESIDENTIAL APPROACH & DRIVEWAY

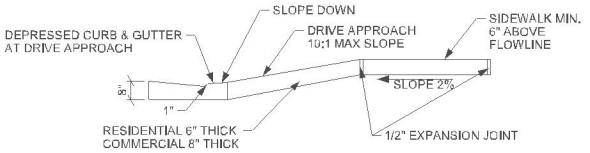


WATER METER SAFETY ZONE

N.T.S.



SECTION A-A



SECTION B-B

DROP DOWN STYLE CURB DETAIL

NOTE: ALL CONCRETE TO BE CLASS 4000

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/22/2021

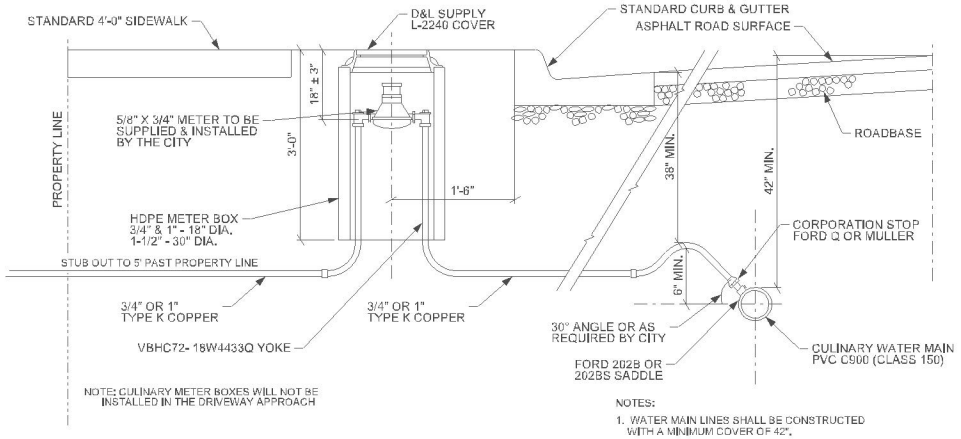
WATER METER SAFETY ZONES & DRIVE WAY APPROACH

CENTERVILLE CITY STANDARD DETAILS

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SHEET 7 OF 26

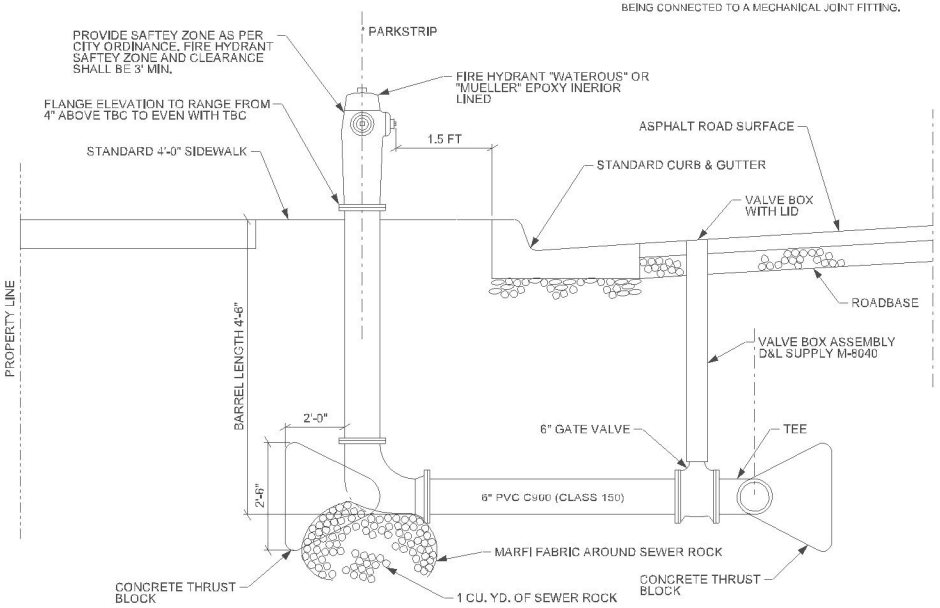
PROJECT NO. 21-017



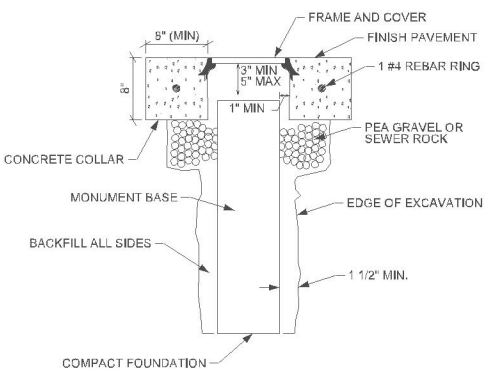
TYPICAL WATER CONNECTION

NOTES:

1. WATER MAIN LINES SHALL BE CONSTRUCTED WITH A MINIMUM COVER OF 42".
2. ALL MECHANICAL JOINT FITTINGS SHALL BE TORQUED BETWEEN 75 - 90 FT. LBS.
3. ALL BEVELED ENDS SHALL BE CUT OFF BEFORE BEING CONNECTED TO A MECHANICAL JOINT FITTING.

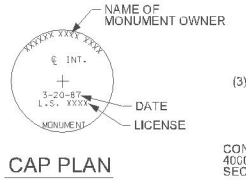


TYPICAL FIRE HYDRANT CONNECTION

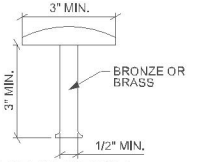


SURVEY MONUMENT SECTION

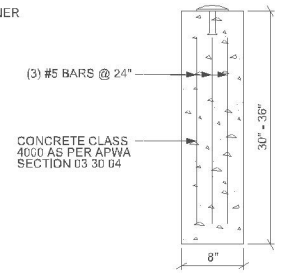
NTS



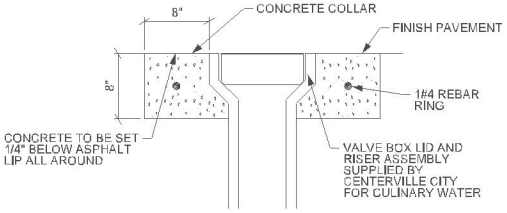
CAP PLAN



CAP SECTION

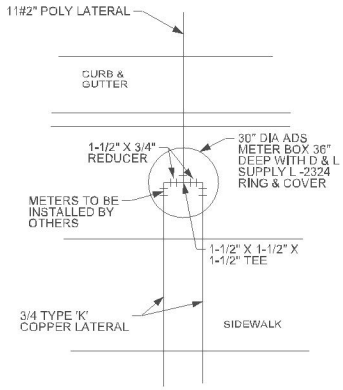


SECTION OF BASE



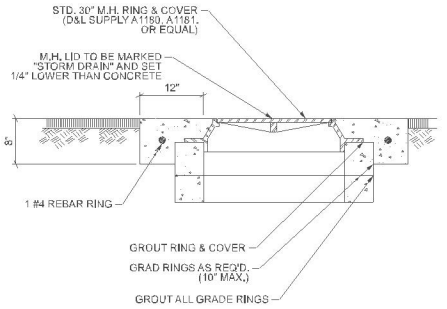
VALVE BOX SECTION

NTS



DOUBLE METER BOX DETAIL

N.T.S.



REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/12/2021

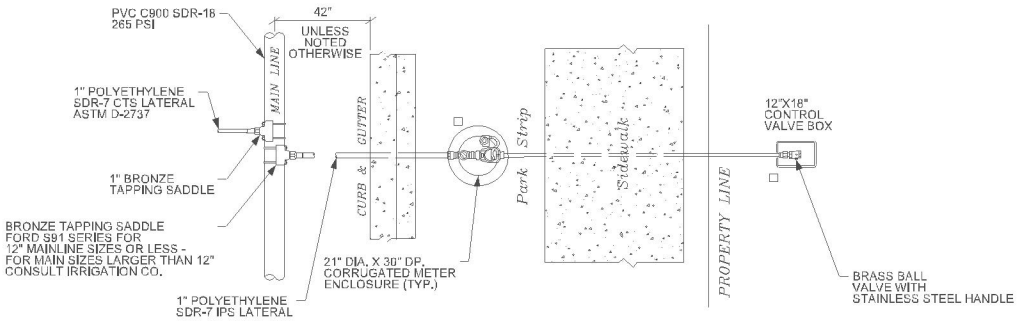
TYPICAL FIRE HYDRANT & SURVEY MONUMENT AND VALVE BOX

CENTERVILLE CITY
STANDARD DETAILS

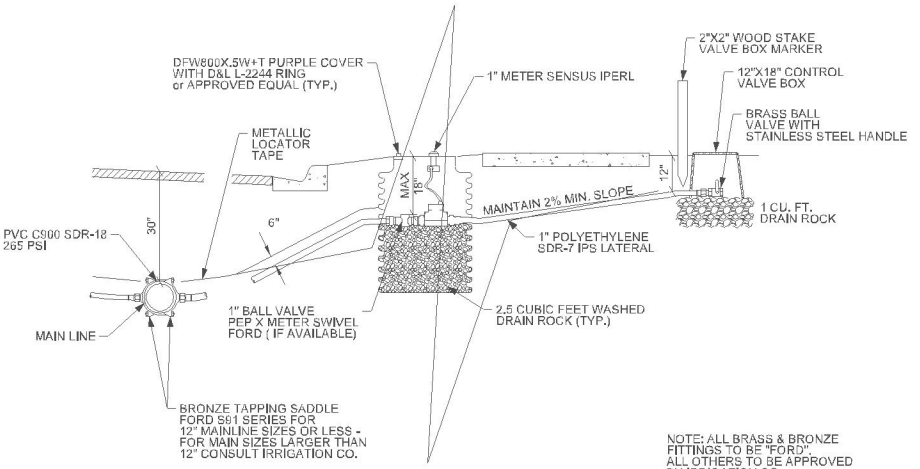
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SHEET 8 OF 26

PROJECT NO. 21-017



PLAN SERVICE



PROFILE

1 - 1-1/2" & 1" PIPE SHALL BE PE, SDR-7 IPS, ASTM D-2737

2 - VALVE BOX MARKERS MUST BE SET ADJACENT TO EVERY VALVE.

3 - SERVICE PIPE SHALL MAINTAIN A MINIMUM BURY DEPTH OF 30" YP TO CURB STOP; 12" MIMIMUM AT CONTROL VALVE BOX.

4 - FITTINGS SHALL BE BRASS UNLESS SPECIFIED OTHERWISE.

5 - ALL VALVE LIDS SHALL BE STAMPED "IRRIGATION"

6 - IRRIGATION STANDARD DETAILS MAY CHANGE WITHOUT NOTICE USE LATEST IRRIGATION CO. STANDARD AS PER CITY ENGINEER.

DEUEL CREEK IRRIGATION CO.

IRRIGATION WATER SERVICE CONNECTION

N.T.S.

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/22/2021

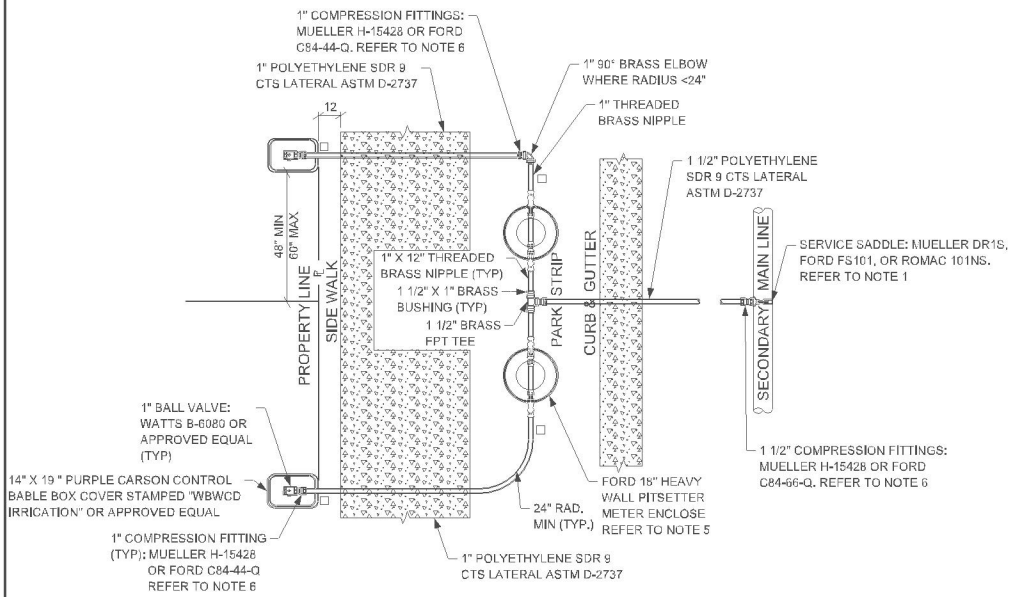
DUEL CREEK IRRIGATION
WATER METER

CENTERVILLE CITY
STANDARD DETAILS

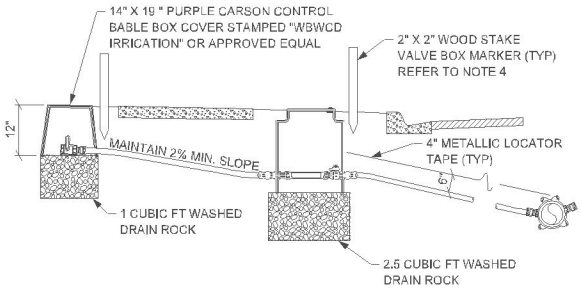
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SHEET 9
OF 25

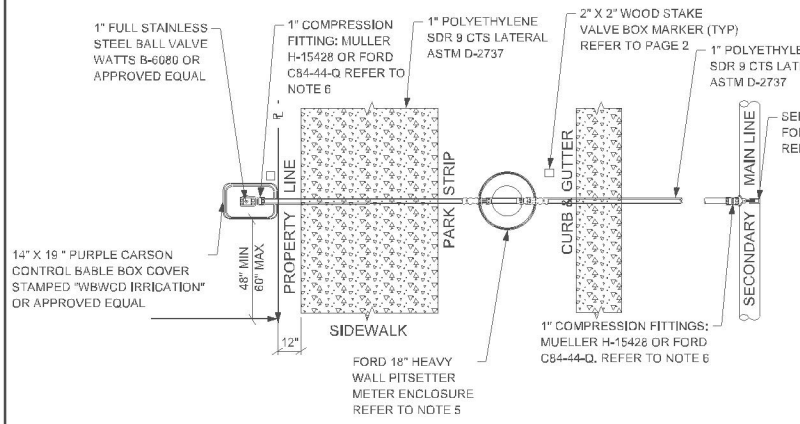
PROJECT NO.
21-017



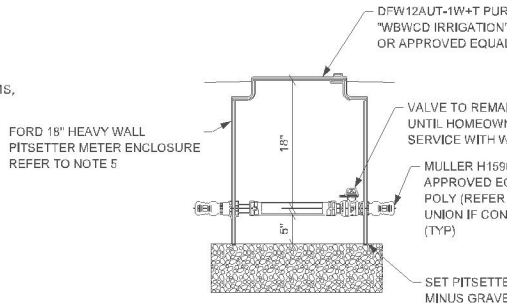
DOUBLE SERVICE CONNECTION



WATER LATERAL PROFILE



SINGLE SERVICE CONNECTION



WATER METER DETAIL

NOTES:

1. EQUIVALENT SADDLES ALLOWED WITH DISTRICT ENGINEER CONSULT DISTRICT ENGINEER FOR MAINLINE PIPE SIZES GREATER THAN 12" OR FOR MAINLINE PIPE MATERIAL OTHER THAN C900 PVC. HOT TAPPING NOT ALLOWED
2. METER & ENCLOSURE SHALL BE LOCATED BEHIND CURB WITHIN STREET R.O.W OR PUBLIC UTILITY EASEMENT IF NO CURB OR GUTTER EXISTS.
3. VALVE & METER ENCLOSURE LIDS SHALL BE STAMPED "WBWCD IRRIGATION".
4. VALVE BOX MARKERS TO BE PAINTED PURPLE AND MUST BE SET ADJACENT TO EVERY VALVE & METER BOX.
5. METER ENCLOSURE TO BE 18" FORD HEAVY WALL PITSETTER MODEL PK4SE-18-C15959-007-NL WITH NO LID AND OPEN BOTTOM.
6. ALL COMPRESSION-TYPE CONNECTIONS REQUIRE STAINLESS STEEL INSERT STIFFENERS. THE TUBING SHOULD BE INSERTED INTO THE FITTING SO THAT THE END OF THE TUBING IS WELL PAST THE RUBBER GASKET AND AT LEAST 1/8" FROM THE BOTTOM OF THE SOCKET.
7. ALL WORK SHALL BE INSPECTED & APPROVED BY DISTRICT INSPECTOR PRIOR TO BACKFILL. ALL INSPECTIONS SHALL BE COORDINATED 48 HOURS IN ADVANCE.
8. UPON ACCEPTANCE, WBWCD INSPECTOR WILL CLOSE VALVE AND LOCK AND TAG THE SERVICE. NEW RESIDENTIAL HOMEOWNER WILL BE REQUIRED TO APPLY FOR SERVICE VIA WEBER BASINS WEBSITE AT SETUP.WEBERBASIN.COM IN ORDER TO HAVE METER INSTALLED AND SERVICE ACTIVATED.

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/22/2021

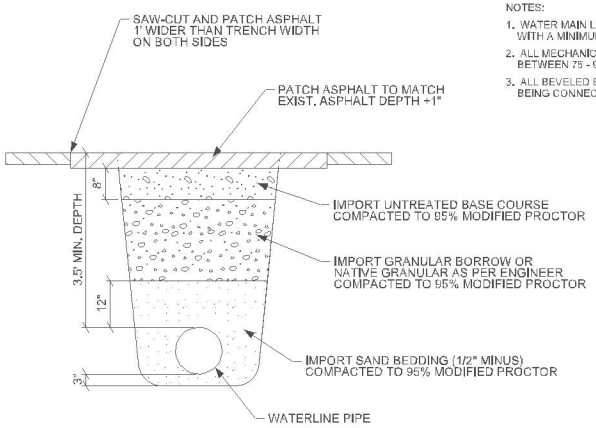
WEBER BASIN WATER CONSERVANCY DISTRICT
WATER METER

CENTERVILLE CITY
STANDARD DETAILS

ESI ENGINEERING
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3500 SOUTH MAIN STREET, SUITE 208
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SHEET 10 OF 26

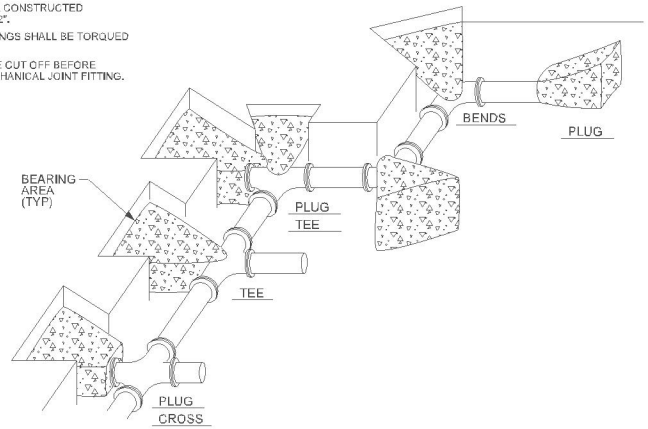
PROJECT NO. 21-017



TYPICAL CULINARY WATERLINE TRENCH SECTION

NOTES:

1. WATER MAIN LINES SHALL BE CONSTRUCTED WITH A MINIMUM COVER OF 42".
2. ALL MECHANICAL JOINT FITTINGS SHALL BE TORQUED BETWEEN 75 - 90 FT. LBS.
3. ALL BEVELED ENDS SHALL BE CUT OFF BEFORE BEING CONNECTED TO A MECHANICAL JOINT FITTING.



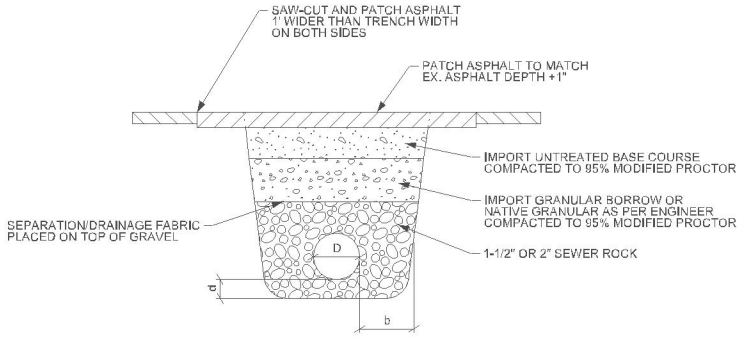
MINIMUM BEARING AREA IN SQ. FT					
SIZE OF PIPE	TEE, VALVE, DEAD END	90° BEND	45° BEND	22½° BEND	11¼° BEND
4"	2	3	2	2	1
6"	4	5.5	3	1.5	1
8"	6.5	9.5	5	2.75	1.5
10"	10	14	8	4.25	2.5
12"	14	20	11	5.50	3
14"	19	26.5	14.5	7.5	4
16"	24	34	18.5	9.5	6
20"	27	52	28.5	14.5	16
24"	53	74	41	21	16

THRUST BLOCKING

CONCRETE THRUST BLOCK SCHEDULE
FOR PRESSURIZED WATER LINES
(160 PSI MAXIMUM)

NOTES:

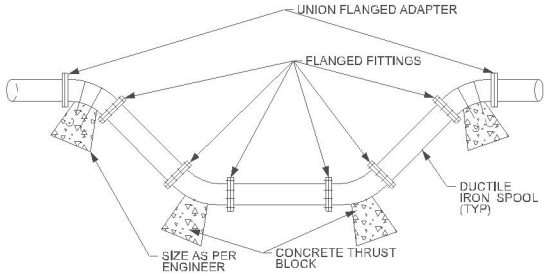
1. CONCRETE SHALL NOT BE PLACED AROUND BOLTS & VISQUINE SHALL BE WRAPPED BETWEEN THE CONCRETE & THE FITTING.
2. THE CITY SHALL REQUIRE THRUST BLOCK SIZES INCREASED DEPENDING ON THE SOIL BEARING CAPACITY.
3. ALL THRUST BLOCKS MUST REST AGAINST UNDISTURBED SOIL.
4. MIN. CONCRETE STRENGTH FOR THRUST BLOCKS SHALL BE 4,000 PSI.



TYPICAL STORM DRAIN TRENCH SECTION

DEPTH OF MATERIAL BELOW PIPE	
D	d (MIN.)
27" OR SMALLER	4"
30" TO 60"	6"
66" OR LARGER	8"

TRENCH WIDTH CLEARANCE FROM EDGE OF PIPE	
D	b
18" OR SMALLER	9"
21" TO 27"	10"
30" TO 48"	12"
54" OR LARGER	15"



THRUST BLOCKING FOR VERTICAL REALIGNMENT OF WATER MAIN

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/22/2021

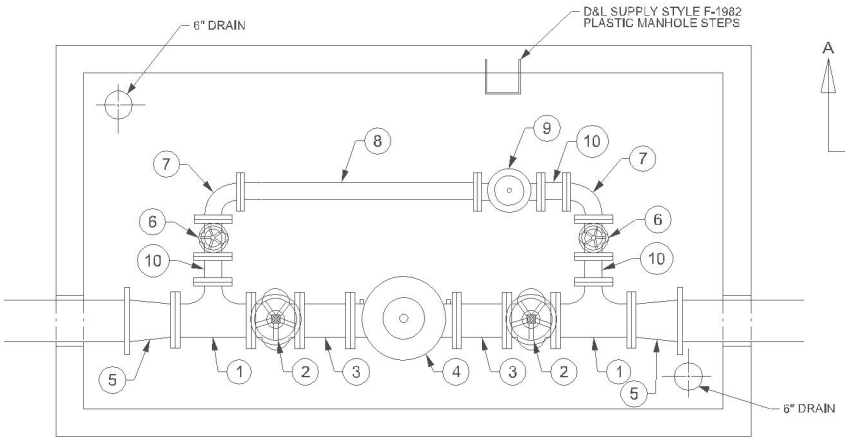
TRENCH SECTIONS AND THRUST BLOCK DETAIL

CENTERVILLE CITY
STANDARD DETAILS

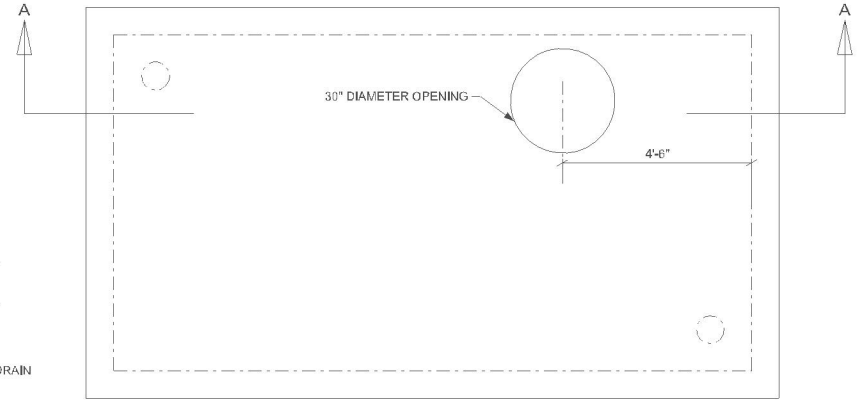
ESI ENGINEERING
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SHEET 11
OF 26

PROJECT NO.
21-017

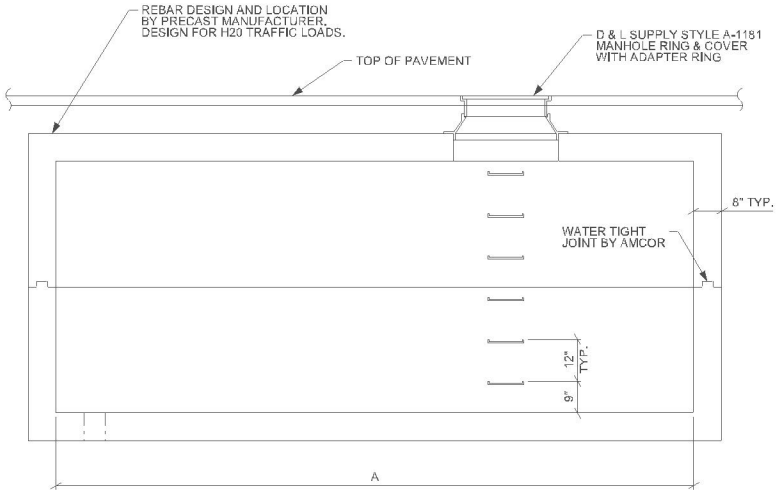


PLAN VIEW

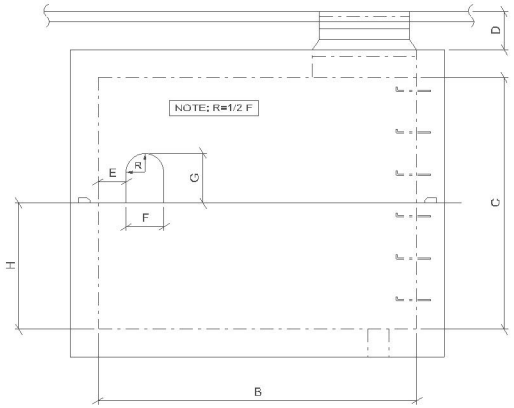


TOP VIEW

NOTE: PIPING SCHEDULE BASED ON 10" WATER MAIN. PIPING AND BOX DIMENSIONS VARY BASED ON SIZE OF WATER MAIN.



SECTION A-A



END ELEVATION

PIPING SCHEDULE

NO.	DESCRIPTION	10"
1	FLANGED TEE	10"x10"x4"
2	GATE VALVE	10"
3	10" DI SPOOL	1'-0"
4	PRESSURE REDUCING VALVE	10"
5	MJ REDUCER	12"x10"
6	GATE VALVE	4"
7	FLANGED ELBOW	4"
8	4" DI SPOOL	5'-8"
9	PRESSURE REDUCING VALVE	4"
10	4" DI SPOOL	6"

DIMENSION SCHEDULE

MARK NO.	DESCRIPTION	MAIN LINE SIZE		
		10"	8"	6"
A	LENGTH DIMENSION	16'- 0"	12'- 0"	12'- 0"
B	WIDTH DIMENSION	8'-0"	6'-0"	6'-0"
C	HEIGHT DIMENSION	6'-0"	6'-0"	6'-0"
D	DEPTH OF COVER	1'-0"	1'-0"	1'-0"
E	LOCATION DIM.	12"	12"	10"
F	BLOCKOUT WIDTH	13"	11"	9"
G	BLOCKOUT HEIGHT	16"	14"	12"
H	SECTION	3'-0"	3'-0"	3'-0"

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/12/2021

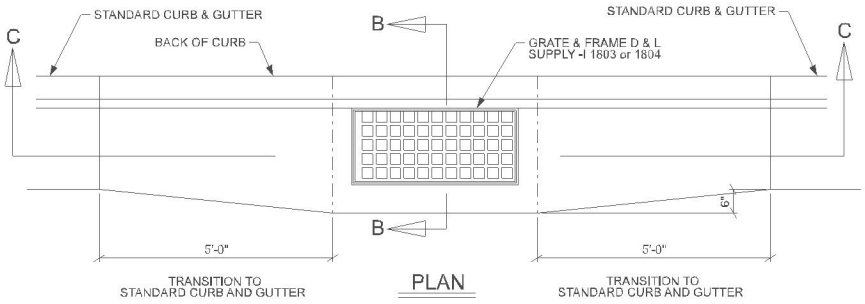
PRESSURE REDUCING VALVE

CENTERVILLE CITY
STANDARD DETAILS

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3500 SOUTH MAIN STREET, SUITE 208
SALT LAKE CITY, UTAH 84115
TEL: (801) 263-1752

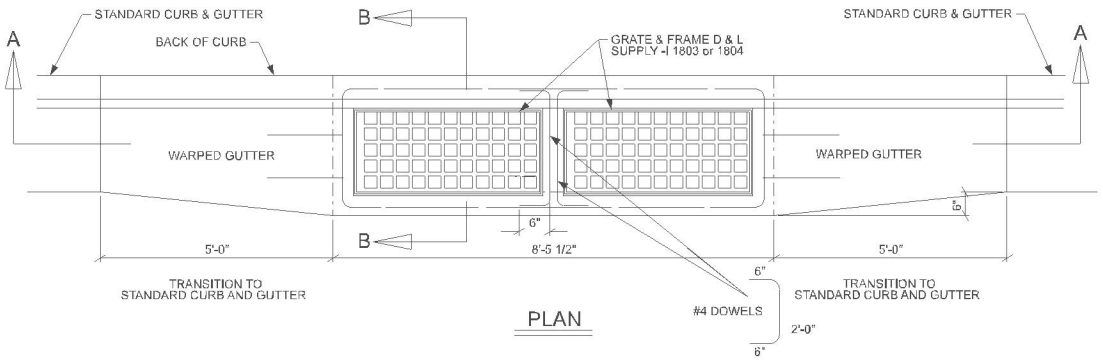
SHEET 12
OF 26

PROJECT NO.
21-017



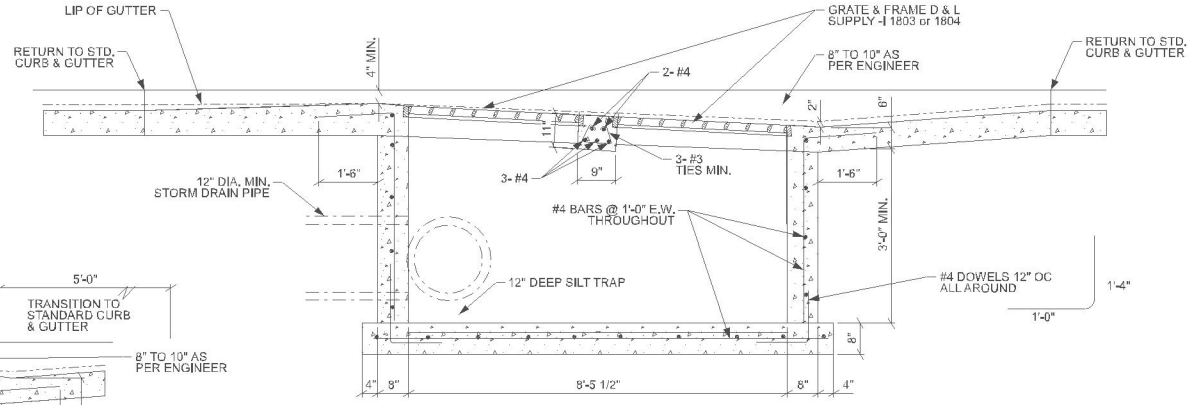
PLAN

INLET BOX - TYPE I SINGLE (SLOPED STREET)

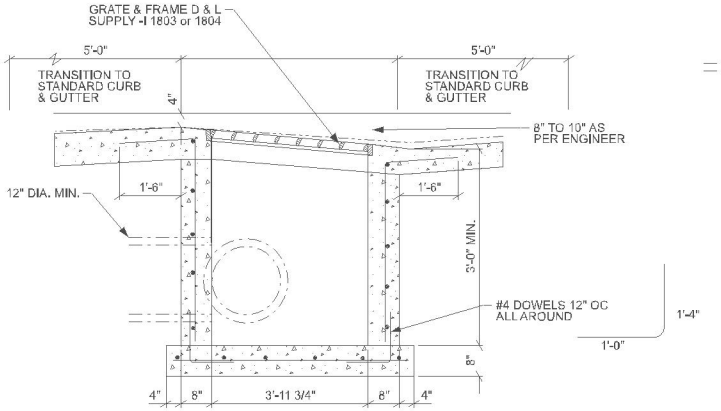


PLAN

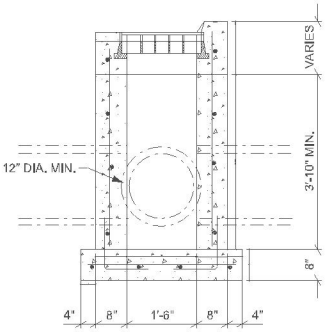
INLET BOX - TYPE I DOUBLE (SLOPED STREET)



SECTION "A" (SLOPED STREET)



SECTION "C"



SECTION "B"

NOTE: ALL CONCRETE TO BE CLASS 4000

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/12/2021

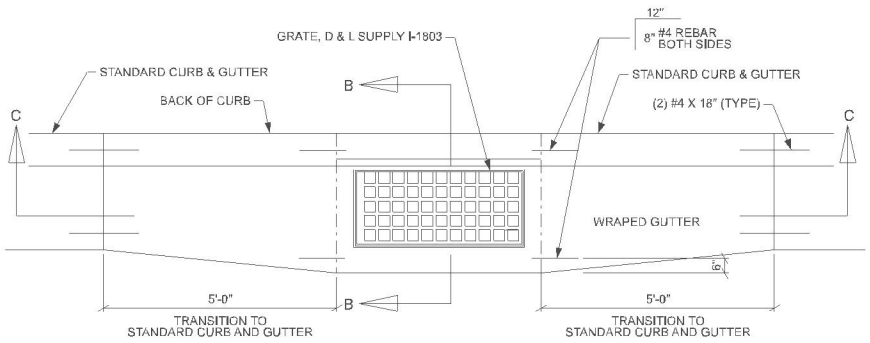
SINGLE INLET AND DOUBLE INLET BOX SLOPED STREET

CENTERVILLE CITY
STANDARD DETAILS

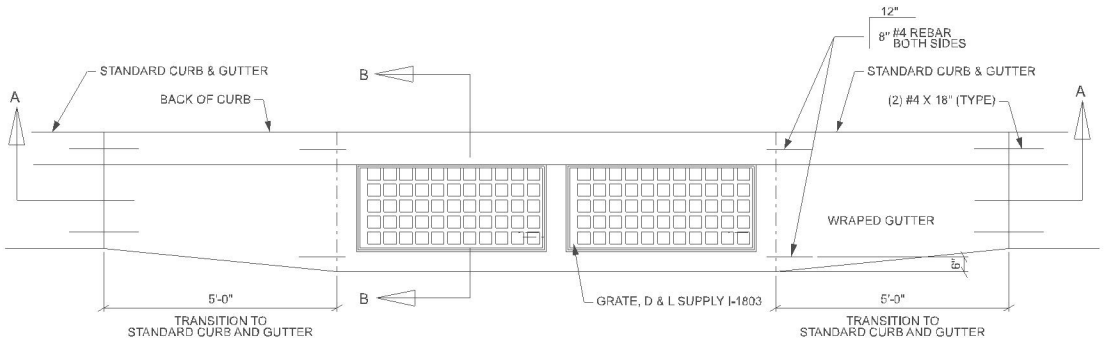
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SHEET 13
OF 26

PROJECT NO.
21-017

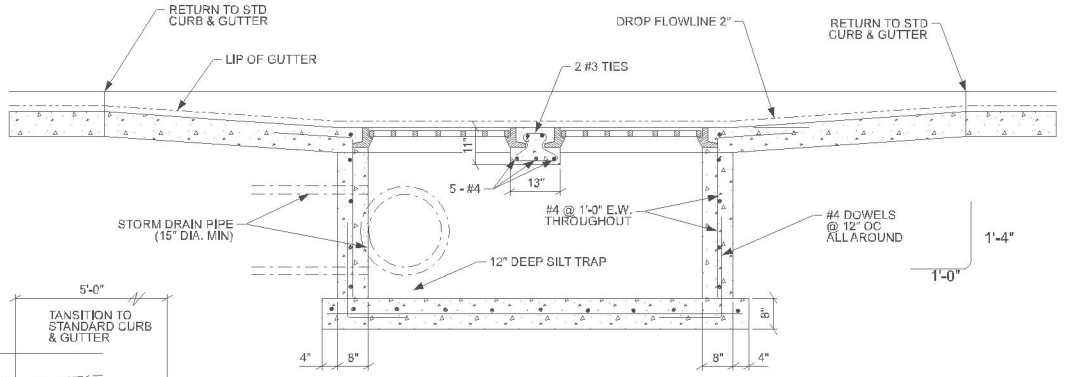


INLET BOX - TYPE II SINGLE (LOW AREA)

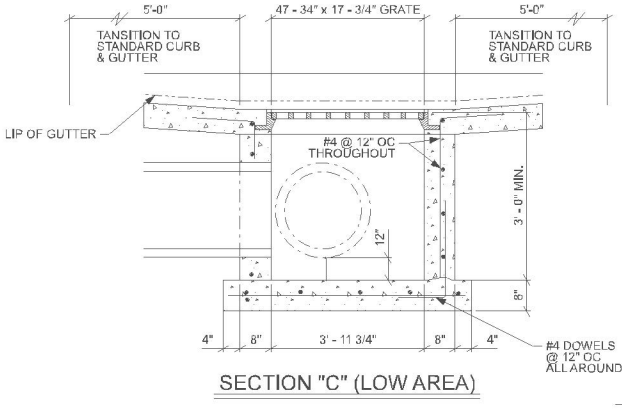


PLAN

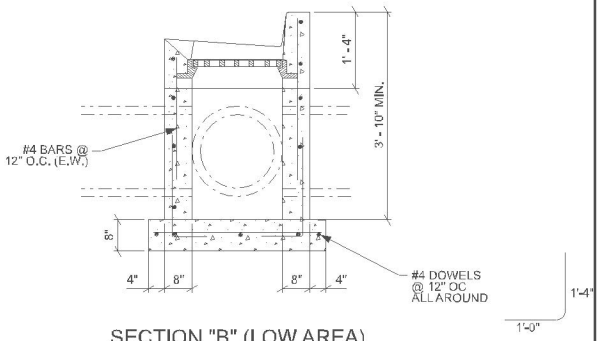
INLET BOX - TYPE II DOUBLE (LOW AREA)



SECTION A-A (LOW AREA)



SECTION "C" (LOW AREA)



SECTION "B" (LOW AREA)

NOTE; ALL CONCRETE TO BE CLASS 4000

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/12/2021

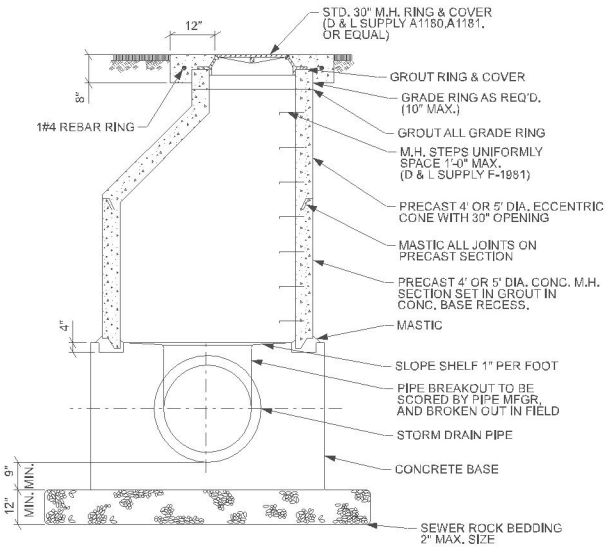
TYPICAL INLET BOX
IN LOW AREA OF STREET

CENTERVILLE CITY
STANDARD DETAILS

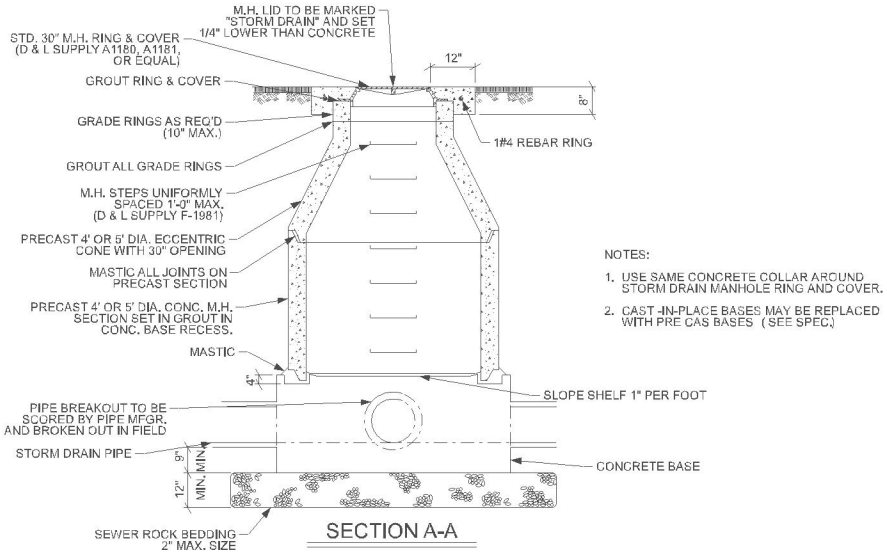
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SHEET 14
OF 26

PROJECT NO.
21-017



SECTION B-B

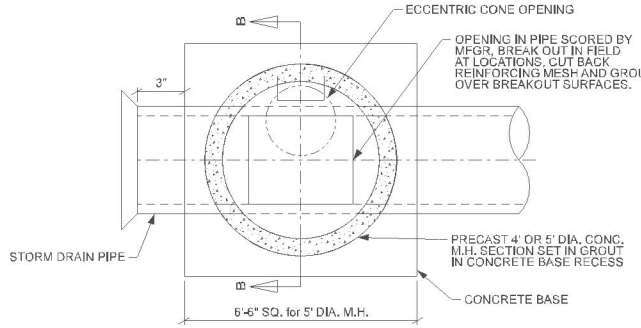


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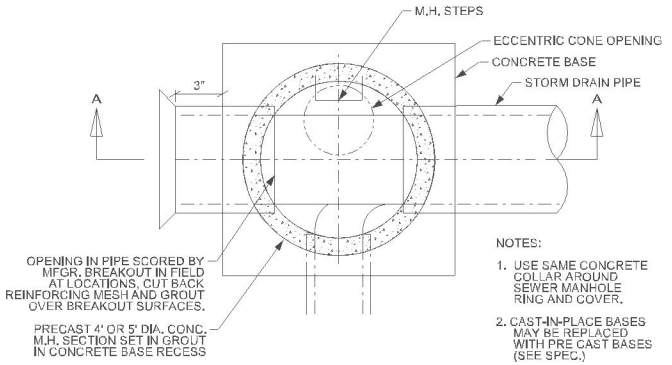
1. USE SAME CONCRETE COLLAR AROUND STORM DRAIN MANHOLE RING AND COVER.
2. CAST-IN-PLACE BASES MAY BE REPLACED WITH PRE CAS BASES (SEE SPEC.)

SECTION A-A

TYPICAL MANHOLE



TYPICAL LINE MANHOLE PLAN



NOTES:

1. USE SAME CONCRETE COLLAR AROUND SEWER MANHOLE RING AND COVER.
2. CAST-IN-PLACE BASES MAY BE REPLACED WITH PRE CAST BASES (SEE SPEC.)

JUNCTION MANHOLE PLAN

NOTE: ALL CONCRETE TO BE CLASS 4000

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/12/2021

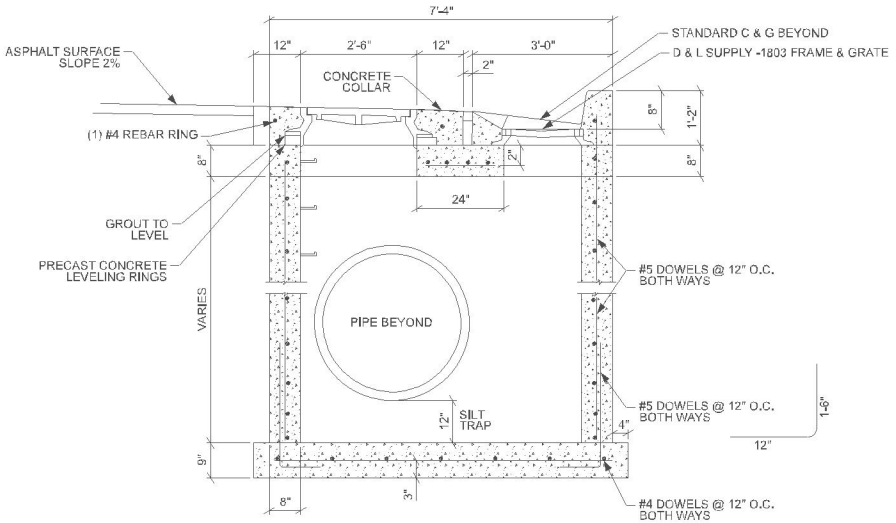
STORM DRAIN & SUBDRAIN MANHOLES

CENTERVILLE CITY STANDARD DETAILS

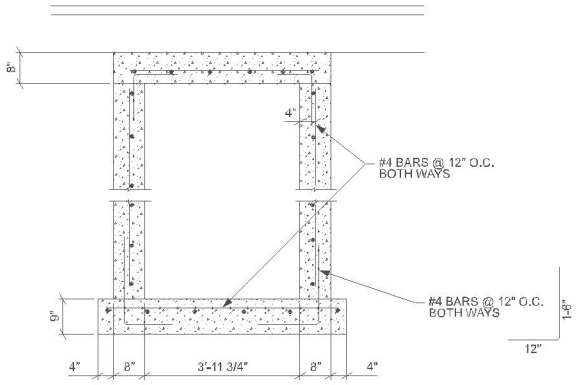
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SHEET 15 OF 26

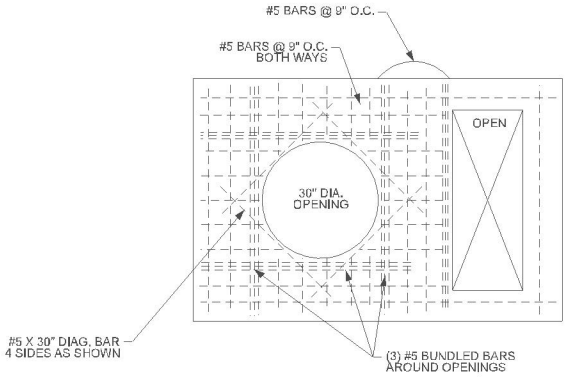
PROJECT NO. 21-017



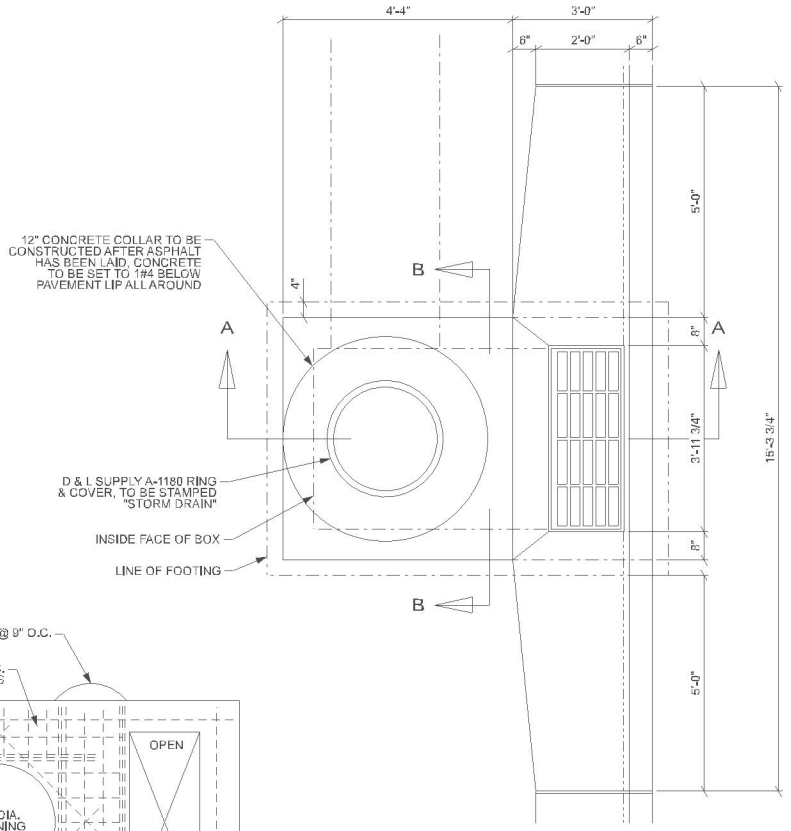
SECTION "A"



SECTION "B"



TOP SLAB REINFORCEMENT



COMBINATION CLEANOUT-INLET BOX

NOTE: ALL CONCRETE TO BE CLASS 4000

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/12/2021

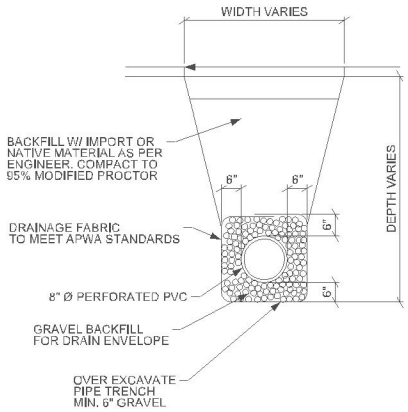
TYPICAL CLEANOUT BOX & COMBINATION CLEANOUT INLET BOX DETAILS

CENTERVILLE CITY
STANDARD DETAILS

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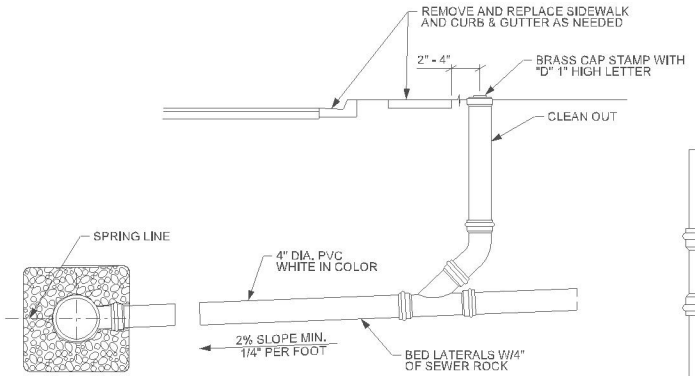
SHEET 16
OF 26

PROJECT NO.
21-017



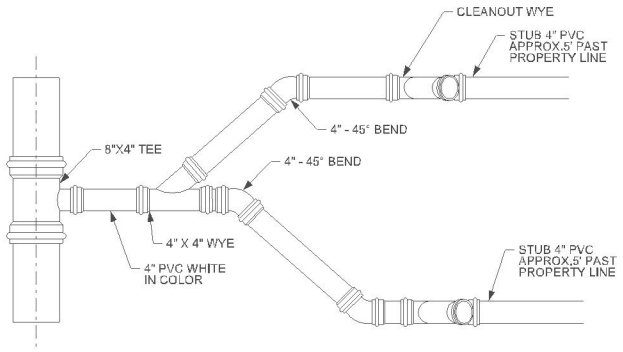
TYPICAL SUB-DRAIN PIPE SECTIONS

NTS

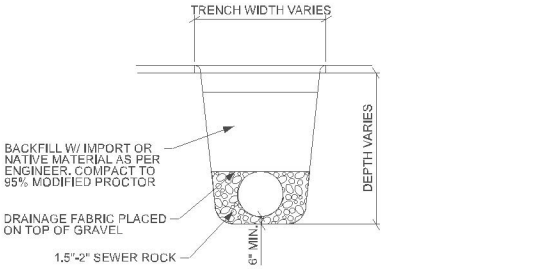


PROFILE

SUB-DRAIN CLEANOUT DETAIL

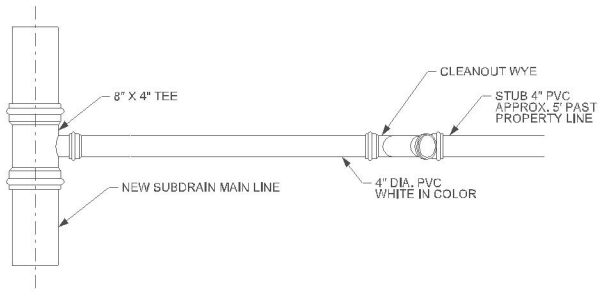


SUB-DRAIN DOUBLE LATERAL (OPTION B)

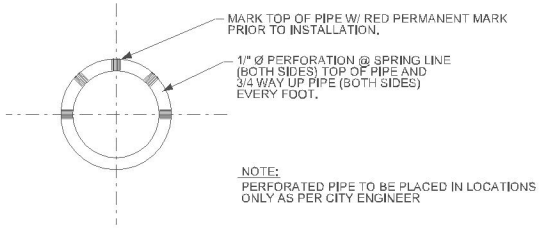


NOTE:
PIPE SHALL BE PVC ASTM 3034 SDR-35

TYPICAL "SOLID" SUBDRAIN PIPE SECTION FOR LANDSCAPED AREAS

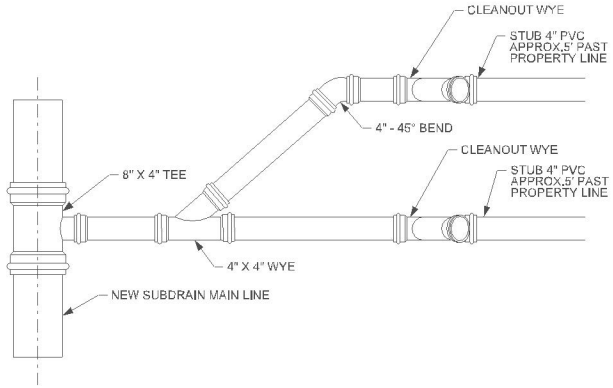


SUB-DRAIN SINGLE LATERAL



NOTE:
PERFORATED PIPE TO BE PLACED IN LOCATIONS ONLY AS PER CITY ENGINEER

8" PPVC SUB-DRAIN PERFORATION SCHEDULE



SUB-DRAIN DOUBLE LATERAL (OPTION A)

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/12/2021

SUB-DRAIN DETAILS

CENTERVILLE CITY
STANDARD DETAILS

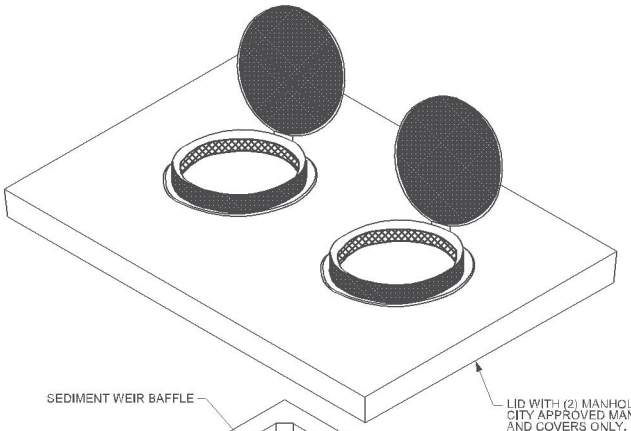
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SALT LAKE CITY, UTAH 84115
TEL: (801) 263-1752

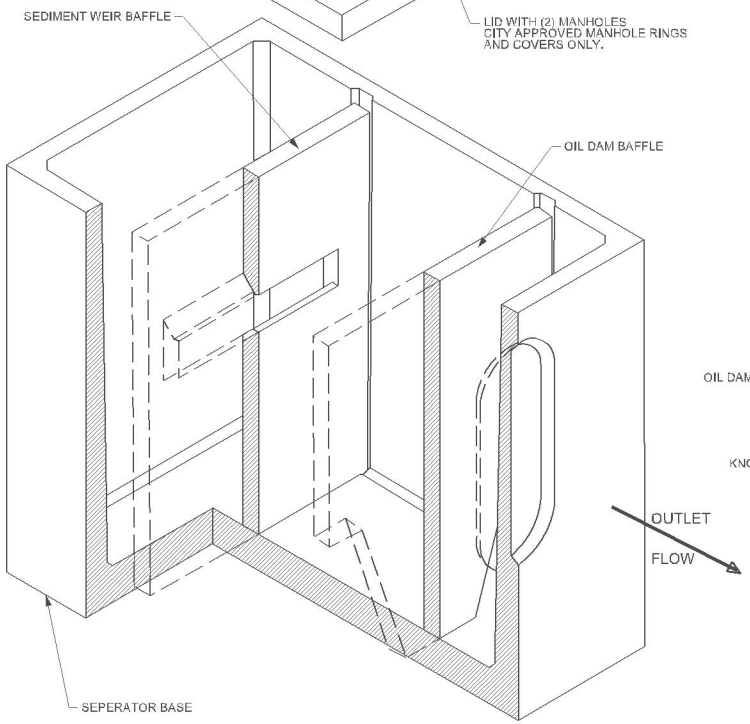
SHEET 17
OF 26

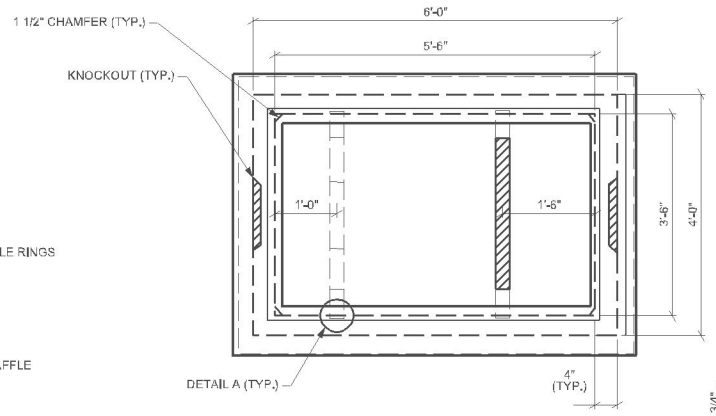
PROJECT NO.
21-017

NOTES:

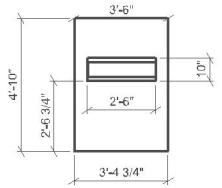
1. DETAIL IS SIMILAR TO OLDCASTLE PRECAST MODEL 660 SA.
2. SEPARATOR CAPACITY BASED ON DIMENSIONS - 575 GALLONS.
3. SEPARATOR SHALL BE PRECAST ONLY AND SHALL BE MANUFACTURED IN ACCORDANCE WITH CURRENT ASTM STANDARDS.
4. SEPARATOR LID SHALL BE DESIGNED FOR H-20 HIGHWAY LOADING.
5. SEPARATOR TYPE AND LOCATION REQUIRES APPROVAL BY CITY ENGINEER.



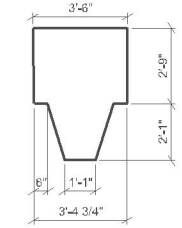




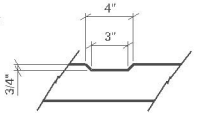
PLAN VIEW



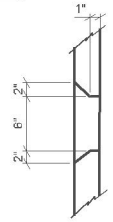
SEDIMENT WEIR BAFFLE
ELEVATION VIEW
(INLET SIDE)



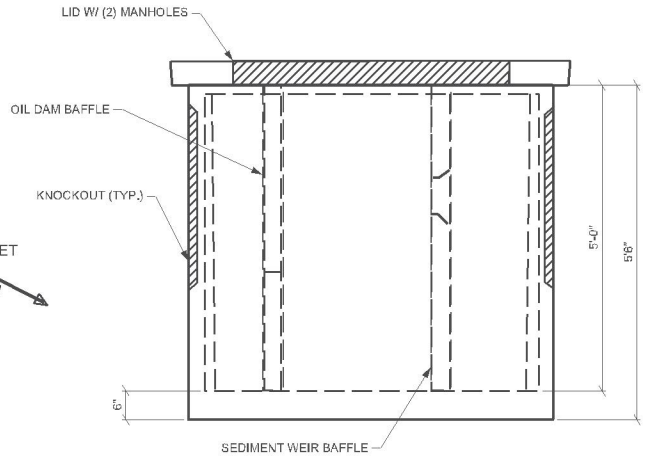
OIL DAM BAFFLE
ELEVATION VIEW
(OUTLET SIDE)



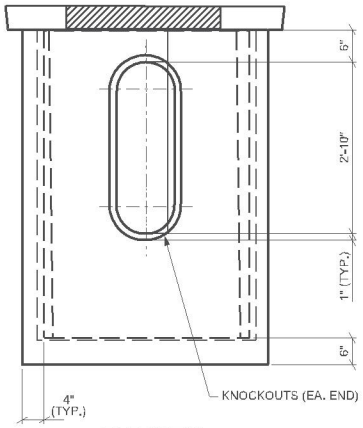
DETAIL A



WEIR OPENING
SECTION DETAIL



ELEVATION VIEW



END VIEW

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 01/29/2021

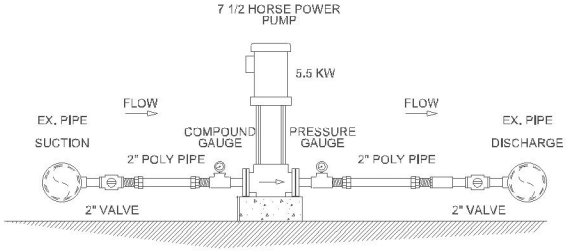
OIL / WATER SEPARATOR DETAIL

CENTERVILLE CITY
STANDARD DETAILS

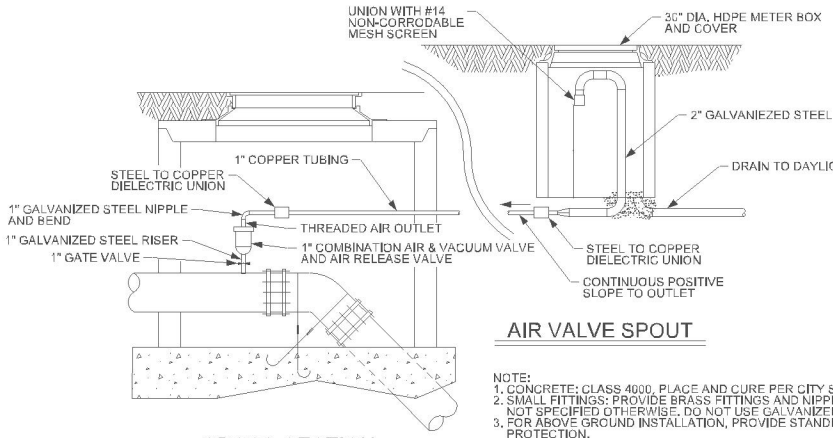
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SHEET 18
OF 26

PROJECT NO.
21-017



SUPPLEMENTAL BOOSTER PUMP DETAIL

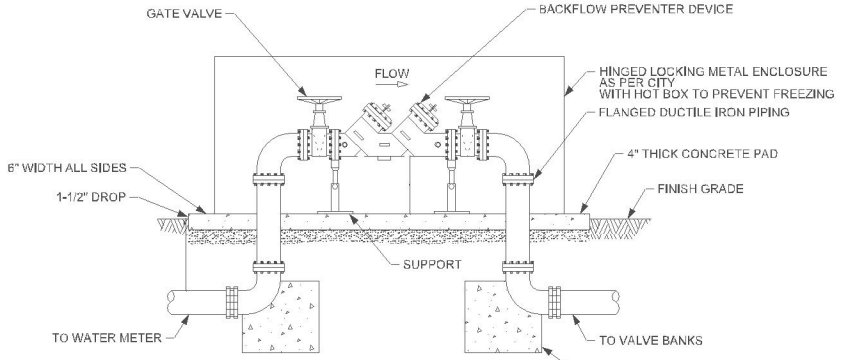


AIR VALVE SPOUT

CROSS-SECTION

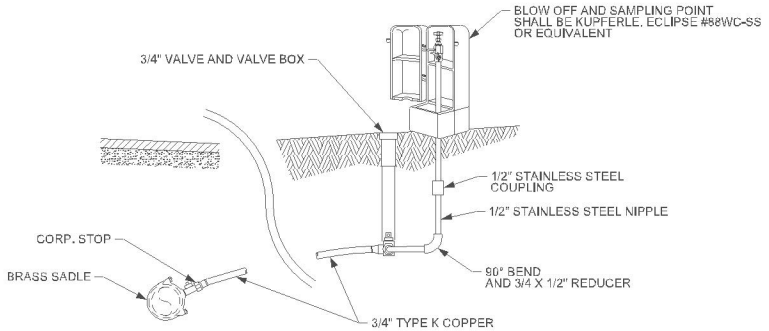
NOTE:
1. CONCRETE: CLASS 4000, PLACE AND CURE PER CITY SPEC.
2. SMALL FITTINGS: PROVIDE BRASS FITTINGS AND NIPPLES IF NOT SPECIFIED OTHERWISE. DO NOT USE GALVANIZED MATERIALS.
3. FOR ABOVE GROUND INSTALLATION, PROVIDE STANDPIPE PROTECTION.

AIR RELEASE ASSEMBLY



NOTE:
1. CONCRETE: CLASS 4000, PLACE AND CURE PER CITY SPEC.
2. COATING: EXCEPT MACHINED SURFACES, COAT ALL ITEMS EXPOSED TO ATMOSPHERE WITH EPOXY PAINT.
3. INSTALLATION: INSTALL PER THE PLUMBING CODE, SHALL NOT BE SUSCEPTIBLE TO FLOODING AND MUST BE ACCESSIBLE.

BACKFLOW PREVENTER



WATER SAMPLING STATION

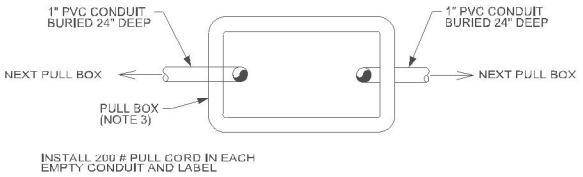
REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/12/2021

WATER SYSTEM DETAILS

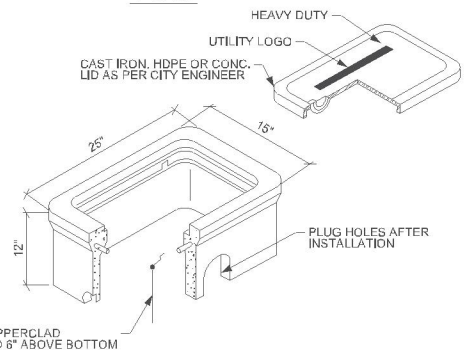
CENTERVILLE CITY
STANDARD DETAILS

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TEL: (801) 263-1752



INSTALL 200 # PULL CORD IN EACH EMPTY CONDUIT AND LABEL

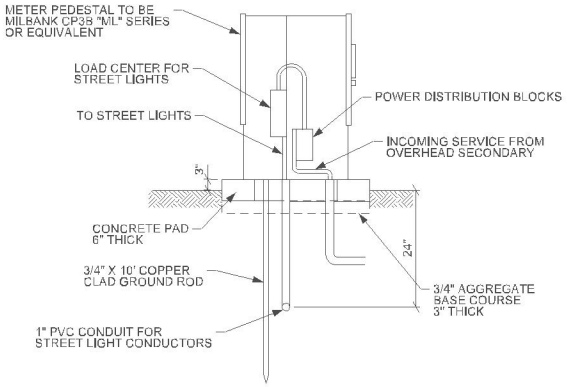
PLAN



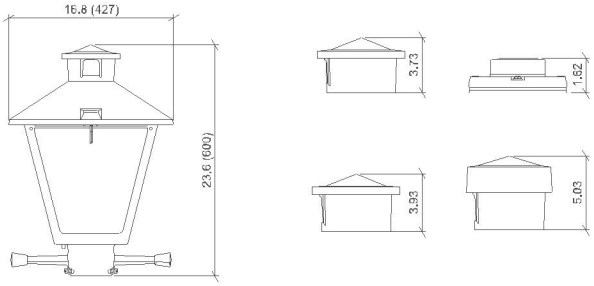
OBLIQUE

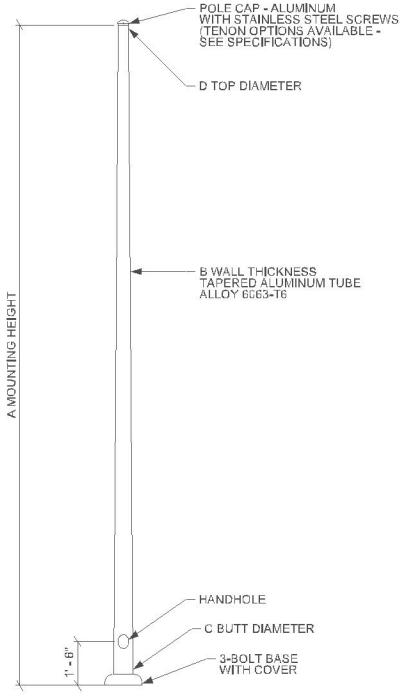
CAST IRON, HDPE OR CONC. PULL BOX

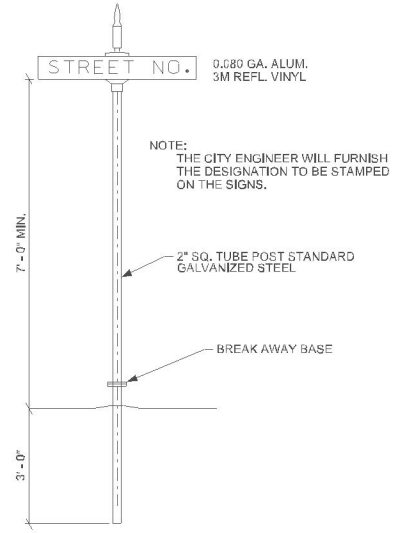
NOTE: SUBMIT BOX SHOP DRAWINGS TO CITY ENGINEER FOR REVIEW AND ACCEPTANCE



STREET LIGHT METER PEDESTAL







TYPICAL STREET NUMBERING SIGN

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/22/2021

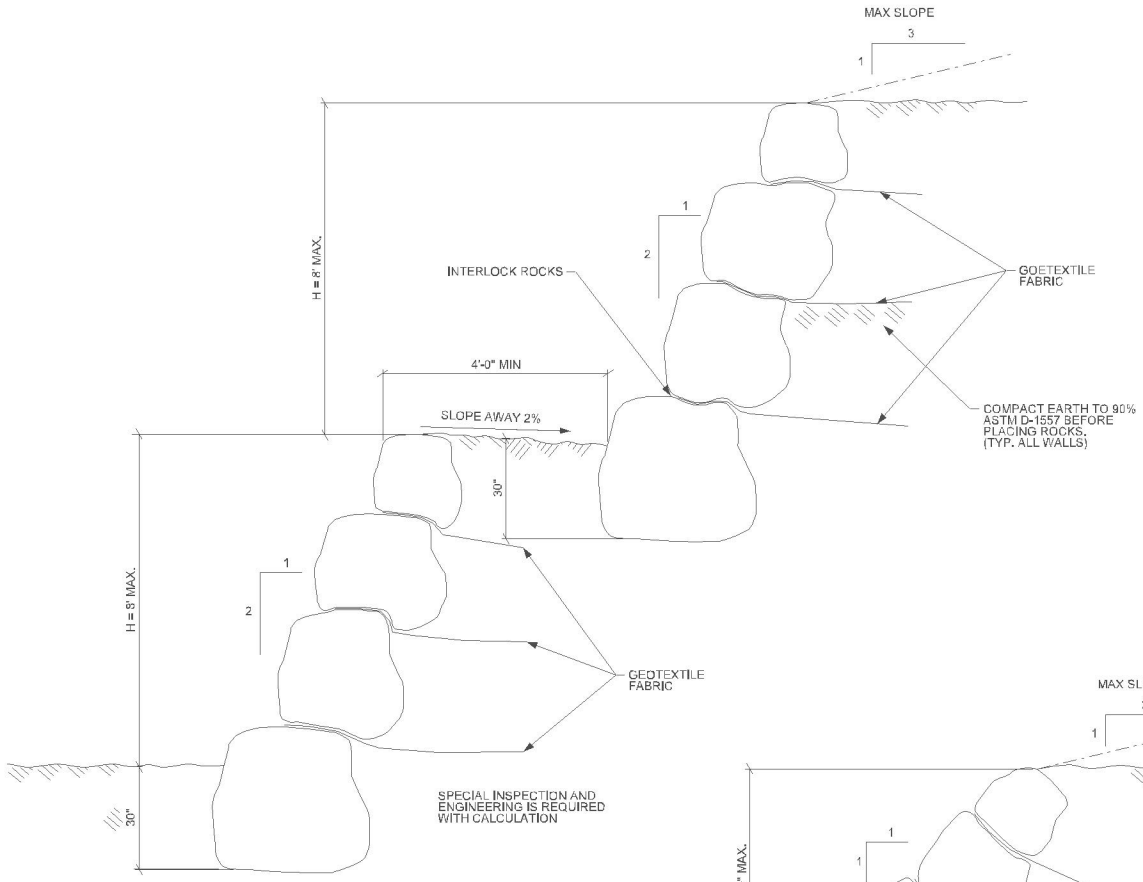
STREET LIGHT AND
STREET NUMBERING SIGN

CENTERVILLE CITY
STANDARD DETAILS

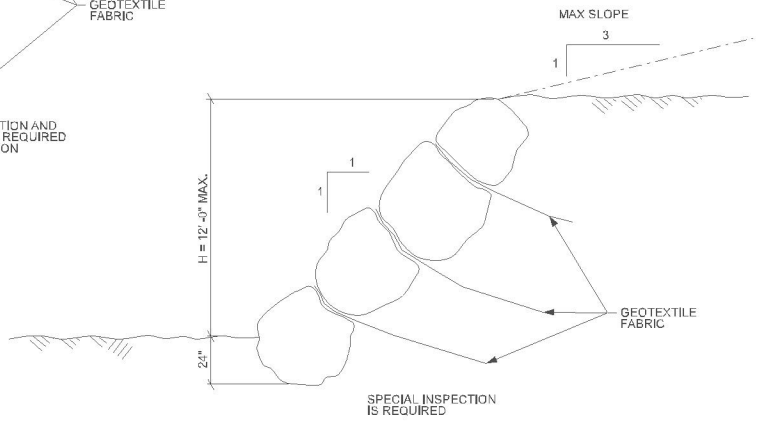
ESI ENGINEERING
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SHEET 20
OF 26

PROJECT NO.
21-017



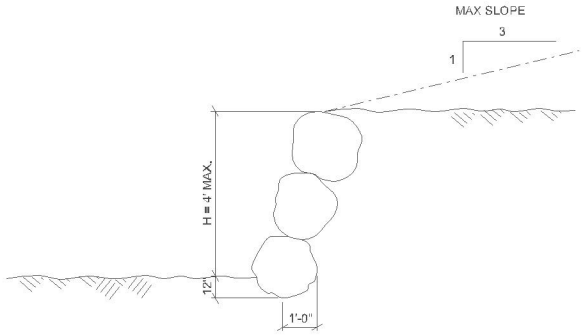
STEPPED ROCK WALLS
GREATER THAN
4' VERTICAL HEIGHT



ROCK SLOPES AT 1:1

NOTES :

1. SOILS SLOPES SHALL BE FEE DRAINING (SANDY GRAVELS) WITH MINIMAL AMOUNTS OF CLAY. FABRIC REQUIRED FOR ALL WALLS OVER 4'-0" EXCEPT FOR WELL GRADED GRAVEL WITH FINES.
2. ROCKS SHALL BE ANGULAR GRANITE OR DOLOMITE STONES, EACH WHICH ARE NON-SOLUBLE, HARD AND DURABLE.
3. ROCKS SHALL BE KEYED TOGETHER AND INTERLOCKED WITH LOWER ROCKS.
4. BASE ROCKS SHALL BE BURIED TO THE DEPTHS SHOWN.
5. EARTH SHALL BE THOROUGHLY COMPACTED BEFORE PLACEMENT OF ROCKS.
6. THE BUILDING OFFICIAL SHALL REQUIRE A SOILS REPORT PREPARED BY A LICENSED GEOTECHNICAL ENGINEER WHERE WATER IS ENCOUNTERED OR WHERE FINE GRAINED (CLAY) SOILS EXIST.
7. BASE ROCK DIAMETERS SHALL NOT BE LESS THAN 3'-6", EXCEPT FOR WALLS LESS THAN 4'-0" IN HEIGHT UPPER ROCKS SHALL NOT BE LESS THAN 2'-0" DIA.
8. STEPPED ROCK WALLS SHALL BE ENGINEERED AND ARE REQUIRED TO HAVE A SPECIAL INSPECTION BY THE ENGINEER.
9. ROCK WALLS HIGHER THAN 4'-0" SHALL HAVE MINIMUM ROCK FALL AREAS (OR LANDINGS), CLEAR OF ALL BUILDINGS OF 10'-0" WIDTH.
10. ESTABLISHED VEGETATION IS REQUIRED ALONG THE TOP OF ALL WALLS TO PREVENT WASHING AND EROSION.
11. A MINIMUM SET BACK OF 4'-0" FROM BUILDING AND STRUCTURES SHALL BE MAINTAINED ABOVE OR BELOW ALL ROCK WALLS.



ROCK WALLS LESS THAN
4' VERTICAL HEIGHT

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/12/2021

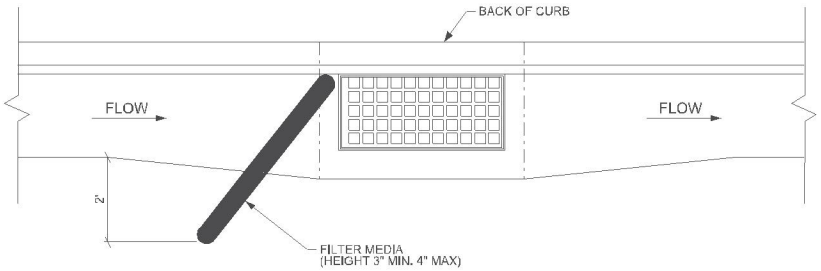
ROCK RETAINING WALLS

CENTERVILLE CITY
STANDARD DETAILS

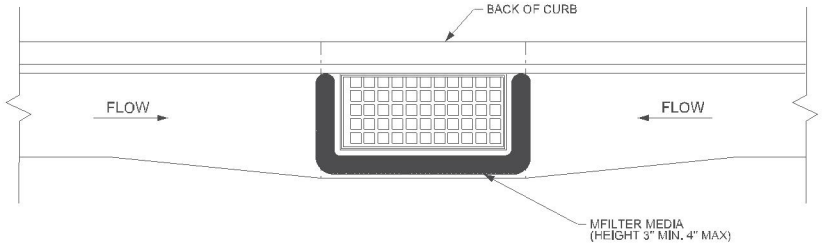
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SHEET 21
OF 26

PROJECT NO.
21-017



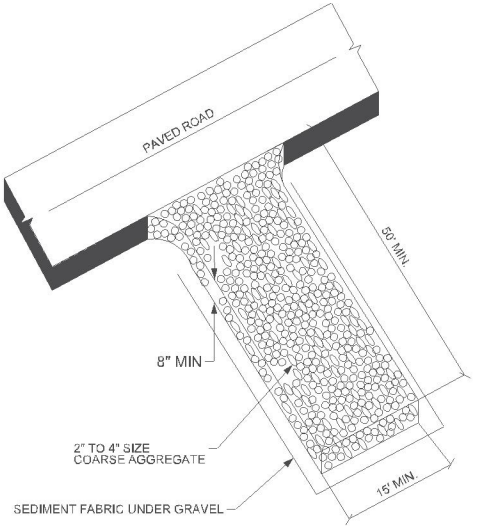
ON-GRADE INLET PROTECTION



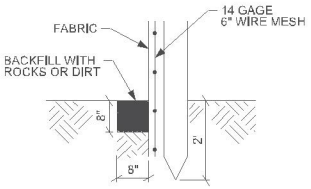
DROP INLET PROTECTION

NOTES:

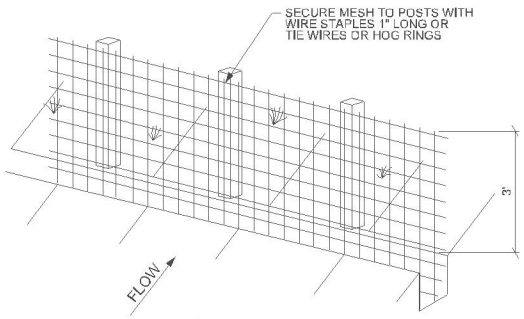
1. THESE PLANS MAY BE USED FOR THE CONSTRUCTION OF A STORM WATER BEST MANAGEMENT PRACTICE (BMP). THEY ARE NOT INCLUSIVE OF ALL PRACTICES AVAILABLE AND ARE ONLY SPECIFIC TO THE CONSTRUCTION OF THESE TYPES. MAINTENANCE OF THESE TYPES OF INSTALLATION IS IMPORTANT AND SHOULD BE CONTINUOUSLY MONITORED BY THE CONTRACTOR DETAILS SHOWN HERE HIGHLIGHT IMPORTANT PARTS OF CONSTRUCTION, AND SHOULD BE MODIFIED AS NEEDED.
2. REFER TO "A GUIDE TO STORMWATER BEST MANAGEMENT PRACTICES" FROM THE DAVIS COUNTY STORM WATER COALITION FOR MORE DETAILS. A COPY MAY BE OBTAINED FROM THE CITY DRAINAGE UTILITY SUPERVISOR AT 292-8232



STABILIZED ROADWAY ENTRANCE

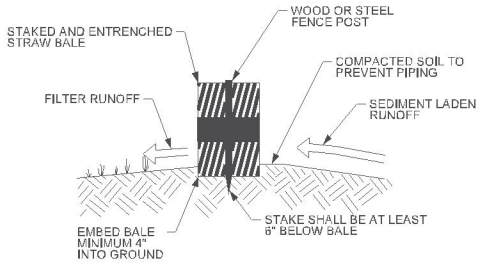


TOE DETAIL

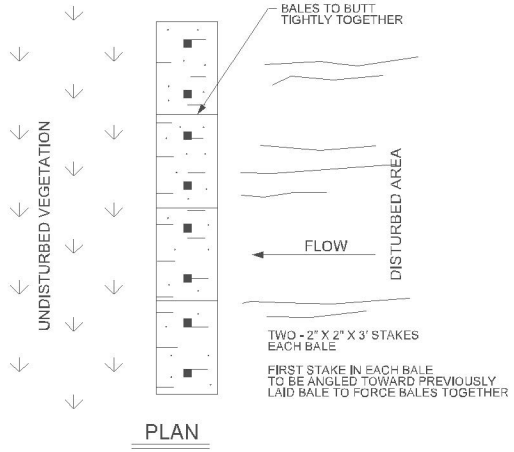


NOTE:
WITH ENGINEER'S APPROVAL, AN EXTRA STRENGTHH FILTER FABRIC CAN BE USED IN LIEU OF WIRE MESHH SUPPORT

SILT FENCE



SECTION



PLAN

STRAW BALE BARRIER

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/12/2021

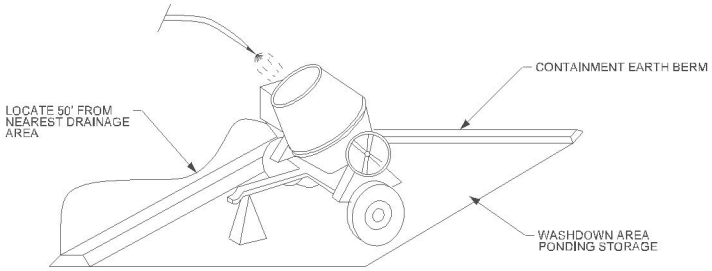
EROSION CONTROL DETAILS

CENTERVILLE CITY
STANDARD DETAILS

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3500 SOUTH MAIN STREET, SUITE 208
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TEL: (801) 263-1752

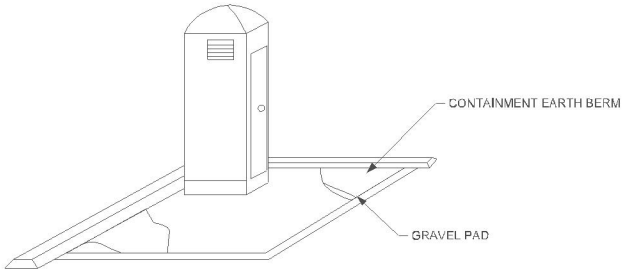
SHEET 22
OF 26

PROJECT NO.
21-017



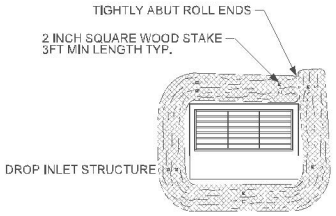
NOTES

1. DESCRIPTION: PREVENT OR REDUCE THE DISCHARGE OF POLLUTANTS TO STORM WATER FROM CONCRETE WASTE BY CONDUCTING WASHOUT OFF-SITE, PERFORMING ON-SITE WASHOUT IN A DESIGNATED AREA, AND TRAINING EMPLOYEES AND SUBCONTRACTORS.
2. APPLICATION: THIS TECHNIQUE IS APPLICABLE TO ALL TYPES OF SITES.
3. INSTALLATION/APPLICATION CRITERIA: STORE DRY AND WET MATERIALS UNDER COVER, AWAY FROM DRAINAGE AREAS. AVOID MIXING EXCESS AMOUNTS OF FRESH CONCRETE OR CEMENT ON-SITE. PERFORM WASHOUT COUNCRETE TRUCKS OFF-SITE OR IN DESIGNATED AREAS ONLY. DO NOT WASH OUT CONCRETE TRUCKS INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS. DO NOT ALLOW EXCESS CONCRETE TO BE DUMPED ON-SITE, EXCEPT IN DESIGNATED AREAS. WHEN WASHING CONCRETE TO REMOVE FINE PARTICLES AND EXPOSE THE AGGREGATE AVOID CREATING RUNOFF BY DRAINING THE WATER WITHIN THE BERMED OR LEVEL AREA. TRAIN EMPLOYEES AND SUBCONTRACTORS IN PROPER CONCRETE WASTE MANAGEMENT.
4. LIMITATIONS: OFF-SITE WASHOUT OF CONCRETE WASTES MAY NOT ALWAYS BE POSSIBLE.
5. MAINTENANCE: INSPECT SUBCONTRACTORS TO ENSURE THAT CONCRETE WASTES ARE BEING PROPERLY MANAGED. IF USING A TEMPORARY PIT, DISPOSE HARDENED CONCRETE ON A REGULAR BASIS.

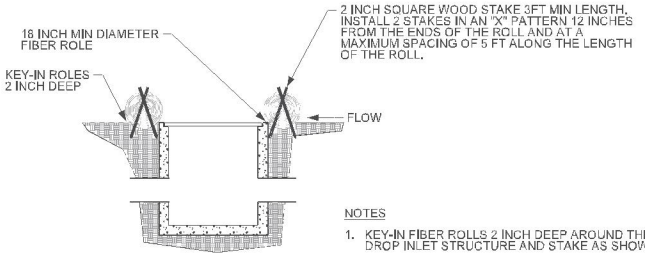


NOTES

1. DESCRIPTION: TEMPORARY ON-SITE SANITARY FACILITIES FOR CONSTRUCTION PERSONNEL
2. APPLICATION: ALL SITES WITH NO PERMANENT SANITARY FACILITIES OR WHERE PERMANENT FACILITY IS TOO FAR FROM ACTIVITIES
3. INSTALLATION/APPLICATION CRITERIA: LOCATE PORTABLE TOILETS IN CONVENIENT LOCATIONS THROUGHOUT THE SITE. PREPARE LEVEL, GRAVEL SURFACE AND PROVIDE CLEAR ACCESS TO THE TOILETS FOR SERVICING AND FOR ON-SITE PERSONNEL. CONSTRUCT EARTH BERM PERIMETER CONTROL FOR SPILL/PROTECTION LEAK.
4. MAINTENANCE: PORTABLE TOILETS SHOULD BE MAINTAINED IN GOOD WORKING ORDER BY LICENSED SERVICE WITH DAILY OBSERVATION FOR LEAK DETECTION. REGULAR WASTE COLLECTION SHOULD BE ARRAGNED WITH LICENSED SERVICE. ALL WASTE SHOULD BE DEPOSITED IN SANITARY SEWER SYSTEM FOR TREATMENT WITH APPROPRIATE AGENCY APPROVAL.



FIBER ROLL
DROP INLET BARRIER PLAN



SECTION

NOTES

1. KEY-IN FIBER ROLLS 2 INCH DEEP AROUND THE PERIMETER OF THE DROP INLET STRUCTURE AND STAKE AS SHOWN.
2. OVERLAP THE ENDS OF THE FIBER ROLL AT LEAST 18 INCHES.
3. CONSTRUCT ROLLS IN MEDIAN AREAS SO THAT THE TOPS OF THE ROLLS ARE NOT HIGHER THAN THE ADJACENT ROADWAY.
4. MAINTAIN A PROPERLY FUNCTIONING FIBER LOG BARRIER THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE INLET HAVE BEEN PAVED OR VEGETATED.
5. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/12/2021

COMMERCIAL ENTRANCE DETAILS

CENTERVILLE CITY
STANDARD DETAILS

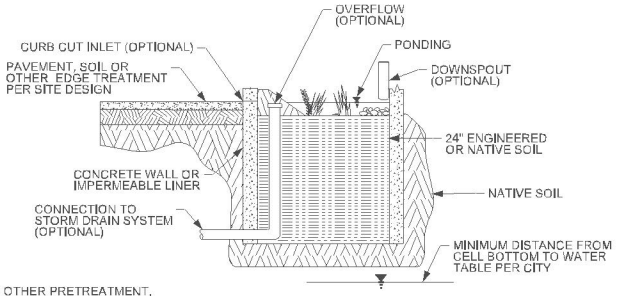
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3500 SOUTH MAIN STREET, SUITE 208
SALT LAKE CITY, UTAH 84115
TEL: (801) 263-1752

SHEET 23
OF 26

PROJECT NO.
21-017

BIORETENTION CELL DESIGN PARAMETERS

PARAMETER	MIN. VALUE	MAX. VALUE	NOTES
DEPTH TO GROUNDWATER	2-FT	NO MAX	-
PONDING DEPTH	NO MIN.	18-IN	-
DRAWDOWN TIME	12-HOURS	72 HOURS	24 TO 48 HOURS PREFERRED; DRAWDOWN TIME MAY ALSO DEPEND ON LOCAL MOSQUITO ABATEMENT REGULATIONS
INFILTRATION RATE	0.25-IN/HR	6-IN/HR	FIELD TESTING REQUIRED FOR FINAL DESIGN; INFILTRATION RATE SHALL BE LOW TO ALLOW BIOFILTRATION PROCESSES TO OCCUR
FREEBOARD	NO MIN.	NO MAX	FREEBOARD PER CITY; FOR PUBLIC SAFETY, A MIN. OF 6-IN REQ'D EMBANKMENT WHEN PONDING DEPTH GREATER THAN 6-IN

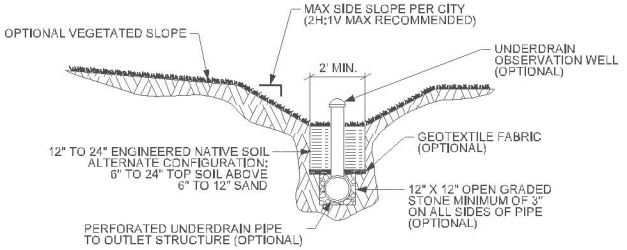


NOTES:
1. CONSIDER FOREBAY OR OTHER PRETREATMENT.
2. CONSIDER UPSTREAM BYPASS FOR LARGE STORM EVENTS.

BIORETENTION CELL - IN NATIVE OR ENGINEERED SOILS

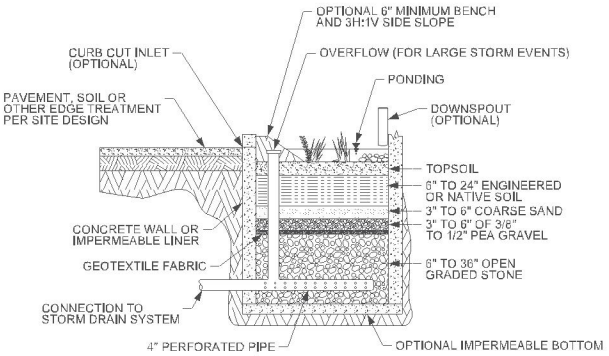
BIOWALE DESIGN PARAMETERS

PARAMETER	MIN. VALUE	MAX. VALUE	NOTES
LENGTH	HYDRAULIC RESIDENCE TIME	NO MAX	-
LONGITUDINAL SLOPE	0.50%	5%	UNDERDRAIN RECOMMENDED BELOW MINIMUM SLOPE
BOTTOM WIDTH	2-FT	NO MAX	-
SIDE SLOPE	NO MIN.	3H:1V	PER CITY REQUIREMENTS
FLOW VELOCITY	NO MIN.	1.0-FT/S	MAXIMUM PERMISSIBLE SHEAR STRESS MAY ALSO DICTATE MAX. FLOW VELOCITY
FLOW DEPTH	NO MIN.	2/3 VEGETATION HEIGHT	FLOW DEPTHS GREATER THAN VEGETATION HEIGHT WILL BYPASS BIOFILTRATION
FREEBOARD	NO MIN.	NO MAX	PER CITY REQUIREMENTS
VEGETATION COVERAGE	> 65%		REQUIRED FOR BIOFILTRATION SUCCESS
HYDRAULIC RESISTANCE TIME	5 MIN.	NO MAX	-



NOTES:
1. ENGINEERED SOIL MAY IMPROVE FILTRATION.
2. UNDERDRAIN RECOMMENDED FOR LONGITUDINAL SLOPES < 1%
3. (OPTIONAL) ITEMS SHOWN FOR USE WITH UNDERDRAIN.
4. DIMENSIONS SHOWN MAY VARY BASED ON SITE CONDITIONS.

BIOSWALE

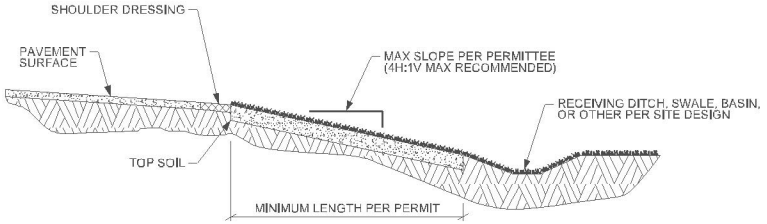


NOTES:
1. OVERFLOW ELEVATION MUST BE BELOW ELEVATION OF INLET (CURB CUT, DOWNSPOUT, OR OTHER PER SITE DESIGN).
2. DIMENSIONS SHOWN MAY VARY BASED ON SITE CONDITIONS.
3. CONSIDER FOREBAY OR OTHER PRETREATMENT.

BIORETENTION CELL - WITH UNDERDRAIN SYSTEM

VEGETATED STRIP DESIGN PARAMETERS

PARAMETER	MIN. VALUE	MAX. VALUE	NOTES
LENGTH (FLOW DIRECTION)	15-FT	NO MAX	-
LONGITUDINAL SLOPE	NO MIN.	4H:1V	PER CITY REQUIREMENTS
FLOW VELOCITY	NO MIN.	1.0-FT/S	MAXIMUM PERMISSIBLE SHEAR STRESS MAY ALSO DICTATE MAX. FLOW VELOCITY
FLOW DEPTH	NO MIN.	2/3 VEGETATION HEIGHT	FLOW DEPTHS GREATER THAN VEGETATION HEIGHT WILL BYPASS BIOFILTRATION
FREEBOARD	NO MIN.	NO MAX	PER CITY REQUIREMENTS
VEGETATION COVERAGE	>65%		REQUIRED FOR BIOFILTRATION SUCCESS



NOTES:
1. DIMENSIONS SHOWN MAY VARY BASED ON SITE CONDITIONS.

VEGETATED STRIP

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/12/2021

WATER RETENTION AND VEGITATION

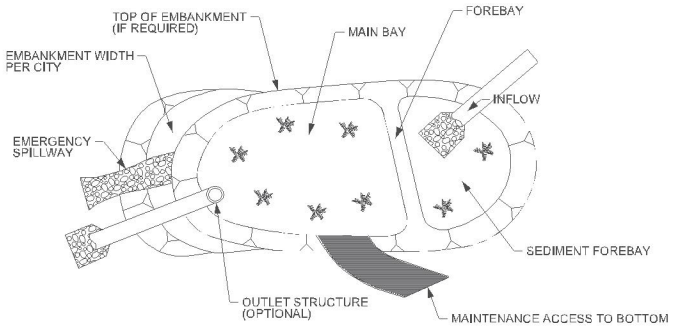
CENTERVILLE CITY STANDARD DETAILS

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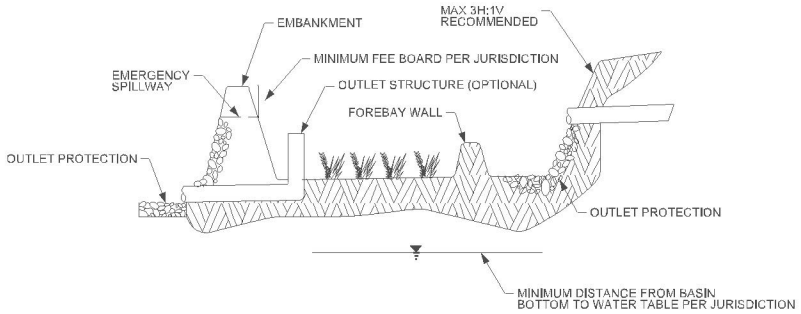
SHEET 24 OF 26

PROJECT NO. 21-017

INFILTRATION BASIN DESIGN PARAMETERS			
PARAMETER	MIN. VALUE	MAX. VALUE	NOTES
WATER QUALITY VOLUME	0.1-AC-FT (4356CF)	NO MAX	-
FEEBOARD	1-FT		-
OVERFLOW SPILLWAY LENGTH	3-FT		-
INVERT SLOPE	0% (FLAT BASIN BOTTOM)		-
INTERIOR SIDE SLOPES	NO MIN.	3H:1V	-
DRAWDOWN TIME	24-HOURS	72-HOURS	48-HOURS RECOMMENDED
DESIGN INFILTRATION RATE	0.25-IN/HR	6-IN/HR	FIELD TESTING REQUIRED FOR FINAL DESIGN
DEPTH TO GROUNDWATER	2-FT	NO MAX	PER CITY REQUIREMENTS



PLAN VIEW

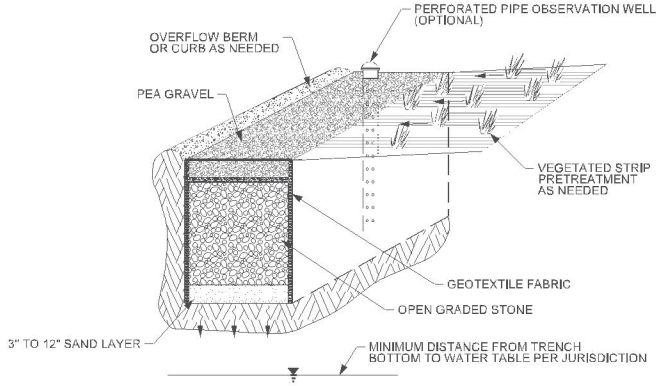


SECTION VIEW

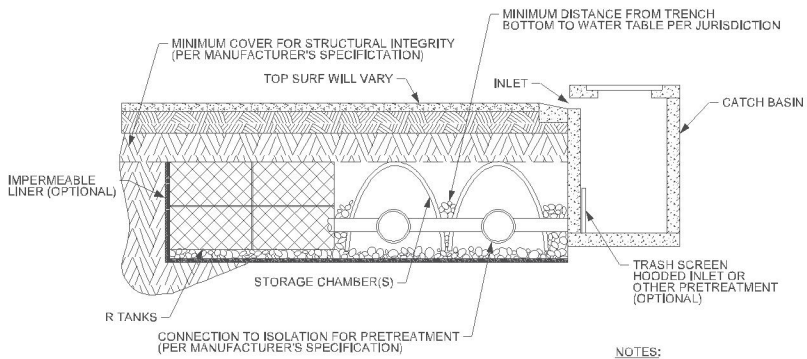
NOTES:
1. DIMENSIONS SHOWN MAY VARY BASED ON SITE CONDITIONS.
2. FOREBAY CONNECTION TYPE TO MAIN BAY WILL VARY: OUTLET PIPE: GABION WALL, NOTCHED CONCRETE WALL, AND OTHERS ARE ACCEPTABLE.
3. CONSIDER UPSTREAM BYPASS FOR LARGE STORM EVENTS.

INFILTRATION BASIN

INFILTRATION BASIN DESIGN PARAMETERS			
PARAMETER	MIN. VALUE	MAX. VALUE	NOTES
DEPTH OF TRENCH	2-FT	NO MAX	MAX. DEPTH DETERMINED BY CITY
LONGITUDINAL TRENCH SLOPE	0%	1%	-
WIDTH	2-FT	NO MAX	-
DRAWDOWN TIME	12-HOURS	72-HOURS	-
DESIGN INFILTRATION RATE	0.25-IN/HR	6-IN/HR	FIELD TESTING REQUIRED FOR FINAL DESIGN
DEPTH TO GROUNDWATER	2-FT	NO MAX	-



INFILTRATION TRENCH



NOTES:
1. CONFIGURATION WILL VARY.
2. IMPERMEABLE LINER AROUND UNDER GROUND SYTEM IF GROUND WATER CONCERNS EXIST.
3. IF IMPERMEABLE LINER IS USED, PROVIDE OUTLET TO PREVENT STANDING WATER.

UNDERGROUND INFILTRATION GALLERY

REVISION	DATE	BY	DESCRIPTION

DESIGN BWN
DRAWN MKN
CHECKED KLC
DATE 03/12/2021

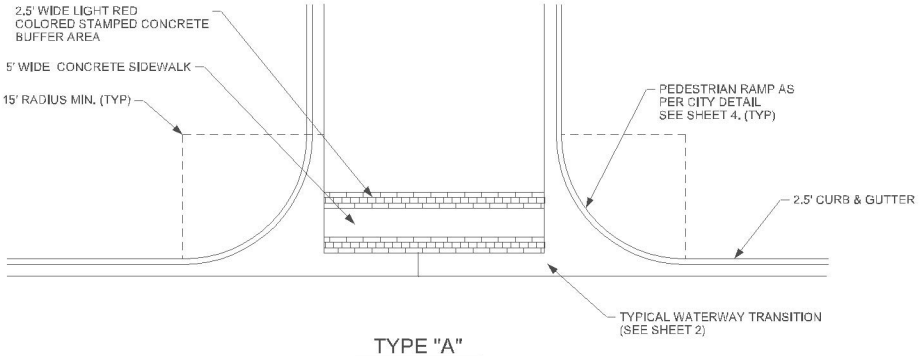
WATER INFILTRATION DETAIL

CENTERVILLE CITY
STANDARD DETAILS

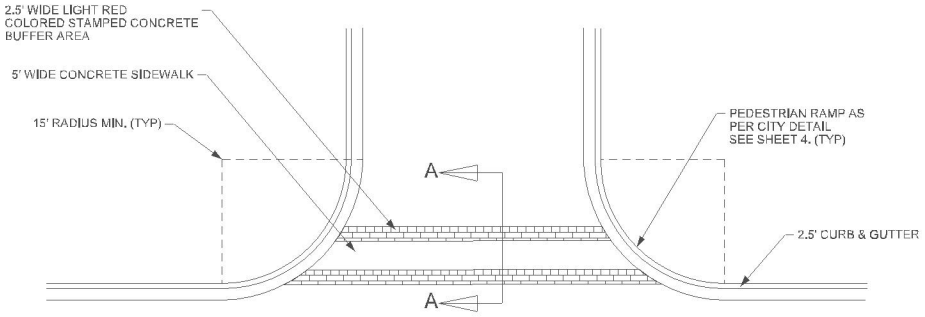
ESI ENGINEERING
CONSULTING ENGINEERS AND LAND SURVEYORS
3500 SOUTH MAIN STREET, SUITE 208
SALT LAKE CITY, UTAH 84115
TEL: (801) 263-1752

SHEET 25
OF 26

PROJECT NO.
21-017

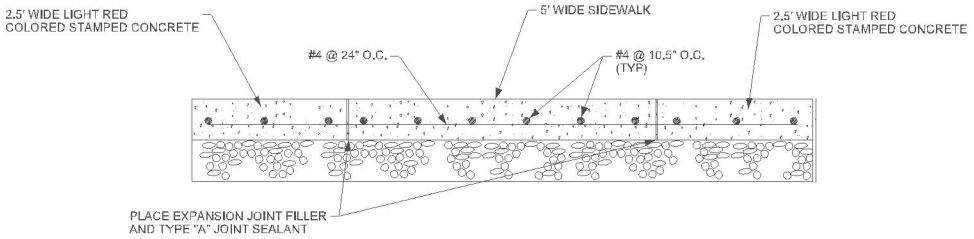


TYPE "A"



TYPE "B"

NOTES:
1. CONCRETE CROSSWALK OPTIONAL AS PER CITY PLANNING AND ZONING COMMISSION.



SECTION A-A

REVISION	DATE	BY	DESCRIPTION

DESIGN	BWN
DRAWN	MKN
CHECKED	KLC
DATE	03/22/2021

COMMERCIAL ENTRANCE DETAILS

CENTERVILLE CITY
STANDARD DETAILS

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SHEET 26
OF 26

PROJECT NO.
21-017

SECTION 01 00 00 – 34 00 00

SPECIFICATIONS AND GENERAL REQUIREMENTS

Table of Contents

Division 01 - General Requirements

Summary
Section 01 11 00 ..... Summary of Work

Price and Payment Procedures
Section 01 24 00 ..... Value Analysis
Section 01 25 00 ..... Product Options and Substitutions
Section 01 26 00 ..... Contract Modification Procedures
Section 01 29 00 ..... Payment Procedures

Administrative Requirements
Section 01 31 13 ..... Coordination
Section 01 31 19 ..... Preconstruction Conference
Section 01 31 20 ..... Partnering
Section 01 32 16 ..... Progress Schedule
Section 01 33 00 ..... Submittal Procedures
Section 01 35 10 ..... Acceptance

Quality Requirements
Section 01 42 19 ..... References
Section 01 43 00 ..... Quality Assurance
Section 01 43 40 ..... Resident Superintendent
Section 01 45 00 ..... Quality Control

Temporary Facilities and Controls
Section 01 55 26 ..... Traffic Control
Section 01 57 00 ..... Temporary Controls

Product Requirements
Section 01 64 00 ..... Owner-Furnished Products
Section 01 65 00 ..... Product Delivery and Handling
Section 01 66 00 ..... Product Storage and Protection

Execution and Closeout Requirements
Section 01 71 13 ..... Mobilization and Demobilization
Section 01 71 23 ..... Construction Layout
Section 01 71 34 ..... Survey Referencing
Section 01 73 29 ..... Cutting and Patching
Section 01 74 13 ..... Progress Cleaning
Section 01 75 16 ..... Startup Procedures
Section 01 78 23 ..... Operation and Maintenance Data

Section 01 78 39..... Project Record Documents
Section 01 78 50.....Closeout Procedures

Division 02 - Existing Conditions

Demolition and Structure Moving
Section 02 41 13..... Selective Site Demolition
Section 02 41 14..... Pavement Removal
Section 02 41 15..... Pavement Pulverizing
Section 02 41 19.....Selective Building Demolition

Division 03 - Concrete

Concrete Forming and Accessories
Section 03 11 00..... Concrete Forming

Concrete Reinforcing
Section 03 20 00.....Concrete Reinforcing

Cast-in-place Concrete
Section 03 30 04..... Concrete
Section 03 30 05.....Concrete Testing
Section 03 30 10..... Concrete Placement
Section 03 35 00.....Concrete Finishing
Section 03 39 00.....Concrete Curing

Precast Concrete
Section 03 40 00.....Precast Concrete

Grouting
Section 03 61 00.....Cementitious Grout

Division 04 - Masonry

Masonry General
Section 04 05 16..... Masonry Mortar and Grout
Unit Masonry
Section 04 21 00.....Clay Unit Masonry
Section 04 22 00.....Concrete Unit Masonry

Division 05 - Metals

Metals General
Section 05 05 10.....Metal Galvanizing

Section 05 05 23.....Bolts, Nuts and Accessories

Structural Metal Framing
Section 05 12 00.....Structural Steel

Metal Fabrication
Section 05 51 00.....Metal Stairs
Section 05 53 00.....Gratings and Floor Plates
Section 05 56 00.....Metal Casings

Division 06 - Wood, Plastics and Composites

Carpentry General
Section 06 61 00.....Rough Carpentry

Division 07 - Thermal and Moisture Protection

Damp Proofing and Water Proofing
Section 07 19 00.....Water Repellants

Thermal Protection
Section 07 21 00.....Insulation

Painting
Section 09 91 00.....Painting

High Performance Coating
Section 09 96 23.....Graffiti Resistant Coating

Special Coatings
Section 09 97 14.....Coatings for Steel Bridges
Section 09 97 15.....Coatings for Steel Water Storage Tanks

Division 13 - Special Construction

Special Structures
Section 13 34 19.....Metal Building

Division 22 - Plumbing

Plumbing General
Section 22 05 00.....Mechanical General Requirements

Plumbing Piping and Pumps

Section 22 11 13.....Facility Water Distribution Piping
Section 22 13 33..... Submersible Pump

Division 26 - Electrical

Electrical General
Section 26 05 00..... Electrical General Requirements
Section 26 05 13..... Conductors and Cables
Section 26 05 33.....Raceway
Section 26 05 34..... Electrical Boxes and Fittings
Section 26 09 26.....Panelboard

Medium-Voltage Electrical Distribution
Section 26 13 13.....Circuit Breaker

Low-Voltage Electrical Transmission
Section 26 29 13.....Motor Controllers

Lighting
Section 26 56 19.....Roadway Lighting System

Division 31 - Earthwork

Earthwork General
Section 31 05 10..... Boundary Markers and Survey Monuments
Section 31 05 13..... Common Fill
Section 31 05 15..... Cement Treated Fill
Section 31 05 19..... Geotextiles
Section 31 05 21.....Geogrids/Geo-composites

Site Clearing
Section 31 11 00.....Site Clearing

Earth Moving
Section 31 23 16.....Excavation
Section 31 23 17.....Rock Removal
Section 31 23 23.....Backfilling for Structures
Section 31 23 26..... Soil Compaction Quality Control
Section 31 25 00.....Erosion and Sedimentation Control

Earthwork Methods
Section 31 31 19.....Vegetation Control
Section 31 36 00..... Gabions
Section 31 37 00.....Riprap

Shoring

Section 31 41 00 ..... Shoring

Division 32 - Exterior Improvements

Exterior Improvements General

Section 32 01 05 ..... Information, Regulatory, And Warning Signs
Section 32 01 06 ..... Post Mounted Signs
Section 32 01 07 ..... Relocate Post Mounted Signs and Mail Boxes
Section 32 01 10 ..... Relocate Fences and Gates
Section 32 01 13.50 ..... Fog Seal
Section 32 01 13.52 ..... Mastic Seal
Section 32 01 13.61 ..... Slurry Seal
Section 32 01 13.64 ..... Chip Seal
Section 32 01 13.50 ..... High Density Mineral Bond Seal
Section 32 01 13.69 ..... Micro-Surface Seal
Section 32 01 16.71 ..... Cold Milling Bituminous Pavement
Section 32 01 16.74 ..... In Place Hot Reused Bituminous Pavement
Section 32 01 17 ..... Sealing Cracks in Bituminous Paving
Section 32 01 19 ..... Patching Rigid Paving
Section 32 01 20 ..... Dowel Bar Retrofit
Section 32 01 26 ..... Grinding Pavement
Section 32 01 29 ..... Concrete Paving Raising
Section 32 01 31 ..... Pavement Smoothness
Section 32 01 34 ..... White Top Inlay
Section 32 01 90 ..... Maintenance of Planting
Section 32 01 91 ..... Tree Root Cutting
Section 32 01 93 ..... Pruning Trees
Section 32 05 10 ..... Backfilling Roadways

Bases, Ballasts, and Paving

Section 32 11 23 ..... Aggregate Base Courses
Section 32 11 24 ..... Pulverized Pavement Base Course
Section 32 12 03 ..... Asphalt Binder
Section 32 12 05 ..... Bituminous Concrete
Section 32 12 08 ..... Rubberized Asphalt Concrete
Section 32 12 13.13 ..... Tack Coat
Section 32 12 13.19 ..... Prime Coat
Section 32 12 16.13 ..... Plant Mix Bituminous Paving
Section 32 12 16.18 ..... Recycle Bituminous Pavement
Section 32 12 16.19 ..... Cold-Mix Bituminous Paving
Section 32 13 13 ..... Concrete Paving

Section 32 13 73 ..... Concrete Paving Joint Sealants
Section 32 14 13 ..... Precast Concrete Unit Paving
Section 32 14 16 ..... Brick Unit Paving
Section 32 16 13 ..... Driveway, Sidewalk, Curb, Gutter
Section 32 16 14 ..... Curb Cut Assembly
Section 32 17 23 ..... Pavement Markings

Site Improvements
Section 32 31 13 ..... Chain Link Fences and Gates
Section 32 31 16 ..... Welded Wire Fences and Gates
Section 32 32 26 ..... Crib Walls

Planting Irrigation
Section 32 84 23 ..... Underground Irrigation Systems

Planting Preparation
Section 32 91 13 ..... Structural Soil Mix
Section 32 91 19 ..... Landscape Grading

Planting
Section 32 92 00 ..... Turf and Grasses
Section 32 93 13 ..... Ground Cover
Section 32 93 43 ..... Tree
Section 32 93 43 ..... Vegetation Establishment Period

Division 33 - Utilities

Operation and Maintenance of Utilities
Section 33 01 30.73 ..... Relining Pipe Culverts

Utilities General
Section 33 05 01 ..... Acrylonitrile-Butadiene-Styrene (ABS) Pipe
Section 33 05 02 ..... Concrete Pipe and Culvert
Section 33 05 03 ..... Copper Pipe
Section 33 05 04 ..... Corrugated Metal Pipe
Section 33 05 05 ..... Ductile Iron Pipe
Section 33 05 06 ..... Polyethylene Pipe
Section 33 05 07 ..... Polyvinyl Chloride Pipe
Section 33 05 08 ..... Pre-Stressed Concrete Pipe
Section 33 05 09 ..... Steel Pipe – Lined and Coated
Section 33 05 10 ..... Vitrified Clay Pipe
Section 33 05 14 ..... Utility Grade Adjustment
Section 33 05 20 ..... Backfilling Trenches
Section 33 05 23.35 ..... Trenchless Utility Installation

Section 33 05 23.40..... Cured-in-place Pipe
Section 33 05 25..... Pavement Restoration
Section 33 08 00..... Commissioning of Water Utilities

Water Utilities

Section 33 11 00..... Water Distribution and Transmission
Section 33 11 11.....Relocate Water Meters and Fire Hydrants
Section 33 12 16.....Water Valves
Section 33 12 19.....Hydrants
Section 33 12 33..... Water Meter
Section 33 13 00.....Disinfection
Section 33 16 13.....Water Tank

Sanitary Sewerage Utilities

Section 33 31 00..... Sanitary Sewerage Systems

Storm Drain Utilities

Section 33 41 00.....Drainage Systems
Section 33 47 00.....Ponds

Electrical Utilities

Section 33 71 73..... Electrical Utility Services

Division 34 - Transportation

Signaling and Control Equipment

Section 34 41 13.....Traffic Signals

Construction and Equipment

Section 34 71 13..... Vehicle Barriers
Section 34 71 19.....Vehicle Delineators

SECTION 01 11 00

SUMMARY OF WORK

This section is intended as a guide for the ENGINEER's use to include in the Project Manual a section for identification of the Work, type of contract, plus, as a broad-scope section, a flexible number of optional Articles to accommodate various administrative requirements needed to tailor the documents to specific Project needs. Such needs may include but not be limited to the following:

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Indicate type of Work, name of Project and its location, and name of OWNER. This article is not a scope of work.

1.2 WORK BY OTHERS

A. Include the person or organization having authority and responsibility for coordinating activities among prime contractors.

1.3 FUTURE WORK

1.4 WORK SEQUENCE

1.5 CONTRACTOR USE OF PREMISES

1.6 OWNER OCCUPANCY

1.7 PARTIAL OWNER UTILIZATION

1.8 PREORDERED PRODUCTS

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 24 00

VALUE ANALYSIS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedure for evaluating alternate or substitute proposals for materials or equipment for the purpose of the betterment of the Work or reducing the Cost of the Work.

B. Each proposal will be compared for Effective Cost.

1.2 VALUE ENGINEERING -MEASUREMENT AND PAYMENT

A. If a cost reduction proposal is accepted in whole or in part, OWNER will pay 50 percent of the net savings and the cost of developing the proposal minus 50 percent of ENGINEER's cost of investigating the cost reduction proposal.

B. In determining the estimated net savings, the right is reserved to disregard the Contract Bid prices.

C. Payment constitutes the full reimbursement for any cost reduction proposal. OWNER may use the proposal in future work as it deems needful.

1.3 DEFINITIONS

A. Design Life: The time life span of the product used in the Work established by ENGINEER.

B. Effective Cost: Total cost of material or equipment in today's dollars. The cost includes First Cost, any Replacement Costs during the Design Life, and any residual value at the end of the Design Life. Three possible cases exist for determining effective cost:

1. Case 1 -Service Life equals Design Life.
2. Case 2 -Service Life is less than Design Life.
3. Case 3 -Service Life is greater than Design Life

C. First Cost: First cost is the bid price for an alternate material or equipment and installation. Historical data may be used to determine an appropriate value for pre-Bid evaluations.

D. Replacement Cost: The cost in today's dollars to replace material or equipment.

E. Service Life: The time life span of material or equipment before Failure occurs or before cost of maintenance justifies replacement. Service life shall be established by ENGINEER.

1.4 **SUBMITTALS**

A. At any time after award of Contract, CONTRACTOR may submit written proposals for modifying the Contract Documents.

1.5 **EVALUATION OF PROPOSALS**

A. Compute each proposal's least cost using the appropriate steps in the following table. Rank the proposals in order of lowest Effective Cost.

B. The ENGINEER will announce as soon as possible the Effective Cost ranking of the most responsible cost proposal.

C. Should a Service Life longer than that assigned be included in a cost reduction proposal, written documentation supporting the proposed Service Life must be submitted to the ENGINEER. The documentation must be in a form satisfactory to the ENGINEER. ENGINEER is not obliged to accept the proposed Service Life, but may elect to use the announced Service Life.

1.6 **ACCEPTANCE**

A. ENGINEER shall be sole judge of the acceptance of a cost reduction proposal.

B. ENGINEER may accept wholly or in part or reject the proposal, as judgment deems correct.

C. OWNER and ENGINEER are not liable for failure to accept or act upon any cost reduction proposal.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 25 00

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Administrative and procedural requirements for the selection of product and the substitution of product.

B. Substitution of product occurs after the Effective Date of the Construction Contract. Prior to Effective Date, OWNER only considers options for selecting alternate products.

1.2 DEFINITIONS

A. **Options**: CONTRACTOR's choices in selecting products. The choices include:

1. Products Specified by reference standards or by Description Only: Any product meeting those standards.
2. Products Specified by Naming One or More Manufacturers: No options or Substitutions.
3. Products Specified by Naming a Manufacturer with an "or equal" Phrase: Any manufacturer not specifically named will be allowed after approval by ENGINEER.

B. **Substitutions**: Changes requested by CONTRACTOR after award of the Contract which affects products, materials, equipment, and methods of construction required by Contract Documents. The following are NOT considered substitutions:

1. Revisions to Bid Documents requested by Bidders during the bidding period, and accepted prior to award of contract, are considered as included in the Contract Documents and are not subject to requirements specified in this section for substitutions.
2. Revisions to Contract Documents requested at any time by OWNER or ENGINEER.
3. Specified Options of products and construction methods included in Contract Documents.
4. The CONTRACTOR's determination of and compliance with governing Laws and Regulations and orders issued by governing authorities.

1.3 SUBMITTALS

A. After Notice of Intent to Award, submit 4 copies of the list of product Options that are proposed. Include name of manufacturer.

B. Tabulate products by specification section number, title, and article number.

C. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

D. ENGINEER will reply in writing stating whether there is objection to listed items. Failure to object to a listed item shall not relieve CONTRACTOR from compliance with the requirements of the Contract Documents.

1.4 LIMITATIONS ON SUBSTITUTIONS

A. Substitutions will not be considered when indicated on Shop Drawings or Product Data submittals without separate formal request, when requested directly by Subcontractor or Supplier, or when acceptance will require substantial revision of Contract Documents.

B. Substitute products shall not be ordered or installed without written acceptance.

C. ENGINEER to determine acceptability of Substitutions.

1.5 REQUEST FOR SUBSTITUTIONS

A. Allow ENGINEER 10 days to evaluate Substitution requests.

B. Submit separate request for each Substitution. Document each request with complete data substantiating compliance and compatibility of proposed Substitution with requirements of Contract Documents.

C. Identify product by specification's section and article numbers. Provide manufacturer's name, address and phone number, trade name of product, and model or catalog number. List fabricators and Suppliers as appropriate.

D. Attach product data as indicated in Section 01 33 00.

E. Give itemized comparison of proposed Substitution with specified product, listing variations, and reference to specification's section and article numbers.

F. Give quality and performance comparison between proposed Substitution and the specified product.

G. Give cost data comparing proposed Substitution with specified product, and amount of net change to Contract Price.

H. List availability of maintenance services and replacement materials.

I. Indicate effect of Substitution on progress schedule, and change required in other work or products.

1.6 CONTRACTOR REPRESENTATION

A. Request for Substitution constitutes a representation that CONTRACTOR.

1. Has investigated proposed product and determined that it is equal to or superior in all respects to specified product.
2. Shall provide same warranty for Substitution as for specified product unless warranty for substituted product is larger.
3. Shall coordinate installation of accepted substitute, making such changes as may be required for Work to be complete in all respects.
4. Certifies that cost data presented is complete and includes all related costs.

5. Waives claims for additional costs related to Substitution that may later become apparent

1.7 **SUBMITTAL PROCEDURES**

A. After the Effective Date of the Construction Contract, submit copies of each Substitution request in the form and per procedures required for Change Order proposals (refer to Section 01 26 00).

B. For accepted products, submit shop drawings, product data, and samples; Section 01 33 00.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedures for initiating and authorizing contemplated changes to the Work.

1.2 DEFINITIONS

A. Request for Proposal (RFP): Written or verbal inquiry by ENGINEER to the CONTRACTOR that asks for information pertinent to OWNER's contemplated changes to the Work.

B. Request for Change (RFC): Written or verbal inquiry to the ENGINEER by the CONTRACTOR that asks for changes to the Work.

1.3 PRELIMINARY PROCEDURES

A. Changes Proposed by ENGINEER: ENGINEER may initiate changes by issuing a Request for Proposal (RFP) to CONTRACTOR. Such request is for information only, and is not an instruction to execute the changes, nor to stop work in progress. The request will include:

1. A specific statement from the CONTRACTOR advising the ENGINEER whether or not the proposed change affects the Progress Schedule's critical path.
2. Description of the propose change, products required in the change, and location of the change in the Project.
3. Supplementary or revised Drawings and Specifications.
4. The projected time span for making the change, and a specific statement as to whether overtime work is, or is not, authorized.
5. A specific period of time during which the requested price will be considered valid.

B. Changes Proposed by CONTRACTOR: CONTRACTOR may propose changes by submitting a written Request for Change (RFC) to the ENGINEER, containing:

1. A specific statement of the effect that the contemplated change has on the Progress Schedule's critical path.
2. Description of the proposed change.
3. Statement of the reason for making the changes.
4. Statement of the effect on the work of separate contractors.
5. Documentation supporting any change in the Contract Price or Contract Time as appropriate.
6. Documentation of any Substitutions per Section 01 25 00.

C. Work Directive Change: In lieu of a Request for Proposal (RFP), ENGINEER may issue a Work Directive Change for CONTRACTOR to proceed with work which will be included in a subsequent Change Order.

1. The Work Directive Change will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Price and any change in Contract Time.
2. CONTRACTOR may sign and date the Work Directive Change to indicate agreement with the terms therein.
3. ENGINEER will sign and date the Work Directive Change as authorization for the CONTRACTOR to proceed with the changes.

D. Force Account: When Contract Price or Contract Time cannot be determined prior to executing a Change Order for contemplated work:

1. ENGINEER will issue a Work Directive Change instructing the CONTRACTOR to proceed with the contemplated work.
2. At completion of the contemplated work, CONTRACTOR shall submit itemized accounting and supporting data as provided in the General Conditions.
3. ENGINEER will determine the allowable cost of such contemplated work, as provided in the General Conditions.
4. CONTRACTOR signs and dates the Change Order to indicate agreement therewith.
5. ENGINEER signs and dates the Change Order to establish the change in Contract Price and Contract Time.

1.4 DOCUMENTATION REQUIRED FOR PROPOSALS OR CLAIMS

A. Support each proposal or claim with sufficient substantiating data to allow ENGINEER to evaluate the quotation. Provide the following data.

1. Existing work affected (change to progress schedule).
2. Labor required.
3. Equipment required.
4. Products required.
   a. Recommended source of purchase and unit cost.
   b. Quantities required.
5. Taxes, insurance and bonds.
6. Credit for work deleted from Contract, similarly documented.
7. Overhead and profit.
8. Justification for any change in Contract Time.

B. Support each claim on a time and materials (force account) basis, with documentation as required for a lump-sum proposal, plus additional information:

1. Name of OWNER's authorized agent who ordered the work, and date of the order.
2. Dates and times work was performed, and by whom.
3. Time record, summary of hours worked, and hourly rates paid.
4. Receipts and invoices for:

a. Equipment used, listing dates and time of use.
b. Products used, listing of quantities.
c. Subcontracts.

C. Document requests for Substitutions for products as specified in Section 01 25 00.

1.5 PREPARATION OF CHANGE ORDER

A. ENGINEER will prepare the Change Order.

B. The Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

C. The Change Order will provide an accounting of the adjustment in the Contract Price and in the Contract Time.

D. Several Request for Proposal (RFP) and Request for Changes (RFC) may be included in one Change Order.

1.6 LUMP SUM, OR FIXED PRICE CHANGE ORDER

A. The content of a Change Order in a lump sum contract will be based on, either:

1. ENGINEER's Request for Proposal (RFP) and CONTRACTOR's responsive proposal as mutually agreed between ENGINEER and CONTRACTOR; or
2. CONTRACTOR's Request for Change (RFC), as recommended by ENGINEER to OWNER.

B. CONTRACTOR may sign and date the Change Order to indicate agreement with the terms therein.

C. ENGINEER will sign and date the Change Order as authorization for the CONTRACTOR to proceed with the contemplated work.

1.7 UNIT PRICE CHANGE ORDERS

A. Content of unit price Change Orders will be based on:

1. ENGINEER's definition of the scope of the required changes;
2. CONTRACTOR's proposal for a change, as recommended by ENGINEER; or
3. Survey of completed work.

B. The amounts of the unit prices to be:

1. Those stated in the Agreement; or
2. Those mutually agreed upon between ENGINEER and CONTRACTOR and accepted by the OWNER.

C. When quantities of each of the items affected by the Change Order can be determined prior to start of the contemplated work:

1. CONTRACTOR signs and dates the Change Order to indicate agreement with the quantities and the Terms therein;
2. ENGINEER signs and dates the Change Order as authorization for CONTRACTOR to proceed with the contemplated work, And

3. CONTRACTOR completes contemplated work and is paid total amount indicated on the Change Order.

D. When quantities of the items cannot be determined prior to start of the contemplated work:

1. ENGINEER prepares Change Order using his best estimate of needed quantities.
2. CONTRACTOR signs and dates Change Order to indicate agreement with the terms therein.
3. ENGINEER signs and dates Change Order as authorization for CONTRACTOR to proceed with the contemplated work.
4. CONTRACTOR completes contemplated work and is paid for work quantities completed.

1.8 **CORRELATION WITH CONTRACTOR'S SUBMITTALS**

A. Periodically revise Schedule of Values and request for payment forms to record each change as a separate item of Work, and to record the adjusted Contract Price.

B. Periodically revise the Progress Schedule to reflect each change in Contract Time. Revise sub-schedules to show changes for other items of work affected by the changes.

C. Upon completion of Change Order work, enter pertinent changes in the Record Documents. Refer to Section 01 78 39.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Measurement and payment procedures, forms, submission requirements, and price adjustments.

1.2 SUBMITTAL PROCEDURES

A. Submit at least two copies of each Application for Payment. Each application must be signed by CONTRACTOR.

B. Submit an updated progress schedule with each Application for Payment.

C. When ENGINEER requires substantiating information, submit data.

1.3 UNIT PRICE PAY REQUEST FORMS

A. Application Form: ENGINEER prepared or one acceptable to the ENGINEER.

B. Schedule of Prices: ENGINEER prepared or one acceptable to the ENGINEER.

1.4 LUMP SUM PAY REQUEST FORMS

A. Application Form: Use AIA Form G702 -Application and Certificate for Payment; or AIA G722 -Project Application and Project Certificate for Payment; or EJCDC Form 1910-8-E -Application for Payment; or CONTRACTOR's standard form; or electronic media printout following one of the above standard forms.

B. Schedule of Values Form: Use AIA Form G703 -Application and Certificate for Payment Continuation Sheet and AIA G723 -Project Application Summary, or EJCDC Form 1910-8-E, or CONTRACTOR's standard form, or electronic media printout following one of the above standard forms. Follow the outline presented in the Bid Form. For each item, provide a column (or row) for listing each of the following:

1. Item number.
2. Description of work.
3. Scheduled values.
4. Previous applications.
5. Work in plan and stored materials under this application.
6. Authorized Change Orders.
7. Total completed and stored to date of application.
8. Percentage of completion.

9. Balance to finish.
10. Retainage.
11. Overhead and profit.

C. Submission Schedule: Comply with the time requirement of Paragraph 2.5 B of the General Conditions when submitting the Schedule of Values. (Within 10 Days after the Effective Date of the Construction Contract) when submitting the Schedule of Values. (Within 10 Days after the Effective Date of the Construction Contract.)

D. Revisions: Revise schedule of values to list approved Change Orders, with each Application for Payment.

1.5 MEASUREMENT

A. General:

1. Measurement methods specified in the individual Sections of the Standard Specifications are intended to compliment the criteria of this Section.
2. Furnish labor to assist ENGINEER in obtaining and handling test samples at site or sources.
3. ENGINEER will take all measurements and compute all quantities.
4. CONTRACTOR will verify ENGINEER's measurements and computations.
5. CONTRACTOR will provide all equipment, workers, and survey crews to assist ENGINEER in making measurements.

B. Unit of Measurement: Refer to the Bid Form that identifies the unit of measurement to be used for unit price items.

C. Weight Basis: Measured by scale or by handbook weights for the type and quantity of material actually furnished and used.

1. For material to be measured and paid for by weight, furnish accurate scales. Use platform scales of sufficient size and capacity to permit the entire vehicle or entire combination of vehicles to rest on the scale platform while being weighed. Combination vehicles may be weighed as separate units provided they are disconnected while being individually weighed. Pay for all costs incurred as a result of regulating, adjusting, testing, inspecting, and certifying scales.
2. ENGINEER may be present to witness weighing and to check and compile daily records of such scale weights; however, in any case, furnish weigh slips and daily summary weigh sheets. Furnish duplicate weigh slip or a load slip to each vehicle weighed and deliver the slip to ENGINEER at the point of delivery of the material.
3. If the material is shipped by rail, certified car weights will be accepted. Only actual weight of material will be paid for and not minimum car used for assessing freight tariff. Car weights will not be used for material to be passed through mixing plants.

4. Trucks used to haul material shall be weighed empty daily and at such additional times as directed. Each truck shall bear a plainly legible identification mark. ENGINEER may require the weight of the material verified by weighing empty and loaded trucks on other scales.

D. Area Basis: Measured by square dimension using mean length and width and radius.

E. Linear Basis: Measured by linear dimension at the item centerline or mean chord.

F. Volume Basis: Measured by cubic dimension using mean length, width and height or thickness.

1. Volumes will be determined and based upon material compacted in-place (not loose measure as per delivery ticket).
2. When it is impractical to determine the volume by rectilinear measurements in place or by the specified method of measurement, or when requested by the CONTRACTOR in writing and accepted in writing, the material will be weighed in accordance with the requirements specified for weight measurement. Such weights will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined and shall be agreed to by CONTRACTOR before such method of measurement of pay quantities will be accepted.

G. Each Basis: Measured by the unit.

H. Lump Sum Basis: Measured on a percent complete basis.

1.6 PAYMENT

A. Payment covers all labor, products, tools, equipment, paint, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

B. Quantities supplied or placed in the Work and measurements agreed to by CONTRACTOR determine payment.

C. The final payment sum may be as great as twice the value of Punch List work or at least equal to the value of the work declared defective by the ENGINEER.

1.7 INCIDENTAL WORK

A. No separate measurement or payment for incidental work. See paragraph 3.1C of the General Conditions (Document 00 72 00).

1.8 PRODUCT

A. No separate measurement and payment for:

1. Product or work provided by ENGINEER or OWNER;
2. Product wasted or disposed of in a manner that is not acceptable;
3. Product determined as unacceptable before or after placement;
4. Product not completely unloaded from the transporting vehicle;

5. Product placed beyond the lines and levels of the required Work;
6. Product remaining on hand after completion of the Work; or
7. Loading, hauling and disposing of rejected product.

1.9 MATERIALS AND EQUIPMENT ON-HAND

A. CONTRACTOR may include in partial payment applications, an advanced payment item for acceptable non-perishable products purchased or manufactured expressly for the Work, if:
1. Certified copies of product invoices are approved.
2. The maximum sum to be included in partial payment applications does not exceed 75 percent of the value of the product shown on the invoice or 75 percent of the in-place price, whichever sum is less.
3. Product is stored in the vicinity of the Project or when the approved storage location is other than the site, evidence is furnished that the stored product is irrevocably obligated to the Work.
4. CONTRACTOR is responsible for any damages, loss or theft of product until product is incorporated in the Work and accepted.

B. Payment for materials shall not constitute acceptance of any materials which do not conform to the Contract Documents.

C. No partial payment will be made on living, or perishable plant materials until planted.

1.10 PRICE ADJUSTMENT

A. Defective Work: If ENGINEER determines it is not practical to remove and replace Defective Work or material, one of the following remedies may be applied.
1. Defective Work or material may remain, but the price reduced up to 50 percent. If non-complying material has been installed and no price for the material is specified, apply price reduction against cost of work requiring complying material as part of its installation.
2. Defective Work or material will be partially repaired and the price will be adjusted to a new price.
3. Pay for Defective Work on a pay factor basis.
   a. Where 2 or more pay factors apply to one item of Defective Work or material (even if pay factors are determined using separate specification sections), the smallest pay factor shall be used to determine price adjustment.
   b. Pay factors shall not be cumulative.
   c. Pay factors shall be applied to unit prices in either the bid form or a Change Order.

B. Change Order: Contract Price adjustment shall be effected by Change Order in lump sum contracts. In unit price contracts, Contract Price adjustment shall be effected by adjusting unit price quantities.

C. Early Completion: No additional money will be due CONTRACTOR:
1. if CONTRACTOR completes Work or any portion of Work prior to Contract

Time, or
2. if early completion is delayed.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 31 13

COORDINATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination among CONTRACTOR's employee's and Subcontractors, And any utility company, separate contractor, property owner, OWNER, and authority having jurisdiction.

1.2 COORDINATING WITH ENGINEER

A. Cooperate with ENGINEER, inspectors, and separate contractors to establish on-site lines of authority for communication.

B. Develop procedures for handling submittals, reports, records, recommendations, coordination drawings, and schedules.

C. Notify in writing of problems that develop during construction.

D. Ensure agency responsible for operation and maintenance of the completed facility is advised before a project or parts thereof are open for use.

E. Maintain and operate the Work until accepted and turned over to the agency responsible for operation and maintenance.

1.3 COORDINATING WITH PRIVATE AND PUBLIC AGENCIES

A. Notify private and public agencies affected by the proposed construction, coordinate required adjustments, and arrange for all necessary adjustments of utilities within or adjacent to the limits of construction.

B. Obtain utility locations from the one-call center (Blue Stake) or other utility coordination service 2 to 7 working Days prior to any excavation. Locations must be updated every 14 Days.

C. All utilities and utility appurtenances within the limits of the Work that are to be relocated or adjusted shall be moved by the affected utility company, unless specified otherwise.

D. Notify police, fire and transit authority.

1.4 COORDINATING WITH SEPARATE CONTRACTORS

A. Coordinate with separate contractors at no additional cost to OWNER to leave Work complete and finished.

B. Inspect and promptly report any apparent discrepancies or defects in work done by

separate contractors that render Work unsuitable for proper execution and results. Failure to inspect and report shall constitute acceptance of separate contractor's work as fit and proper to receive work of this contract, except as to defects that may develop in the other separate contractor's work after the execution of the CONTRACTOR's work.

1.5 COORDINATING WITH ADJACENT PROPERTY OWNER

A. Notice: Notify property owner 10 Days prior to the start of construction and at least 48 hours in advance of the interruption of utility service or the interruption of access, or the installation of bituminous material.

B. Access: Provide all weather access to property owner at all times, unless property owner or ENGINEER approve otherwise.

C. Easements: Where work is on easements on private property, coordinate work with the property owner so that work will minimize inconvenience to property owner.

D. Refuse Collection:

1. Notify all affected property owners ahead of time by written notice. Notify them not to put out any refuse at the appropriate time. Tell them another time that will be the time to collect their refuse.
2. If necessary haul refuse to nearest point of suitable collection as determined by the refuse collection agency. E, Mail: Cooperate with the U.S. Postal Service in the delivery of mail.

1.6 INTERRUPTION OF UTILITIES

A. Notify fire and police services in local jurisdiction if emergency is safety related or if construction activities interrupt any utility service.

B. Contact the affected utility company. Find out how soon repairs can be made as well as when the repairs will begin.

C. Contact the affected local residences or businesses. Inform when repairs will begin and how long it will take to complete them.

D. Inform ENGINEER and OWNER.

1.7 INTERRUPTION OF OWNER'S OPERATIONS

A. If any aspect of normal OWNER operations needs to be interrupted for completion of the Work, notify ENGINEER in writing.

B. Submit notice with an alternate plan to cover contingency problems. In the alternate plan allow for maintenance of utilities or other essential services that must be interrupted for any period otherwise deemed necessary by OWNER to be unacceptable for necessary OWNER operations.

C. Shutdown of utilities must be accomplished during approved hours at no additional cost to OWNER. If work requires a longer shutdown, it must then be accomplished

during separate periods.

D. Do not proceed with proposed shutdown without written approval.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 31 19

PRECONSTRUCTION CONFERENCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. CONTRACTOR participation in preconstruction conference.

1.2 PRECONSTRUCTION CONFERENCE

A. Prior to commencement of Work at site, a preconstruction conference will be held at a mutually agreed time and place attended by CONTRACTOR, its' superintendent, and its' Subcontractors as appropriate. Other attendees will be:

1. ENGINEER and Resident Project Representative.
2. Representatives of OWNER.
3. Representatives of affected utility companies.
4. Governmental representatives as appropriate.
5. Others as requested by CONTRACTOR, OWNER, or ENGINEER.

B. Unless previously submitted, bring to the conference one copy of each of the following:

1. Progress schedule.
2. Procurement schedule of major equipment and materials and items requiring long lead time.
3. Schedule of submittals.
4. Schedule of values (lump sum price breakdown) for progress payment purposes.
5. Schedule of OWNER furnished items.

C. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the CONTRACTOR prior to the meeting date, which may include the following:

1. CONTRACTOR's tentative schedules.
2. Transmittal, review and distribution of CONTRACTOR's tentative schedules.
3. Processing applications for payment.
4. Maintaining Record Documents.
5. Critical work sequencing.
6. Field decisions and Change Orders.
7. Use of Project site, office and storage areas, security, housekeeping, and OWNER's needs.
8. Major equipment deliveries and priorities.
9. CONTRACTOR's assignments for safety and first aid.

D. ENGINEER will preside at preconstruction conference and will arrange for recording and distributing minutes to all persons in attendance.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 31 20

PARTNERING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Administrative guidelines for partnering.

1.2 PARTNERING INITIATIVE

A. The OWNER desires to create a foundation for a voluntary partnership with the CONTRACTOR and the CONTRACTOR's Subcontractors and Suppliers. The partnership will be structured to draw on the strengths of the OWNER and the CONTRACTOR to achieve the following goals.

1. To expedite the project in full compliance with the plans and specifications with all issues among the OWNER, the CONTRACTOR, the CONTRACTOR's sub-contractors, and interested outside agencies resolved in a timely manner at the appropriate decision making level.
2. To mitigate to the fullest extent possible any disruptions to the CONTRACTOR's and OWNER's use of the facilities at the construction site;
3. To emphasize value engineering and expedite submittal and review of all proposals;
4. To foster atmospheres of trust and team work;
5. To appreciate the fiscal objectives of all participants in the partnership, And
6. To insure there are no unsettled issues at the completion of the work.

B. This partnering initiative will not change the legal relationship of the parties to the Construction Contract or release nor relieve either party from any of the terms of the Construction Contract.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 32 16

PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for preparing and submitting a construction progress schedule for ENGINEER's use in determining if Work can be Substantially Complete within the Contract Time.

1.2 TYPE OF SCHEDULE

A. CONTRACTOR's choice.

1.3 SUBMITTALS

A. Prior to construction, submit the preliminary progress schedule per paragraph 2.5B1 of the General Conditions (Document 00 72 00).

B. During construction submit.

1. Updated progress schedule on a monthly basis.
2. A narrative report when the schedule does not reflect the Work process. Discuss recovery procedures shown in the schedule because of problem areas. Identify any costs to be paid by OWNER.
3. Promptly deliver to ENGINEER a revised progress schedule if work cannot be completed per the current schedule.

C. At any time upon ENGINEER's request and at no additional cost to the OWNER, submit a critical path schedule, in place of an activity bar chart (Gantt chart) schedule if work falls more than 7 Days behind schedule.

1.4 CONTENT OF SCHEDULES

A. Title Block: Show on each page:

1. Project title, number and CONTRACTOR's name.
2. Date of submittal, revision number, page number, and Project status cutoff date.
3. Approval signatures for each Subcontractor.
4. Legend of symbols, codes and abbreviations.
5. Network nomenclature, e.g., "Detailed" or "Summary" or "Building Area" identification.

B. Activities: Show complete sequence of construction activity networks as time scaled (squared) with starting time for all activities, in no less than weekly divisions from left

to right, and with activities scheduled from **right to left**. Provide complete sequence of construction by activity to include but not limited to:

1. Shop drawings, product data and sample submittal dates, and dates required for submittal approvals.
2. Decision dates for product specified by allowances, Selection of finishes, And critical material or equipment release order.
3. Product procurement and delivery dates.
4. Detailed construction activities, including all Subcontractor's work, oriented to identifiable work areas.
5. Fabrication of special material, equipment and their installation and testing.
6. Coordination activities, including utility relocations, separate contractors, etc.
7. Constraints between interrelated activities. Ensure that those constraints are compatible and coordinated with separate contractors.
8. Anticipated weather impacts, holidays, and change orders.
9. Certificates of compliance, submittal reviews, Substantial Completion review and progress schedule reviews, especially if submittals or schedules are not approved.
10. Specific dates for all special Inspections required prior to any utilities "turn-on" including temporary power.
11. Cleanup, Final Inspection, Punch List.
12. Submittal of record drawings and maintenance manuals.
13. Anything that affects Work Completion.

C. Activity Bar Chart (Gantt Chart) Schedule: Plan and record the construction of the Project using a conventional activity schedule chart analysis system. Include activities of Subcontractors and Suppliers.

1. Provide a minimum of 25 activities showing construction prosecution or preparation activities. Unit price contracts with ten or fewer bid items shall have a minimum of 10 activities. Use the table of contents or bid schedule as the basis for defining activities.
2. Note periods of non-work when the non-working period exceeds three consecutive calendar days.
3. When employing "S" curve analysis, plot contract time vs. percent of contract completed.

D. Critical Path Schedule: Plan and record the construction of the Project using a conventional critical path network analysis system such as outlined in the Associated General Contractors of America (AGC) publication "The Use of CPM in Construction. A Manual for General Contractors and the Construction Industry".

1. Use activity-on-node (AON) format.
2. Divide long activities into small units so no single activity exceeds a total flow time (including float time) of **20 calendar Days**.
3. Show the head to tail path of activities (scheduled from right to left) that requires the longest construction activity time.
4. Precedence diagramming method (PDM) with

E. Float Time:

1. Where float exists, show activities at late-start/late-finish times and periods.
2. Allocate float time in the best interests of the Work. Float time shall not be owned solely by CONTRACTOR.
3. ENGINEER may notify CONTRACTOR of OWNER's claim to use any float time at any time.

1.5 REVISIONS

A. Revise the progress schedule if work falls behind.

B. Provide written narratives describing cause of delay for each impacted activity. Identify any cost to be charged against the OWNER.

C. Indicate progress of each activity, and new completion date of each activity.

D. Identify changes in scope, and other changes since previous submittal.

E. Identify all planned actions for construction recovery such as:

1. Use of overtime or extended work hours and extended workweek.
2. Use of additional equipment.
3. Use of additional crews, or other auxiliary forces.
4. Projected cost to the OWNER.

F. Add extra work to schedule at no additional cost to OWNER, except as identified by Change Order.

1.6 DISTRIBUTION

A. Distribute copies of schedule per the General Conditions. Instruct recipients to promptly report, in writing, problems anticipated by projections shown.

1.7 PERFORMANCE

A. Prosecute Work in accordance with and measure all progress against the progress schedule.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General procedures and requirements for submittals during the course of construction.

1.2 CONTRACTOR REVIEW

A. Review submittals prior to transmittal. Determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.

B. Coordinate submittals with requirements of Work and of Contract Documents.

C. Sign or initial each sheet of shop drawings and product data, and each sample label to certify compliance with requirements of Contract Documents. Notify ENGINEER in writing at time of submittal, of any deviations from requirements of Contract Documents.

D. Do not fabricate products or begin work that requires submittals until return of submittal with ENGINEER acceptance.

1.3 PROCEDURE

A. Transmit submittals to ENGINEER under transmittal form. Submit the number of copies that CONTRACTOR requires, plus the number of copies required by ENGINEER.

B. Comply with submittal sequences shown in the progress schedule.

C. When required by Laws and Regulations, affix licensed professional's stamp to submittal documents.

D. Identify pertinent Drawing sheet and detail number, and Specification section number.

E. Identify deviations from Contract Documents.

F. Identify the date when ENGINEER must complete review of submittal.

G. Provide space for CONTRACTOR and ENGINEER review stamps.

H. After ENGINEER's review of submittal, revise and resubmit as required, identifying changes made since previous submittal.

I. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.4 SHOP DRAWINGS

A. Present drawings in a clear and thorough manner. Title each drawing with Project name and number. Identify each element of drawings by reference to sheet number and detail or equipment schedule.

B. Identify field dimensions. Show relation to adjacent or critical features or work or products.

C. Provide sheet size adequate for ENGINEER's review.

1.5 PRODUCT DATA

A. Submit only pages which are pertinent. Mark each copy of standard printed data to identify pertinent products, referenced to specification section and article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions, And required clearances.

B. Modify product data by deleting information that is not applicable to the Work or by marking each copy to identify pertinent data.

C. Supplement standard information, if necessary, to provide additional information applicable to the Work.

D. Provide manufacturer's preparation, assembly and installation instructions.

1.6 SAMPLES

A. Submit 1 of each sample required by Contract Documents. Samples shall show the quality, type, range of color, finish and texture of the material.

1.7 CERTIFICATES

A. Submit certificates, in duplicate, in accordance with requirements of each Specification section.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 GENERAL

1.1 **SECTION INCLUDES**

A. Procedures for submitting shop drawings, product data and samples.

1.2 **SCHEDULE**

A. Designate a coordinated schedule, the dates for submission and the dates that reviewed shop drawings, product data and samples will be needed.

1.3 **SUBMITTAL REQUIREMENTS**

A. Identify submittals with project title and number. Include CONTRACTOR's name, date and revision date.

B. Include names of subcontractors and suppliers, applicable specification section number and CONTRACTOR's stamp, initialed or signed, certifying review of submittal, verification of field measurements and compliance with Contract Documents.

C. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.
2. The project title and number.
3. The names of CONTRACTOR, supplier and manufacturer.
4. Product identification with the specification section number.
5. Clearly identified field dimensions.
6. Relationship to adjacent or critical features of work or materials.
7. Proposed deviation from the Contract Documents requirements.

1.4 **SHOP DRAWINGS**

A. Present in a clear and thorough manner. Title each drawing with project name and number. Identify each element of drawings by reference to sheet number and detail or equipment schedule.

B. Identify field dimensions. Show relation to adjacent or critical features of work or products.

C. Sheet size adequate for ENGINEER's review.

D. Corrections or comments made on shop drawings during ENGINEER's review shall not relieve the CONTRACTOR of requirements of the Contract Documents. The ENGINEER will check and review only for general conformance with the design concept of the project and general compliance with information given in the Contract Documents. The CONTRACTOR shall be responsible for: Conforming and

correlating all quantities and dimensions; fabrication processes and techniques of construction; coordination of this work with that of all other trades; and the safe and satisfactory performance of his work.

1.5 **PRODUCT DATA**

A. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to specification section and article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions, and required clearances.

B. Modify product data by deleting information which is not applicable to work or by marking each copy to identify pertinent data.

C. Supplement standard information, if necessary, to provide additional information applicable to project.

D. Provide manufacturer's preparation, assembly, installation, operation, maintenance and lubrication instructions.

1.6 **SAMPLES**

A. Submit one of each sample required by Contract Documents. Samples shall show the quality, type, range of color, finish and texture of the material.

1.7 **RESUBMITTALS**

A. Make any corrections or required changes in the submittals and resubmit under procedures specified for initial submittals.

1.8 **ENGINEER'S REVIEW**

A. Review submittals in accordance with acceptable schedule.

B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or contract compliance.

1.9 **CONTRACTOR'S DUTIES**

A. Do not commence work requiring a shop drawing or other submittal until contract compliance has been issued.

PART 2 PRODUCTS Not used

PART 3 EXECUTION Not used

END OF SECTION

SECTION 01 35 10

ACCEPTANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. ENGINEER's acceptance provisions.
B. Dispute resolution.

1.2 DEFINITIONS

A. Acceptance Testing: Testing to verify product or work complies with the Contract Documents. ENGINEER or Independent Testing Agency usually accomplishes the testing. The CONTRACTOR's control testing is sometimes used.

B. Independent Testing Agency: A testing agency NOT owned by affiliated with, or in any way associated with CONTRACTOR, or any of CONTRACTOR's Subcontractors and Suppliers, that is accredited by a national authority.

C. Lot: A lot is an isolated quantity of material produced essentially by the same process. Example: One day's production or 1500 tons.

D. Sample: A sample is one measurement or count that represents a part or all of the Lot. Example: Five density measurements that represent the day's production (or Lot) are five separate samples.

1.3 ACCEPTANCE

A. Acceptance of Product and Material: Based upon visual examination or physical testing. ENGINEER may have such examination or testing done by a separate agency.

B. Control Testing: ENGINEER retains right to accept or reject material or work based upon CONTRACTOR's control testing.

C. Acceptance of Lots:

1. Samples in a Lot will be randomly collected.
2. A Lot may be evaluated on the basis of fewer Samples when the minimum specified number of Samples cannot be collected.
3. A Lot will not be passed until ENGINEER accepts or passes all sub-lots.
4. A Lot with a defective sub-lot may be accepted at a reduced price if an appropriate pay factor is used to determine the price adjustment for the whole Lot. Do not apply pay factors only against defective sub-lots.

D. Submittals: Acceptance of submittal data supercedes specified criteria. Example; Mix design acceptance may alter specified mix design criteria.

1.4 **DEFECTIVE WORK**

A. Failure to detect any Defective Work or materials does not prevent later rejection when such defect is discovered, nor does it obligate ENGINEER for acceptance.

B. If work or material is obviously defective, it must be corrected even if it or they are not a part of a set of random Samples.

1.5 **DISPUTE RESOLUTION**

A. CONTRACTOR must provide basis of disagreement in writing to ENGINEER.

B. If CONTRACTOR desires to do any retesting, CONTRACTOR must submit a written plan to the ENGINEER for approval. Any testing done without ENGINEER's written approval will be rejected.

C. The retesting must be performed by a mutually acceptable Independent Testing Agency.

D. Retesting for acceptance will be done at no cost to the OWNER.

E. ENGINEER reserves the sole right not to utilize the retest results for evaluation of the Work.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 42 19

REFERENCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Acronyms used in Contract Documents for reference standards.
B. Source of references.
C. Applicability of referenced standards.
D. Provision of referenced standards at site.

1.2 QUALITY ASSURANCE

A. For products or workmanship specified by trade association or government agency, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The latest edition of the standards and their supplements referenced as a part of any section are incorporated in that section to the extent specified therein. In any case of conflict, the requirements of the section shall prevail. The date of the standard is that in effect as of the Bid date, or date of OWNER-CONTRACTOR Agreement when there are no bids, except when a date is specified.

C. When required by individual specification section, obtain copy of standard. Maintain copy at job site during submittals, planning, and progress of the specific work, until Substantial Completion.

1.3 TRADE ASSOCIATIONS

A. The following acronyms or abbreviations referenced in Contract Documents are subject to change, and are the best known at date of this book's publishing.

AAMA American Architectural Manufacturer's Association, 2700 River Road, Suite 118, Des Plaines, IL 60018.

AAN American Association of Nurserymen, Inc., 1250 I Street, NW., Suite 500, Washington DC 20005.

AASHTO American Association of State Highway and Transportation Officials, 444 North Capitol Street, NW, Washington, DC 20001.

ACI American Concrete Institute, Box 19150, Reford Station, Detroit, MI 48219.

ACPA American Concrete Pipe Association, 8320 Old Courthouse Rd., Vienna, VA 22180.

AGC Associated General Contractors of America,1957 E. Street, NW, Washington, DC 20006.

AI Asphalt Institute, Asphalt Institute Building, College Park, MD 20740.

AIA American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C. 20006-5292.

AISC American Institute of Steel Construction, 400 North. Michigan Ave., Chicago, IL 60611.

AMRL Aashto Materials Reference Library, 444 North Capitol Street, NW, Washington, DC 20001.

AISI American Iron Standards Institute, 1133 Fifteenth St., NW Washington, DC 20005.

ANSI American National Standards Institute, 1430 Broadway, New York, NY 10018.

APA American Plywood Association, P.O. Box 11700, Tacoma, WA 98411.

ASME American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.

ASPA American Sod Producers Association, Association Building, Ninth and Minnesota, Hastings, NE 68901.

ASTM American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ATSSA American Traffic Safety Services Association, Inc., ATSSA Building, 5440 Jefferson Davis Highway, Fredericksburg, VA 22401.

AWPA American Wood-Preservers' Association, P.O. Box 849, Stevensville, MD 21666

AWPB American Wood-Preservers' Bureau,

P.O. Box 5283, Springfield, VA 22150. AWS American Welding Society, 350 Le Jeune Road, NW., Miami, FL 33125. AWWA American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235. BIA Brick Institute of America, 11490 Commerce Park Drive, Suite 300, Reston, VA 22091. CLFMI Chain Link Fence Manufacturers Institute, 1776 Massachusetts Avenue, N.W., Washington, DC 20036. CRSI Concrete Reinforcing Steel Institute, 933 Plum Grove Rd., Schaumburg, IL 60195. CSI The Construction Specifications Institute, 601 Madison Street, Alexandria, VA 22314-1791. EIA Electronic Industries Association, 2001 I Street, NW, Washington, DC 20037.

ICBO Workman Mill Road, Whittier, CA 90601. ICEA Insulated Cable Engineer's Association, P.O. Box 440, South, Yarmouth, MA 02664

ICPI Interlocking Concrete Pavement Institute, 14444 Eye Street NW, Suite 700, Washington DC 20005-2210. www.icpi.org.

IMIAC International Masonry Industry All-Weather Council, International Masonry Institute, 823 15th Street, N.W, Washington, DC 20005.

IMSA International Municipal Signal Association, P.O. Box 539, 1115 N. Main St., Newark, NY 14513.

MBMA Metal Building Manufacturer's Association, 1230 Keith Building, Cleveland, OH 44115.

NAA National Arborist Association, 174 Rt. 101, Bedford, NH 03102.

NEC National Electric Code (from NFPA).

NEMA National Electrical Manufacturer's Association, 2101 L Street NW, Suite 300, Washington CD 20037.

N.F.P.A. National Forest Products Association, 1250 Connecticut Avenue, N.W., Washington, DC 20036.

NFPA National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NPCA National Precast Concrete Association, 1033 N. Meridian Street, Suite 272, Indianapolis, IN 46290

NSF National Sanitation Foundation, P.O. Box 1468, 3475 Plymouth Road, Ann Arbor, MI 48106.

PCA Portland Cement Association, 5420 Old Orchard Road, Skokie, IL 60077.

PCI Prestressed Concrete Institute, 175 W. Jackson Blvd., Chicago, IL 60604.

PPI Plastic Pipe Institute. A Division of the Society of The Plastics Industry, Inc., 355 Lexington Avenue, New York, N.Y. 10017.

S.D.I. Steel Door Institute, (c/o A.P. Wherry and Assoc. Inc.) 712 Lakewood Center North, 14600 Detroit Ave, Cleveland, OH 44107.

SSPC Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, PA 15213.

UBC Uniform Building Code (from ICBO).

UL Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062.

WAQUC Western Alliance for Quality Transportation Construction.

WWPA Western Wood Products Association, 522 SW 5th Avenue, Yeon Building, Portland, OR 97204.

1.4 GOVERNMENT AGENCIES

A. The following acronyms or abbreviations indicate names of standards or specification producing agencies of the Federal and State Governments and are the best known at the publishing date of this document.

CE Corps of Engineers (U.S. Dept. of the Army) Chief of Engineers Referral,

Washington, DC 20314.

CS Commercial Standard (U.S. Department of Commerce), Government Printing Office, Washington DC 20402.

DOT Department of Transportation, Federal Highway Administration, 400 Seventh St., SW, Washington, DC 20590.

FS Federal Specification (General Services Administration), Specifications and Consumer Information, Distribution Section (WFSIS), 7th and D Street, SW, Washington, DC 20406.

MIL Military Standardization Documents (U.S. Dept. of Defence) Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

NBS National Bureau of Standards (U.S. Department of Commerce), Gaithersburg, ND 20234.

PS Product Standard of NBS (U.S. Department of Commerce), Government Printing Office, Washington, DC 20402.

REA Rural Electrification Administration (U.S. Department of Agriculture) 14th St. and Independence Ave., SW, Washington, DC 20250.

UDOT Utah Department of Transportation, 4501 South 2700 West Street, Salt Lake City, UT 84119.

USPS U.S. Postal Service, 475 L'Enfant Plaza, SW, Washington, DC 20260.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 43 00

QUALITY ASSURANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. CONTRACTOR quality assurance responsibilities.

1.2 WORKMANSHIP

A. Employ workers, Subcontractors and Suppliers who can produce the specified quality.

B. Supervise and manage workmanship and site conditions so work complies with Contract Document.

C. Comply with industry standards except where more restrictive tolerances, specified requirements, or precise workmanship is required.

1.3 INSTALLER

A. Qualifications: Employ installers with at least 3 years of successful installation experience on work similar to that required for Project.

B. Certificates: When required or request by ENGINEER, submit copy of installer's certifications issued by certification agency.

C. Field Services;

1. Examine areas and conditions under which materials and products are to be installed.
2. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.
3. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration and racking.
4. Make new finishes match adjacent or old finishes.

1.4 MANUFACTURER

A. Qualifications: Employ firms regularly engaged in manufacture of materials and products of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Instructions: When required in individual section, submit manufacturer's instructions in the quantity required for product data, delivery, handling, storage, assembly, installation, start-up, adjusting, balancing, and finishing as appropriate.

1. Should instructions conflict with Contract Documents, request clarification before

proceeding.

2. Require compliance with instructions in full detail, including each step in sequence.

C. Certificates: When required or request by ENGINEER, prove that manufacturer's product meets or exceeds specified requirements.

D. Field Services: Provide qualified representative to observe field conditions, conditions of surfaces and installation, quality of workmanship and start-up of equipment. Test, adjust, and balance equipment. Make written report of observations and recommendations to ENGINEER.

1.5 **MOCK-UPS**

A. Erect field samples and mock-ups in location(s) acceptable to ENGINEER.

B. Assemble and erect complete, with specified attachment and anchorage devices, flashings, seals, finishes, and similar items.

PART 2 PRODUCTS Not used

PART 3 EXECUTION Not used

END OF SECTION

SECTION 01 43 40

RESIDENT SUPERINTENDENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Minimum qualifications.

B. Duties in general.

1.2 QUALIFICATIONS

A. Fluent in English.

B. Completed at least three (3) projects of similar size and nature as the one specified in the Contract Documents.

C. Capable and authorized to take prompt corrective measures to protect the environment and public health, and to protect the health and safety of workers.

D. Authorized to approve Change Orders.

1.3 DUTIES IN GENERAL

A. On-site Presence: Be on-site during work activity.

B. English Proficiency: Keep a person at each work location who is fluent in English who can respond to the concerns of anybody affected by construction.

C. Contract Documents:

1. Know the content and intent of the Contract Documents.
2. Keep on-site all construction Plans; Project Manual; Plans or Specifications associated with updates and Change Orders, Submittals; traffic control plans; copies of the Standard Plans and Standard Specifications.

D. Labor: Provide adequate labor to operate construction equipment, finish concrete, perform land survey work, or to monitor or adjust traffic and pedestrian barricades.

E. Subcontractors and Suppliers: Direct means and methods of work so their work co complies with Plans and Specifications.

F. Safety and Protection: Enforce the work site safety plan. Protect ENGINEER's personnel, the general public and the environment per state or federal Laws and Regulations.

G. Quality Assurance: When materials and installed work require laboratory testing, verify required laboratory personnel are present to do the tests and the tests are made per industry standard.

H. Conflicts: Notify ENGINEER of any drawing, specification, or design conflict so it can be resolved before construction is adversely affected. Recommend any desirable

changes to ENGINEER.

1.4 **CONTRACTOR's DUTIES**

A. Empower Resident Superintendent with all necessary authority, equipment, product, labor and budget to prosecute the Work within the Contract Time.

B. Suspend Work if Resident Superintendent is not on-site or if any of these section requirements are not being met. Contract Time shall continue to run.

C. Replace the Resident Superintendent with one acceptable to the ENGINEER when directed by the ENGINEER.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. CONTRACTOR quality control responsibilities.

1.2 QUALITY ASSURANCE

A. Employ an agency or staff to assure installed product and materials comply with Contract Documents, and to assure inspections, tests, and other services comply with industry standards.

B. Use an AMRL certified laboratory that has WAQTC certified personnel.

C. When requested by ENGINEER, provide a professional opinion from a testing Agency concerning test results and quality of work covered by testing performed.

D. Do more testing, if, in ENGINEER's opinion, work is not being adequately controlled.

1.4 TESTING AGENCY

A. Provide sufficient personnel and cooperate with ENGINEER and CONTRACTOR in performing testing service.

B. Secure samples using procedures specified in the applicable testing code.

C. Perform product testing in accordance with applicable sections of the Contract Documents.

D. Correlate tests with ENGINEER's acceptance tests.

E. When an out-of-tolerance condition exists, perform additional control testing until tolerance is attained.

F. Report report any non-compliance of materials and mixes to CONTRACTOR and ENGINEER immediately.

1.5 SUBMITTALS – CONTRACTOR

A. Before Construction: Identify.

1. Name, address and telephone number of testing agency.
2. Person whom agency has charged with engineering managerial responsibility.
3. Licensed professional for testing agency who is to review services.
4. Names and levels of certification and years of experience of testing agency's laboratory and field technicians.

B. During Construction: Submit quality control test data requested by ENGINEER to demonstrate work performed complies with Contract Documents.

1.6 **SUBMITTALS – TESTING AGENCY**

A. During Construction: Submit field test results immediately to ENGINEER and CONTRACTOR or not later than day of test. Submit laboratory test results within 48 hours of determination.

B. After Construction: Submit a final summary report in tabular form. Show each failed test and its corresponding passing test.

C. Reports: Include on all reports. Project title, number and date. Date, time and location of test. . Name and address of material Supplier.. Identification of product being tested and type of test. Testing results and interpretation of results. Name of technician(s) who sampled and who performed test.

1.7 **LIMITS ON TESTING AGENCY**

A. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Agency may not suspend work.

C. Agency has no authority to determine acceptance for ENGINEER.

D. Samples must be collected and secured only by the testing agency.

PART 2 PRODUCTS

3.1 **MATERIALS**

A. Material furnished from sources that have been found satisfactory under OWNER's or ENGINEER's normal testing and sampling procedures may be used in the Work.

B. Materials that are supported with a Supplier's certificate of compliance may be used in the Work. Certificate must be in possession of CONTRACTOR for review by ENGINEER prior to use.

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 55 26

TRAFFIC CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Traffic control requirements.

1.2 REFERENCES

A. ASTM D 4956: Retroreflective Sheeting for Traffic Control.

B. Instructions to Flaggers. Publication of UDOT.

C. Work Zone Traffic Control Guide: Publication of the Utah LTAP Center.

D. MUTCD: Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD).

1.3 SUBMITTALS

A. Traffic control plan within 10 days of receiving the Notice of Intent to Award.

B. Flagger or traffic control technician certificates when requested by ENGINEER.

1.4 TRAFFIC CONTROL PLAN

A. Create a traffic control plan using the following resources. Resolve discrepancies between resources in descending order shown.

1. MUTCD.
2. Work Zone Traffic Control Guide.
3. ATSSA.

B. Include the following documentation as part of the traffic control plan.

1. Written description of phasing.
2. Drawing showing phasing (if required for clarity).
3. Drawing showing placement of traffic control devices.

C. Show how to move pedestrians through or around the Work site.

D. Show how to handle signalized intersections.

E. Meet grade, slope and protection requirement of the Americans with Disabilities Act (ADA).

1.5 **TRAFFIC CONTROL TECHNICIAN**

A. Certified by ATSSA or AGC.

1.6 **FLAGGER**

A. Certified by ATSSA, AGC or UDOT.

B. Equipment:

1. 24" x 24" "Stop/Slow" sign.
2. 6" to 8" long red wand for night flagging.
3. Light plant for night flagging.

C. Clothing:

1. Clothed; full length pants and long or short sleeved shirt.
2. Hard toed shoes.
3. Orange, red-orange hardhat and vest.
4. Night clothing to be reflectorized.

PART 2 PRODUCTS

2.1 **PAVEMENT MARKINGS, SIGNS, BARRICADES**

A. MUTCH.

B. Channelizing Devices: Crash worthy plastic cones, drums and barricades.

C. Reflective Sheeting: ASTM D 4956.

D. Pavement Markings: Section 32 17 23.

PART 3 EXECUTION

3.1 **FLAGGING**

A. MUTCD.

3.2 **TRAFFIC CONTROL DEVICES**

A. Install before work activities begin.

B. Maintain to ensure proper, continuous function.

C. Remove when no longer needed.

END OF SECTION

SECTION 01 57 00

TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for controlling surface and subsurface environmental conditions at the construction site, and related areas under the CONTRACTOR's responsibility.

B. Requirements for removal of physical evidence of temporary controls upon completion of the Work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Temporary Materials: CONTRACTOR's choice.

PART 3 EXECUTION

3.1 NOISE CONTROL

A. Use equipment that is equipped with noise attenuation devises. Comply with local Laws and Regulations.

B. Control construction noise in residential areas from 9:00 pm to 7:00 am.

3.2 DUST AND MUD CONTROL

A. Provide suitable equipment to control dust or air pollution caused by construction operations.

B. Provide suitable mud and dirt containment, so Work site, access roadways and properties adjacent to the Work site are kept clean.

3.3 SURFACE WATER CONTROL

A. Control all on-site surface water. Provide proper drainage so flooding of the site or adjacent property does not occur.

B. Provide and maintain ample means and devices with which to promptly remove and properly dispose of all water entering the site.

C. Immediately prior to suspension of construction operations for any reason, provide proper and necessary drainage of Work site area.

D. Provide berms or channels as necessary to prevent flooding or saturation of Subgrade. Promptly remove all water collecting in depressions.

E. Dispose of water in a manner that will not cause damage to adjacent areas or facilities.

3.4 GROUND WATER CONTROL

A. Provide a dewatering system sufficient to maintain Excavations and foundations dry and free of water on a 24 hour basis.

B. Notify ENGINEER, in writing, if groundwater conditions differ from conditions shown in the Bidding Documents, or in any soil test data that has been supplied.

C. Remove all dewatering facilities when no longer required.

D. Dispose of water in a manner that will not cause damage to adjacent areas or facilities.

3.5 POLLUTION CONTROL

A. Soil: Prevent contamination of soil from discharge of noxious substances (including engine oils, fuels, lubricants, etc.) during construction operations. Excavate and legally dispose of any such contaminated soil off-site, and replace with acceptable compacted fill and topsoil.

B. Water: Prevent disposal of wastes, effluent, chemicals, or other such substances adjacent to or into streams, waterways, sanitary sewers, storm drains, or public waterways. Perform any emergency measures that may be required to contain any spillage.

C. Air: Control atmospheric pollutants.

3.6 EROSION CONTROL

A. Use measures such as berms, dikes, dams, sediment basins, fiber mat netting, gravel, mulches, slopes, drains and other erosion control devices or methods to prevent erosion and sedimentation.

B. Provide construction and earthwork methods which control surface drainage from cut, fill, borrow, and waste disposal areas, to prevent erosion and sedimentation.

C. Inspect earthwork during execution to detect any evidence of the start of erosion. Apply corrective measures as required.

END OF SECTION

SECTION 01 64 00

OWNER-FURNISHED PRODUCTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. OWNER and CONTRACTOR responsibilities for items furnished by the OWNER.

1.2 OWNER'S RESPONSIBILITIES

A. Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to CONTRACTOR.

B. Deliver Supplier's bill of materials to CONTRACTOR.

C. Arrange and pay for delivery to site in accordance with CONTRACTOR's progress schedule.

D. Inspect deliveries jointly with CONTRACTOR.

E. Submit claims for transportation damage.

F. Arrange for replacement of damaged, defective, or missing items.

G. Arrange for manufacturer's field services, Arrange for and deliver manufacturer's warranties and bonds to CONTRACTOR.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. Designate submittal and delivery dates for each product in a schedule of OWNER Furnished items. Submit this schedule concurrently with the first submission of the progress schedule.

B. Review shop drawings, product data, samples, and other submittals.

C. Inspect deliveries jointly with ENGINEER, record shortages, and damaged or defective items.

D. Handle products at site, including uncrating and storage.

E. Protect products from damage, and from exposure to element.

F. Assemble, install, connect and adjust products.

G. Arrange for installation Inspections required by public authorities.

H. Repair or replace items damaged or lost.

1.4 CONSTRUCTION DELAY

A. If OWNER furnished items may cause delay in the critical path of progress

schedule notify ENGINEER in writing. Only changes to the critical path will be evidence as changes in the Contract Time.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 65 00

PRODUCT DELIVERY AND HANDLING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Basic requirements for product delivery and handling on site.

1.2 DELIVERY

A. Arrange for delivery of products in accordance with progress schedule to facilitate instruction prior to installation.

B. Coordinate deliveries to avoid conflict with work and conditions at site and:

1. Work of separate contractors, or OWNER.
2. Limitations of storage space.
3. OWNER's use of premises.

C. Deliver products in undamaged condition in original containers or packaging, with identifying labels for handling, storing, unpacking, protecting and installing intact and legible.

D. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts and to facilitate assembly.

E. Immediately upon delivery, inspect shipment to determine:

1. Product complies with requirements of Contract Document reviewed submittals.
2. Quantities are correct.
3. Containers and packages are intact, labels are legible.
4. Products are properly protected and undamaged.

1.3 PRODUCT HANDLING

A. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

B. Coordinate delivery with installation time to ensure minimum holding time for items that are hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

C. Handle products to prevent bending or over-stressing.

D. Lift heavy components at designated lifting points.

E. Discard damaged products.

1.4 **ACCESS**

A. Identify access to the CONTRACTOR's work and office area by use of signs so that agents, delivery trucks and other parties desiring to contact the CONTRACTOR may do so.

B. In security zones, prevent unauthorized personnel from proceeding outside of CONTRACTOR's work and office areas.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 66 00

PRODUCT STORAGE AND PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Storage, handling and protection of products to be incorporated in the Work.

1.2 SUBMITTALS

A. Submit a copy of written permission if property other than OWNER's is used to store materials or equipment.

1.3 STORAGE

A. Store products immediately on delivery, per manufacturer's instructions, with seals and labels intact and legible.

B. Store products subject to damage by elements in weather-tight enclosures.

1. Maintain temperatures within ranges required by manufacturer's instructions.
2. Provide humidity control for sensitive products, as required by manufacturer's instructions.
3. Store unpacked products on shelves, in bins or in neat piles, accessible for Inspection.

C. Provide substantial platforms, blocking or skids to support fabricated products above ground, to prevent soiling or staining. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.

D. Store loose granular materials on solid surfaces to prevent mixing with foreign matter. Provide surface drainage to prevent flooding or ponding of rainwater. Prevent mixing with refuse or injurious materials. Do not store construction materials and equipment in municipal rights-of-way for more than 5 days.

E. Arrange storage in manner to provide easy access for Inspection.

1.4 STORAGE ON SIDEWALK, CURB AND GUTTER

A. Do not remove, block, or otherwise render sidewalks unusable by either the storage of construction equipment or materials or construction procedures used, unless a safe, usable, alternate walkway at least 4 feet wide is provided.

B. Maintain curb and gutter clean and clear of debris, dirt, or excavated materials at all times.

1.5 MAINTENANCE OF STORAGE

A. Maintain periodic system of Inspection of stored products on scheduled basis to assure that:

1. State of storage facilities is adequate to provide required conditions.
2. Required environmental conditions are maintained.
3. Surfaces of products exposed to elements are not adversely affected.

B. Any weathering of products, coatings and finishes is not acceptable.

1.6 STORAGE AREA RESTORATION

A. Remove all plant, equipment and stockpiles from the Work.

B. Restore all storage areas and service roads to prior condition without any additional cost to OWNER.

1.7 PROTECTION

A. Installed Product: Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion and acceptance of Work.

B. Finished Surfaces: Provide coverings to protect finished surfaces from damage.

1. Cover projections, wall corners, jambs, sills and soffits of openings, in areas used for traffic and for passage of products in subsequent work.
2. Protect finished floors and stairs from dirt and damage.
   a. In areas subject to foot traffic, secure heavy paper, sheet goods, or other materials in place.
   b. For movement of heavy products, lay planking or similar materials in place.
   c. For storage of products, lay tight wood sheathing in place.
   d. Cover walls and floor of elevator cars, and unprotected surfaces of car doors when used by construction personnel.

C. Waterproofed and roofed surfaces:

1. Prohibit use of surfaces for traffic of any kind, and for storage of any products.
2. When some activity must take place in order to carry out the Work, obtain recommendations of Supplier and installer for protection of surface.
   a. Install recommended protection and remove on completion of that activity.
   b. Restrict use of adjacent unprotected areas.

D. Security: Provide security for materials, equipment and tools. OWNER will not protect Work from vandalism.

1.8 PROTECTION OF LAWNS AND LANDSCAPING

A. Protect planted lawn and landscaped areas from pedestrian and vehicular traffic.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 71 13

MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Mobilization and demobilization requirements.

1.2 DEFINITIONS

A. Mobilization includes bringing all necessary equipment to the site to do the Work. It also includes all labor, materials, and equipment to set up temporary offices, buildings, facilities, signs, and utilities.

B. Demobilization includes removing all construction equipment and debris so site is left clean.

1.3 TEMPORARY FACILITIES

A. Field Office: CONTRACTOR's choice.

B. Utilities: Provide power, telephone, water, storm and sanitary facilities, and all other temporary utilities required.

C. Security and Protection: Construct and maintain temporary fencing for the protection of materials, tools, and equipment. Obtain prior approval for all fence locations.

D. Construction and Support: Set up and maintain in a neat and orderly manner temporary roads and paving, dewatering facilities, enclosures, identification signs and bulletin boards, waste disposal and temporary heat. Provide and maintain temporary all weather pedestrian walk ways and road detours.

E. Invert Cover: Install covers as shown in Standard Plans or Drawings. Installation must be tight so no debris can by-pass the cover and enter the pipes below.

PART 2 PRODUCTS

2.1 MATERIALS

A. Temporary Materials: CONTRACTOR's choice.

PART 3 EXECUTION

3.1 INSTALLATIONS

A. Relocate and modify temporary facilities as required.

B. Install temporary utility service or connect to existing service.

C. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access. Use of gasoline-burning, open flame, or salamander type heating units is prohibited.

D. Use local standards and codes for erection of adequate fences and barricades. Maintain all signing, barricades, fencing, drainage, and other items as required to protect public and private property from damage caused by construction operations.

E. Coordinate location of storage areas to avoid interference with drainage, traffic, or private property.

F. Provide and maintain all temporary signage required by the Work.

3.2 REMOVALS

A. Completely remove temporary materials and equipment;

1. When construction needs can be met because of permanent installation.
2. At completion of the Work.

B. Clean or repair damage caused by installation or use of temporary facilities.

C. Restore areas to original or to specified conditions at completion of the Work

END OF SECTION

SECTION 01 71 23

CONSTRUCTION LAYOUT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Construction surveying requirements.

1.2 SUBMITTALS

A. Prior to contract closeout submit:

1. Documentation to verify accuracy of survey work.
2. When required by Laws and Regulations, submit a certificate signed by a licensed professional certifying that elevations and locations of improvements conform with the Contract Documents.
3. All survey data, survey information showing dimensions, location angles and elevations of construction on contract Record Documents.

1.3 SURVEY REFERENCE POINTS

A. Known basic horizontal and vertical control points for the Project are indicated.

B. Locate and protect survey control points prior to starting site work, and preserve all permanent reference points during construction.

C. Notify ENGINEER in writing within 24 hours of any survey work changes or clarifications required for Project. Secure written authorization prior to making any changes or relocations.

D. Report in writing when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

E. Replace construction stakes damaged or destroyed by CONTRACTOR at no additional cost to OWNER.

PART 2 PRODUCTS Not used

PART 3 EXECUTION

3.1 PROJECT SURVEY REQUIREMENTS

A. Any work done without line and grade established by CONTRACTOR is at CONTRACTOR'S own risk.

B. Locate and layout by instrumentation and similar appropriate means to include but not limited to:

1. Pavement Subgrade and finish grade.

2. Site improvements:
   a. Stakes for grading, fill and topsoil placement.
   b. Slope elevations.
   c. Utility locations and invert elevations.
3. Batter boards for structures.
4. Retaining wall locations and elevations.
5. Curb and gutter alignment and grade.
6. Building foundations, column locations and floor levels.
7. Controlling lines and levels required for civil, mechanical, and electrical trades.

END OF SECTION

SECTION 01 71 34

SURVEY REFERENCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of reference marks.

B. Making permanent records of marks set.

1.2 SUBMITTALS

A. Field notes in 8 1/2 inches x 11 inches format or in standard field book form. Before construction begins and after construction ends show the following.

1. All corners, points, or monuments which may be disturbed, damaged, moved, removed, covered, or destroyed by construction activity. Describe their kind, size, location, and any other data relating thereto.
2. All corners, points, or monuments which are replaced, established, or reestablished, lines of survey, bearings, basis of bearings, scale of drawing, structures containing reference marks, and picture drawings of each mark installed.
3. Found corners, points, or monuments, describing in detail the size, type, location and ownership.
4. A north arrow, length of lines, scale of drawing, weather, temperature, errors of closure, and method of adjustment.
5. Land surveyor's signature and seal on each tie-sheet record.

B. If any survey point, monument, or line is disturbed or destroyed prior to referencing (tie-out), reestablish that point, monument, or line at no additional cost to OWNER, and submit a record of survey plat to the governing agency to show how its location was reestablished.

C. "Corner File Report" that complies with applicable Laws and Regulations.

1.3 QUALITY ASSURANCE

A. Comply with all pertinent surveying codes, Laws and Regulations including but not limited to Utah State Code Title 17 Chapter 23 – County Surveyor.

PART 2 PRODUCTS

2.1 BRASS TAG

A. Imprinted with land surveyor's license number or business name fastened with a 1 inch long brad to.

1. a 3/8 inch diameter and 1-1/4 inch deep lead plug pounded into a hole drilled in a

concrete structure, or

2. a cement water paste poured into the top of a 2 inches diameter 24 inches long cast iron pipe driven into the ground.

B. Depress tag and brad a minimum of 1/8 inch below surface plane of concrete structure or end of pipe.

2.2 REBAR AND CAP

A. No. 5 deformed rebar at least 24 inches long.

B. Installed free from movement.

C. Cap bears the license number, business name, or government agency name.

2.3 RECORD OF SURVEY

A. Mylar plat complying with applicable Laws and Regulations for providing survey control.

2.4 OTHER MATERIALS

A. Select all other materials, not specifically described but required for proper completion of work of this section.

PART 3 EXECUTION

3.1 REFERENCE MARKS

A. Furnish and install reference marks set in concrete or mortar in sufficient number and durability to assure the perpetuation of facile replacement of any survey point, monument or line.

B. Install reference marks where location of section corner or survey monuments are likely to be disturbed or destroyed, or where difficult terrain is encountered.

C. When specified or for new subdivision work, install reference marks for lot lines in concrete curbs or sidewalks. If not available, install witness monuments in approved locations.

3.2 REFERENCE SURVEY MONUMENTS PRIOR TO DISTURBANCE

A. Obtain local jurisdiction's monument permit not less than 72 hours prior to disturbing, damaging, moving, removing, covering, or destroying of any existing survey monument.

B. Pay all costs and submit all pertinent data when replacing monuments not referenced.

3.3 REFERENCING SURVEY POINTS AND LINES

A. Reference all survey points and lines which may be disturbed or destroyed by construction operations using reference marks.

B. Locate reference marks on lines or extensions of lines that the survey points designate.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cutting and patching to:

1. Fit the several parts together, to integrate with other work.
2. Uncover work to install work done out of sequence.
3. Remove and replace defective and non-conforming work.
4. Remove samples of installed work for testing.
5. Provide openings in non-structural elements for penetrations of mechanical and electrical work.

1.2 SUBMITTALS

A. Submit written request in advance of cutting and patching that affects:

1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight-exposed elements.
5. Work of OWNER or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting and patching.
4. Description of proposed work, and products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of OWNER or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

PART 2 PRODUCTS

2.1 MATERIALS

A. Those required for original installation.

B. For any change in materials, submit request for Substitution, Section 01 25 00 requirements.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect existing conditions, including elements subject to damage or movement during modifications to completed work.

B. After uncovering, inspect conditions affecting performance of work.

C. Beginning of Modification work constitutes acceptance of existing conditions.

3.2 PREPARATION

A. Provide supports to assure structural integrity of surroundings, devices and methods to protect other portions of work from damage.

B. Provide protection from elements for areas which may be exposed by work.

3.3 PERFORMANCE

A. Execute work by methods to avoid damage to existing structures and other work, and which will provide proper surfaces to receive patching and finishing.

B. Employ original installer if possible to be responsible for modification work on weather-exposed and moisture-resistant elements, and exposed to view surfaces.

C. Restore Work with new products per requirements of Contract Documents.

D. Fit Work, to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

E. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

END OF SECTION

SECTION 01 74 13

PROGRESS CLEANING PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cleaning and disposal of waste materials, debris, and rubbish.
B. Cleaning of Work prior to Final Inspection.

1.2 SUBMITTALS

A. Prior to Project Closeout: Certificate of disposal of Hazardous Waste if applicable.

1.3 JOB CONDITIONS

A.On Site Burning: Not permitted.

PART 2 PRODUCTS

2.1 CLEANING MATERIALS

A. Use only materials which will not create hazards to health or property, and which will not damage surfaces.

B. Use only cleaning materials recommended by manufacturer of item being cleaned.

PART 3 EXECUTION

3.1 CLEANING DURING CONSTRUCTION

A. Initiate and maintain a specific cleaning program to prevent accumulation of debris. Maintain areas under CONTRACTOR'S control free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Provide covered containers for deposit of debris and rubbish.

C. Periodically clean interior areas to provide suitable conditions for finish work.

D. Remove debris and rubbish from closed or remote spaces prior to closing the space.

E. Broom clean interior areas prior to start of surface finishing, and continue cleaning on an as-needed basis.

F. Control cleaning operations so that dust and other particulate will not adhere to wet or newly-coated surfaces.

3.2 DISPOSAL DURING CONSTRUCTION

A. Regularly remove and legally dispose of waste materials, debris, and rubbish from

site.

B. Provide additional collections and disposal of debris whenever the periodic schedule is inadequate to prevent accumulation.

3.3 CLEANING PRIOR TO FINAL INSPECTION

A. Site:

1. Clean exposed-to-view surfaces.
2. Remove waste, debris, and surplus materials from site.
3. Clean grounds; paved areas and sweep clean.
4. Rake clean other surfaces.

B. Building:

1. Clean interior and exterior exposed-to-view surfaces.
2. Remove temporary protection and labels not required to remain.
3. Clean finishes free of dust, stains, films and other foreign substances.
4. Clean transparent and glossy materials to a polished condition. Polish reflective surfaces to a clear shine.
5. Vacuum clean carpeted and similar soft surfaces.
6. Clean resilient and hard-surface floors.
7. Clean surfaces of equipment; remove excess lubrication.
8. Clean plumbing fixtures to a sanitary condition.
9. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.
10. Clean lighting fixtures and lamps.
11. Continue cleaning until acceptance.
12. Remove waste and debris from roofs, gutters, area ways, and drainage systems.

END OF SECTION

SECTION 01 75 16

STARTUP PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedural requirements for start-up, testing, adjusting and balancing systems.

1.2 COORDINATION

A. Coordinate services with the work of the various trades to ensure rapid completion of the services.

B. Report any deficiencies noted during performance of services to allow immediate corrective action.

1.3 JOB CONDITIONS

A. Prior to start of testing, adjusting and balancing, verify required job conditions.

1. Systems installation is complete and in full operation.
2. Conditions are within a reasonable range relative to design conditions.
3. Special equipment such as electronic equipment are in full operation.

B. Verify that special product or equipment requirements for preparation, testing and balancing have been met for elements of each of the systems that require testing.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide material required to perform start-up of each respective item of equipment and system prior to beginning of test, adjust and balance procedures.

2.2 VERIFICATION OF PERFORMANCE

A. Provide an independent certifying association to provide information and assistance required to adjust and balance system.

PART 3 EXECUTION

3.1 START-UP

A. Start up completed facility with appropriate personnel present.

B. Perform specified services and if necessary employ and pay for a manufacturer

approved organization to perform specified services.

C. Provide appropriate utilities and instrumentation required for starting, testing, adjusting and balancing operations.

1. Make instruments available to ENGINEER to facilitate spot checks during testing.
2. Retain possession of instruments, remove from site at completion of services.

D. Comply fully with the procedural standards of the certifying association under whose standards service will be performed.

1. Execute each step of the prescribed procedure without omission.
2. Accurately record the required data.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparation of operation and maintenance manual to include compilation of product data, related information, and instructions for systems and equipment.

B. Instruction of OWNER'S personnel in maintenance of products and in operation of equipment and systems

C. Schedule of required submittals.

1.2 FORMAT

A. Prepare data in the form of an instructional manual.

B. Consult with ENGINEER to determine format requirements.

1.3 CONTENTS, EACH VOLUME

A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of ENGINEER and CONTRACTOR with name of responsible parties, Schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and Suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Record Documents as maintenance drawings.

E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Guaranties and Warranties: Copies of each showing dates of expiration.

1.4 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Give function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications.

C. Include as installed color coded wiring diagram.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequence. Include regulation, control, stopping, shutdown and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for troubleshooting; disassembly, repair and reassembly instructions: and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide as-installed control diagrams by controls manufacturer.

K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

L. Include test and balancing reports.

M. Additional Requirements: As specified in individual sections.

1.5 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to Substantial Completion, instruct OWNER'S designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

B. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

C. Prepare and insert additional data in Operating and Maintenance Manual when need for such data becomes apparent during instruction.

1.6 SUBMITTALS

A. Submit 2 copies of preliminary draft or proposed formats and outlines of contents before start of Work.

B. For equipment, or component parts of equipment put into service during construction and operated by OWNER, submit documents within 10 days after acceptance.

C. Submit 1 copy of completed volumes in final form 15 days prior to Final Inspection. Revise content of documents as required prior to final submittal.

D. Submit 6 copies of revised volumes of data in final form within 14 calendar days after complete system start-up.

PART 2 PRODUCTS Not Used

PART 3 PRODUCTS Not Used

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for collecting, maintaining, updating, and submitting Record Documents.

1.2 DEFINITIONS

A. Record Documents: Those documents maintained and annotated by CONTRACTOR during construction for the purpose of recording the "as built" condition of the Work.

1.3 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs when specified in the Contract Documents starting with a series of photographs before the start of any physical construction, and continuing for as long as the Work progresses.

1. On 5 inches x 7 inches color prints or size approved by ENGINEER showing the regular progress of the Work, provide not less than 12 exposures of different subjects or angles of view each time from different locations in the Project area at intervals not exceeding one month.
2. On each print indicate the date, job title, photograph identification, and direction the camera was facing.
3. With each request for payment.
4. Upon completion of the Work, submit all negatives. ENGINEER may request an additional 10 exposures of the Work.

B. Secure ENGINEER'S approval if a video tape is to be substituted for the photograph prints.

1.4 DOCUMENTS ON SITE

A. Keep at job site 1 copy of each of the following, if issued for the Work.

1. Contract Drawings.
2. Project Manual.
3. Addenda.
4. Reviewed Shop Drawings, Product Data and Samples.
5. Modifications to the Contract Documents.
6. Field test records.

7. Inspection certificates.
8. Manufacturer's certificates.
9. Survey documentation.

B. Do not use Record Documents for construction purposes.

C. Store Record Documents in a location, apart from documents used for construction.

D. Maintain Record Documents in a clean, dry, legible condition.

E. Provide adequate files and racks for storage of Record Documents that will allow ready access for review and updating.

F. Make Record Documents available at all times for review and Inspection by ENGINEER.

1.5 MARKING DEVICES

A. Red colored waterproof for all marking unless requested otherwise.

1.6 RECORDING

A. Clearly and legibly label each document "PROJECT RECORD".

B. Number Record Documents in a manner which will allow ready retrieval of documents and allow indexing of documents for submittal to ENGINEER.

C. Update Record Documents as work occurs to show the current status of the Work.

D. Do not permanently cover or conceal any work until all required information Has been recorded on the Record Documents.

E. Contract Drawings: Legibly mark contract Drawings to record following actual construction information.

1. Measured depths of various elements of foundation or finish grading in relation to finish floor datum or other permanent benchmark.
2. Measured horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
3. Measured location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of construction.
4. Field changes of dimension and detail.
5. Changes made by contract Modifications.
6. Details not contained in original contract Drawings.

F. Project Manual and Addenda: Legibly update each to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by contract Modifications.
3. Other technical matters and details included in the Work, but not originally specified.

G. Shop Drawings: Maintain reviewed Shop Drawings as Record Documents; legibly annotate drawings to record changes made to Shop Drawings.
H. Product Data and Samples: Maintain reviewed product data and samples as Record Documents; update and document any variations from the reviewed product data and samples after acceptance.

1.7 **SUBMITTAL OF DOCUMENTS**

A. At the completion of the Work, submit all Record Documents.
B. Accompany the submittal with a transmittal letter, in duplicate, containing:
   1. Submittal date.
   2. Project title and number.
   3. CONTRACTOR'S name and address.
   4. Title and number of each Record Document.
   5. Certification that each document as submitted is complete and accurate.
   6. Signature of CONTRACTOR, or CONTRACTOR'S authorized representative.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01 78 50

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Administrative provisions for Substantial Completion, Final Inspection and acceptance.

1.2 REFERENCES

A. American Public Works Associations (Utah Chapter).

1. Plan 110: Arrow Diagram for Project Close-Out.

1.3 SUBSTANTIAL COMPLETION

A. When Work, or designated portion thereof, is Substantially Complete, submit written notice with list of any outstanding items to be completed or corrected.

B. After receipt of CONTRACTOR'S certification of Work Completion, ENGINEER will make Final Inspection to determine status of completion.

C. Should Work not be Substantially Complete, remedy deficiencies and resubmit a written notice.

1.4 ACCEPTANCE OF WORK

A. Protect Work until it is accepted.

B. Neither ENGINEER'S determination that Work is complete, nor acceptance thereof by the OWNER, shall operate as a bar to claim against the CONTRACTOR under the provisions of the Contract Documents.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents: Section 01 78 39.

B. Operation and maintenance data: Section 01 78 23.

C. Evidence of payment to Subcontractors and Suppliers: Document 00 72 00, Final Application for Payment.

D. Final Summary Report of CONTRACTOR'S testing agency: Section 01 45 00 requirements.

1.6 **CLOSEOUT SCHEDULE**

A. Plan 110.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 02 41 13

SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Demolition of structural and utility items on site.

B. Salvage.

1.2 PAYMENT PROCEDURES

A. Payment for structures or obstructions which are not designated for removal and disposal in the Bidding Documents, and which cannot be removed with equipment reasonably expected to be used in the work without cutting, drilling, or blasting, will be paid for by Change Order.

B. Backfilling depressions left because of demolition work will not be measured or paid for separately except as provided in the preceding paragraph.

1.3 RELATED WORK

A. Demolition of Pavements, sidewalks, Driveway Approaches, curbs, gutters, Section 02 41 14.

B. Existing pipelines not to be salvaged are considered a part of excavation work, Section 31 23 16.

C. For use of explosives in the Work; Section 31 23 17.

1.4 SITE CONDITIONS

A. Protect structures to be removed and their contents from vandalism and theft.

B. Repair or replace damaged trees and shrubs at no additional cost to OWNER.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 PREPARATION

A. Review all work procedures with ENGINEER.

B. Locate and preserve all active utilities which are to remain in service.

3.2 PROTECTION

A. Avoid or minimize damage to tree roots. Roots provide anchorage, storage of energy, and absorption and conduction of water and mineral elements. Loss of root connection affects health and stability of tree and safety of people and property.

B. Provide certified arborist observation of root cuts larger than 4 inches diameter. Notify ENGINEER of such root cut.

3.3 STRUCTURE DEMOLITION

A. Remove structures and incidentals such as but not limited to foundations, sidewalks, Pavement slabs, fences and outbuildings.

B. Remove foundation walls at least 2 feet below the finished grade or 2 feet below the natural ground surface. Remove floor slab or break it into pieces no larger than 3 feet square.

C. Backfilling and compaction of Excavations for structures, Section 31 23 23.

D. Building components, Section 02 41 19.

3.4 PIPELINE DEMOLITION

A. Salvaging Pipe: Do not damage.

B. Plugs: Plug disconnected pipe lines near the right-of-way line with a water-tight concrete plug extending into the remaining pipe at least 2 feet.

C. Service Laterals: Excavate and shut off the corporation stop. Disconnect.

3.5 BRIDGE AND ABUTMENT DEMOLITION

A. Remove existing bridges and abutments indicated.

B. Remove structures so that no remaining portion is closer than 3 feet to any water course or closer than 2 feet to the Subgrade and Embankment surface, or within 2 feet of the natural ground surface.

C. Remove structures so that compacted backfill can be provided as required in backfilling operation, Section 31 23 23.

3.6 BURIED FUEL TANK DEMOLITION

A. Remove buried fuel storage tanks and dispose of tank contents in accordance with Laws and Regulations.

B. Do not spill fuel on Subgrade.

C. Comply with the local authority having jurisdiction over fuel tank removals.

3.7 MISCELLANEOUS DEMOLITION

A. Remove miscellaneous structures and obstructions or cover them with backfill if the result meets the following requirements.

1. Backfill is stable.
2. Burial does not interfere with construction.
3. Permission to do so is obtained from the ENGINEER.
4. No remaining portion is within 2 feet of the final ground surface contours.

3.8 **SALVAGE**

A. Salvage designated equipment and materials.

B. All other salvaged materials become the property of the CONTRACTOR unless such materials are not owned by OWNER.

END OF SECTION

SECTION 02 41 14

PAVEMENT REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of roadway Pavement.

B. Milling roadway Pavement.

C. Removal of curb, gutter, sidewalk, Driveway Approach, waterway, or similar flatwork.

D. Disposal of removed materials.

1.2 RELATED WORK

A. Demolition of structures and utilities.

1.3 DEFINITIONS

A. ADA: Americans with Disabilities Act.

1.4 SUBMITTALS

A. Traffic control plan, Section 01 55 26.

1.5 SITE CONDITIONS

A. Control dust, Section 01 57 00.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 PREPARATION

A. General

1. Coordinate utility location, Section 01 31 13.
2. Preserve all active utilities.
3. Notify neighborhood of day and time of operation.
4. Make sure invert covers are properly installed in storm drain and sanitary sewer systems, Section 01 71 13.
5. Mark existing utilities on redline drawings.

B. Traffic Control: Provide worker and public safety, Section 01 55 26.

C. Tree Roots:

1. Avoid or minimize damage to tree roots. Roots provide anchorage, storage of energy, and absorption and conduction of water and mineral elements. Loss of root connection affects health and stability of tree and safety of people and property.
2. Provide certified arborist observation of root cuts larger than 4 inches diameter. Notify ENGINEER of such root cut.

D. Existing Surfaces:

1. Do not damage adjacent concrete surfaces that are not scheduled for removal.
2. Use rubber cleats or Pavement pads when operating backhoes, outriggers, track equipment, or any other equipment on or crossing paved surfaces.
3. Restore paved surfaces that are damaged by removal operations at no additional cost to the OWNER. Match the existing Pavement surface plus 1 inch.

3.2 SAW-CUT PEDESTRIAN TRIP HAZARDS

A. Make saw cuts 1:8 slope measured to grade.

B. Eliminate trip hazards across the full width of the hazard.

3.3 SAW-CUT CURB HORIZONTALLY

A. Saw cut curbs for ADA ramps at 1:12 slope. No trip hazard at gutter flow line.

B. Saw cut curbs for flares:

1.1:4 slope measured to grade, or

2. 1:12 slope measured horizontally when complying with ADA.

3.4 REMOVE PORTLAND CEMENT CONCRETE

A. Remove concrete to the nearest expansion joint or vertical saw cut.

B. Make concrete cuts straight, vertical to the surface, true, full depth.

C. DO NOT use machine mounted impact hammers.

3.5 REMOVE ASPHALT CONCRETE

A. Saw cut full depth and remove Pavement.

B. When asphalt concrete overlays Portland cement concrete Pavements do not use a machine mounted impact hammer.

3.6 MILLING

A. Machine:

1. Equipped to prevent air pollution.
2. Equipped with a system to control slope of mill cut.

B. Tolerances:

1. Milling Depth: As indicated plus or minus 10 percent not uniformly high or

uniformly low.
2. Striation Texture: Uniform, discontinuous, longitudinal, 3/16 inch deep maximum, 3/4 inch center to center.
3. Smoothness: Plus or minus 5/16 inch in 25 feet.
4. Cross Slope: Plus or minus 1/4 inch in 10 feet.

C. Performance:
1. Lower utility frames, covers, and other Street Fixtures.
2. Mill surfaces to the depth shown on the Drawings or indicated by ENGINEER. Do not disfigure adjacent work or existing surface improvements.
3. If milling exposes smooth underlying Pavement surfaces, mill the smooth surfaces to make them rough.
4. Mill off material if it ponds water or if it has been damaged by water.
5. Where vehicles or pedestrians must pass over milled edges provide safe temporary ramps suitable to speed of user vehicles (or suitable for wheel chair user needs).
6. Remove excess material and clean milled surfaces.
7. If work equipment is removed from the milling site and milled surface awaits further work, provide appropriate traffic control and cleaning.

3.7 GRINDING

A. Machine:
1. Cutting head 36 inches wide minimum.
2. 50 to 60 diamond blades per foot of head.

B. Preparation:
1. Control traffic.
2. Provide water truck, waste truck, and other support machinery.
3. Mark areas to be ground.

C. Tolerances:
1. 1/4 inch lip transverse to the direction of vehicular travel. Potential for ponding not allowed.
2. 1/8 inch lip (or dent) parallel to direction of vehicular travel.
3. Taper ground areas from the lane/shoulder line into the shoulder area at 1/4 inch per foot.

D. Performance:
1. Skid resistance of final ground surface must be comparable to adjacent sections not requiring corrective work.
2. Surface treatment of ground areas.
   a. Asphalt Concrete: Asphalt tack coat and sand blotter, Section 32 12 14.
   b. Hydraulic Concrete: Water repellant, Section 07 19 00.
3. Waste grindings legally.
4. Protect downstream fish habitat.

3.8 **CLEANING**

A. Remove all debris and concrete dust. Clean surrounding rails, sidewalks, Driveways, landscaping and other objects in vicinity of work.

END OF SECTION

SECTION 02 41 15

PAVEMENT PULVERIZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Full depth reclamation.

B. Stabilizer selection guide.

1.2 REFERENCES

A. ASTM C 136: Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM C 150: Standard Specification for Portland Cement.

C. ASTM D 558: Standard Test Methods for Moisture-Density Relations of Soil-Cement Mixtures.

D. ASTM C 595: Standard Specifications for Blended Hydraulic Cement.

E. ASTM C 618: Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

F. ASTM D 2922: Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

G. ASTM D 4318: Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

H. ASTM D 4832: Standard Test Method for Preparation and Testing of Soil-Cement Slurry Test Cylinders.

1.3 SUBMITTALS

A. List of equipment to be used.

B. Mix design showing percentage and quantity of stabilizer needed.

C. Traffic control plan; Section 01 55 26.

1.4 SITE CONDITIONS

A. Section 01 57 00; control dust.

1.5 ACCEPTANCE

A. Gradation: Random measure.

B. Depth: Random measure each 1,000 square yards.

C. Density: Nuclear gage or proof roll.

D. Quantity of stabilizer added matches submittal data.

PART 2 PRODUCTS

2.1. TACK COAT CURING COMPOUND

A. Cationic or anionic emulsified asphalt, Section 32 12 03.

2.2 STABILIZER

A. Cement:
   1. Type I or II, ASTM C 150, or
   2. Type IP or IS; ASTM C 595.

B. Aggregate: Gravel, untreated base course, crushed Portland cement concrete.

C. Chemical Stabilizer: Use type allowed by ENGINEER.

2.3 MIX DESIGN

A. Gradation ASTM C 136.

Sieve	Percent Passing by Weight
3"	100
3"	85 to 95
No. 4	45 maximum

B. Stabilizer: Use the following table as a guide.

Table 1 - Stabilizer Selection Guide	
Characteristics of Reclaimed Aggregate Before Addition of Stabilizer	**Stabilizer**
Asphaltic binder content; greater than 15 percent	Aggregate
More than 45 percent of material passes No. 4 sieve	Aggregate or Cement
Plasticity index (ASTM D 4318) of material passing No. 4 sieve is more than 10.	Cement

1. Unless specified otherwise, cement stabilization per ASTM D 4832 is to be in the range of 300 to 800 psi at 7 days.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Capable of cutting to the required depth, pulverizing, and sizing the material.

3.2 PREPARATION

A. Identify location of all buried utilities.

B. Notify neighborhood of day and time of operation.

C. Set traffic control devices.

D. Install invert covers.

E. Lower Street Fixtures.

F. Determine need for stabilizer.

3.3 CONSTRUCTION

A. Pulverize full depth. Do not remove excess material until full depth pulverizing is complete.

B. Remove excess material.

C. Pulverize a second time if stabilizer is required.

D. Shape, grade, roll, compact.

E. Cure stabilized material with water or asphalt tack coat.

3.4 FIELD QUALITY CONTROL

A. Reclaimed Aggregate: 95 percent minimum compaction using

1. Optimum water content and maximum density, ASTM D 558, and
2. Nuclear gage shallow depth, ASTM D 2922.

B. Stabilized Reclaimed Aggregate: Proof roll (prior to cement set).

3.5 REPAIR

A. Repair surface irregularities.

B. Seal cracks in cured stabilized material.

END OF SECTION

SECTION 02 41 19

SELECTIVE BUILDING DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of building components.

1.2 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the OWNER's property unless indicated otherwise by ENGINEER.

B. Remove and Salvage: Items indicated to be removed and salvaged remain OWNER's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to OWNER's designated storage area.

C. Remove and Reinstall: Remove items indicated. Clean, service, and otherwise prepare them for re-use. Store and protect against damage. Reinstall items in locations indicated.

D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by ENGINEER, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.3 PROJECT CLOSEOUT

A. Record removals on Drawings. Submit record documents, Section 01 78 39.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 PREPARATION

A. Survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition.

B. All furnishing, accessories, equipment, etc. that are to be removed from site shall remain property of OWNER ENGINEER shall determine appropriate action for property in question.

C. If OWNER occupies portions of building immediately adjacent to selective demolition area, conduct selective demolition so OWNER's operations will not be disrupted. Provide not less than 72 hours' notice to OWNER of activities that will affect OWNER's operations. 72 hour notifications shall be submitted to ENGINEER.

D. OWNER assumes no responsibility for actual condition of buildings to be selectively demolished.

3.2 **DEMOLITION**

A. Comply with Laws and Regulations before, during, and after selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Photograph or videotape existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.

C. Storage or sale of removed items or materials on site will not be permitted.

END OF SECTION

SECTION 03 11 00

CONCRETE FORMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete.
B. Openings in formwork for other affected work.
C. Form accessories such as snap ties, bracing, etc.
D. Stripping formwork.

1.2 REFERENCES

A. ACI 347: Recommended Practice for Concrete Formwork.

1.3 DEFINITIONS

A. Shoring: The activity to support formwork.

B. Reshoring: The activity to reduce the amount of formwork supporting concrete elements. As concrete sets and strength increases, less need for formwork occurs gradually until concrete becomes free standing.

1.4 SUBMITTALS

A. Shop Drawings: Fabrication and erection drawings of forms for specific finished concrete surfaces, as indicated. Show general construction of forms, jointing, special joints or reveals, location and pattern of form tie placement, and other items affecting exposed concrete visibility.

B. Form Release Agent: Where concrete surfaces are scheduled to receive special finishes or applied coverings which may be affected by agent submit manufacturer's instructions for use of agent.

1.5 QUALITY ASSURANCE

A. Designer's Qualifications: Structural professional engineer who complies with Utah licensing law, has experience in concrete formwork, and is acceptable to the authority having jurisdiction.

B. Design Forms:

1. With sufficient strength to maintain finished tolerances indicated in Section 03 35 00, to support loads, pressures, and allowable stresses as outlined in ACI 347 and for design considerations such as wind loads, allowable stresses, and other applicable requirements of local Laws and Regulations.
2. To permit easy removal.

3. For required finishes.

C. The design, engineering, and construction of formwork is CONTRACTOR's responsibility.

1.6 JOB CONDITIONS

A. For reference purposes, establish and maintain sufficient control points and bench marks to check tolerances. Maintain in an undisturbed condition and until final completion and acceptance of Work.

B. Regardless of tolerances specified, allow no portion of Work to extend beyond legal boundaries.

1.7 FIELD SAMPLES

A. Prepare field samples and submit per Section 01 33 00.

B. Construct and erect sample formwork panel for architectural concrete surfaces receiving special treatment or finish as a result of formwork. Formwork to include vertical and horizontal form joints and typical rustication joints when required.

C. Size panel to indicate special treatment or finish required, including form release agent.

D. Remove formwork after casting concrete.

1.8 ACCEPTANCE

A. Secure ENGINEER's inspection of form layout for concrete flat work.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Faced with material which will produce smooth and uniform texture on concrete, unless indicated otherwise.

B. Arrange facing material orderly and symmetrical, keeping number of seams to a minimum.

C. Do not use material with raised grain, patches, or other defects which will impair texture of concrete surface.

2.2 FORMWORK ACCESSORIES

A. Form Ties:

1. Use ties constructed so that end fasteners can be removed without spalling concrete faces.

2. After end fasteners of ties have been removed, embedded portion of ties are to terminate not less than 2 times the diameter or thickness of the fasteners from formed faces of concrete, but in no case greater than 3/4 inch.
3. When the formed face on concrete is not exposed, form ties may be cut off flush with formed surfaces. Use ties with 3/4 inch diameter cones on both ends or an approved equal for water retaining structures.

B. Premolded Expansion Joint Filler: Unless indicated otherwise, provide Type F1, Section 32 13 73.

C. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, impair natural bonding or color characteristics of concrete. To prevent contamination, agents used on potable water structures are subject to review by ENGINEER prior to use.

D. Fillets for Chamfered Corners: Wood strips 1 inch x 1 inch size, maximum length possible.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify lines, levels, and measurements before proceeding with formwork.

3.2 FORM CONSTRUCTION

A. Make forms sufficiently tight to prevent loss of concrete.

B. Unless indicated otherwise, place chamfer strips in corners of forms to produce beveled edges on permanently exposed exterior corners.

C. To maintain specified finish tolerances, camber formwork to compensate for anticipated deflections.

D. Provide positive means of adjustment using wedges, jacks, Shores, and struts to take up all settlement during concrete placing operation.

E. Provide temporary ports in formwork to facilitate cleaning and Inspection. Locate openings at bottom of forms to allow flushing water to drain.

F. At construction joints, overlap forms over hardened concrete at least 6 inches. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain true surface.

G. Construct wood forms for wall openings to facilitate loosening, or counteract swelling.

H. Fasten wedges used for final adjustment of forms prior to concrete placement in position after final check.

I. Anchor formwork to Shores, supporting surfaces or members to prevent upward or lateral movement and deflection of any part of formwork system during concrete placement.

J. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing.

K. Position expansion joint material and other embedded items accurately and support to prevent displacement.

L. To prevent entry of concrete, fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material.

M. For architectural concrete, limit deflection of facing materials between studs as well as deflection of studs and walers to 0.0025 times span.

N. For underground concrete work, do not use soil walls for forming unless authorized by ENGINEER.

3.3 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings for elements embedded in or passing through concrete.

B. Coordinate work of other sections for the forming and setting of openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install accessories per manufacturer's instructions. Ensure items are not disturbed during concrete placement.

3.4 FORM FINISHES

A. Use forms with smooth rubbed, scrubbed, sand floated finishes that meet ACI 347 unless indicated otherwise.

B. For As-cast Finishes:

1. Install form panels in orderly arrangement with joints planned in approved relation to building elements.
2. Where panel joints are recessed or otherwise emphasized, locate form ties within joints, not within panel areas.
3. Where an as-cast finish is required, no grouting will be permitted in the finishing operation.

C. Textured Finishes: As indicated.

3.5 APPLICATION OF FORM RELEASE AGENT

A. Apply form release agent on formwork per manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

3.6 FORM REMOVAL

A. Do not pry against face of concrete. Use only wooden wedges.

B. When repair of surface defects or finishing is required at an early age, remove forms as soon as concrete has hardened sufficiently to resist damage from removal operations.

C. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging. Perform needed repairs or treatment required on such sloping surfaces at once, followed by specified curing.

D. Loosen wood forms for wall openings as soon as it can be accomplished without damage to concrete.

E. Formwork for columns, walls, sides of beams, and other members not supporting the weight of concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal.

F. Where no Reshoring is planned, leave forms and Shoring used to support weight of concrete in beams, slabs, and other concrete members in place until concrete has attained its specified strength.

G. Where Reshoring is planned, supporting formwork may be removed when concrete has reached 70 percent of specified strength, provided Reshoring is installed immediately.

H. When Shores and other vertical supports are so arranged that non-load carrying, form-facing material may be removed without loosening or disturbing Shores and supports, facing material may be removed at an earlier age as directed.

3.7 RESHORING

A. When Reshoring is permitted or required, plan operations in advance and obtain Approval.

B. During Reshoring do not subject concrete in beam, slab, column, or any other structural member to combined dead and construction loads and live loads in excess of loads permitted for developed concrete strength at time of Reshoring.

C. Place Reshores as soon as practical after stripping operations are complete, but in no Tighten Reshores to carry required loads without over-stressing.

E. Leave Reshores in place until the concrete being supported has reached its specified strength.

F. For floors supporting Shores under newly placed concrete, level original supporting Shore or Reshore.

1. Reshoring system shall have a capacity to resist anticipated loads in all cases equal to at least 1/2 the capacity of the Shoring system.
2. Unless otherwise specified locate Reshores directly under a Shore.
3. In multistory buildings, extend Reshoring through a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads in such a manner that design loads of floors and supporting Shores are not exceeded.

G. Design, engineering, and construction of Shoring and Reshoring is the responsibility of the CONTRACTOR.

3.8 REMOVAL STRENGTH

A. When removal of formwork or Reshoring is based on concrete reaching a specified strength, it shall be assumed that concrete has reached this strength when either of the following conditions has been met:

1. When test cylinders, field cured along with the concrete they represent, have reached the specified strength.
2. When concrete has been cured per Section 03 39 00 for the same length of time as the site-cured cylinders that reached specified strength. Determine the length of time the concrete has been cured in the structure by cumulative number of days or fractions thereof, not necessarily consecutive, during which the air temperature is above 50 deg. F. and concrete has been damp or sealed from evaporation and loss of moisture.

3.9 REUSE OF FORMS

A. Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of concrete surface.

B. Thoroughly clean and properly coat forms before reuse.

3.10 FIELD QUALITY CONTROL

A. Before commencing a pour, verify connections, form alignment, ties, inserts and Shoring are placed and secure.

B. Observe formwork continuously while concrete is being placed to verify that the forms are plumb and there are no deviations from desired elevation, alignment, or camber.

C. If during construction any weakness develops and false-work shows undue settlement or discoloration, stop work, remove affected construction if permanently damaged, and strengthen false-work.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars, wire fabric or rod mats for cast-in-place concrete.

B. Support chairs, bolsters, bar supports, and spacers for supporting reinforcement.

1.2 REFERENCES

A. AASHTO M 254: Standard Specification for Corrosion Resistant Coated Dowel Bars.

B. ACI 301: Specifications for Structural Concrete for Buildings.

C. ACI 315: Details and Detailing of Concrete Reinforcement.

D. ASTM A 82: Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

E. ASTM A 185: Standard Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.

F. ASTM A 615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

G. ASTM A 706: Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

H. ASTM C 1116: Standard Specification for Fiber-Reinforced Concrete and Shotcrete.

I. ASTM D 3963: Standard Specification for Epoxy-Coated Reinforcing Steel.

J. AWS D1.1: Structural Welding Code Steel.

K. AWS D1.4: Structural Welding Code Reinforcing Steel.

L. CRSI Document: Manual of Standard Practice.

1.3 SUBMITTALS

A. Manufacturer's Certificate: Submit mill test certificates of supplied concrete reinforcement, indicating physical and chemical analysis.

B. Welder's certification.

C. Shop Drawings.

1. Indicate sizes, spacings, locations, and quantities of reinforcing steel, wire fabric, bending and cutting schedules, splicing, stirrup spacing, supporting, and spacing devices.

2. When required, prepare shop drawings by an engineer who complies with Utah licensing law and is acceptable to agency having jurisdiction.

1.4 **QUALITY ASSURANCE**

A. Perform concrete reinforcement work per CRSI Manual of Standard Practice.

B. Comply with ACI 301.

C. Welders: Certified to comply with AWS D1.1 or AWS D1.4 as applicable.

1.5 **ACCEPTANCE**

A. Unless specified otherwise, chairs for supporting reinforcement in flat slabs are spaced as follows.

1. 3 feet maximum for No. 5 and smaller bars.
2. 5 feet maximum for bars larger than No. 5.

B. Dowels are placed on dowel baskets and properly aligned.

C. Epoxy and galvanized coatings are not chipped or cut. Ends of cut bars are epoxy coated or galvanize painted prior to placement.

D. Minimum covering over reinforcement is as specified.

PART 2 PRODUCTS

2.1 **MATERIALS**

A. Fiber Reinforcement: ASTM C 1116 glass.

B. Reinforcing Steel: Deformed 60 ksi yield grade steel, ASTM A 615 and supplementary requirements S1 or ASTM A 706 for welding.

C. Welded Steel Wire Fabric: ASTM A 185 plain type in flat sheets or coiled rolls. Dimensions of the mesh 4"x 4" or as indicated.

D. Stirrups: ASTM A 82 steel.

E. Plain Dowel Bars for Expansion Joints: Smooth grade 60 ksi yield grade steel, ASTM A 615,

1. Galvanized or epoxy coated in roadway Pavements.
2. Provide metal dowel cap at one end of dowel to permit longitudinal movement of dowel within concrete section. Design caps with 1 end closed.
3. Provide for movement equal to joint width plus 1/2 inch.
4. For load transfer bars, paint with 1 coat of paint conforming to AASHTO M 254 and coat 1/2 with grease.

F. Coatings for Corrosion Protection:

1. Epoxy coat, ASTM D 3963.
2. Galvanized, Section 05 05 10.

2.2 **ACCESSORY MATERIALS**

A. Tie Wire: Minimum 16 gage annealed type or an acceptable patented system.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

2.3 **FABRICATION**

A. Fabricate reinforcement, ACI 315 providing for concrete cover.

B. Locate reinforcing splices not indicated on Drawings at points of minimum stress. Indicate location of splices on shop drawings.

C. Weld reinforcing bars; with AWS D1.4.

PART 3 EXECUTION

3.1 **PLACING**

A. All reinforcement to be free of loose mill scale, loose or thick rust, dirt, paint, oil or grease.

B. Place all reinforcement in the exact position indicated. With tie wire, tie bars together at all intersections except where spacing is less than 12 inches in each direction, in which case tie alternate intersections.

C. Maintain the distance from vertical forms and between layers of reinforcement by means of prefabricated chairs, ties, hangers, or other approved devices. Placing and fastening of reinforcement in each section of the Work must be approved before concrete is placed.

D. Overlap sheets of metal mesh one square plus 6 inches to maintain a uniform strength. Securely fasten at the ends, edges, and supports to maintain clearances.

E. Flat Slab Work:

1. Support reinforcing steel of formed flat slabs with metal chairs, precast concrete blocks or other slab bolsters.
2. Size chairs or bolsters to position the steel in the exact location indicated.
3. Space chairs for supporting the top steel and bolsters for supporting the bottom steel not more than 5 feet on centers in each direction.
4. Plastic or epoxy coat that portion of the metal support in contact with the forms to prevent rust.
5. Tie down deck steel to beams or forms at regular intervals of not more than 5 feet on centers along the beams or forms to prevent movement of the steel during concrete placement.

3.2 **SPLICING**

A. Furnish all reinforcement in the full lengths indicated unless otherwise permitted. Splicing of bars, except where indicated is not permitted without written approval. Stagger splices where possible.

B. Unless indicated otherwise, overlap reinforcing bars a minimum of 30 diameters to make

the splice. In lapped splices, place the bars and wire to maintain the minimum distance for clear spacing to the surface of the concrete.

C. Do not use lap splices on bars greater in diameter than No. 11 unless approved.

D. Weld reinforcing steel only if indicated or if authorized in writing. Weld in conformance to AWS D1.4.

E. Do not bend reinforcement after embedding in hardened concrete.

F. Do not permit reinforcement or other embedded metal items bonded to the concrete, to extend continuously through any expansion joint, except dowels in floors bonded on only one side of joints.

3.3 PLACING EMBEDDED ITEMS

A. Place all sleeves, inserts, anchors and embedded items prior to concrete placement. Temporarily fill voids in embedded items to prevent entry of concrete.

B. Give all trades whose work is related to the concrete section ample notice and opportunity to introduce or furnish embedded items before concrete placement.

END OF SECTION

SECTION 03 30 04

CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Material requirements.

1.2 REFERENCES

A. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

B. ACI 211.2: Standard Practice for Selecting Proportions for Structural Lightweight Concrete.

C. ACI 211.3: Standard Practice for Selecting Proportions for No-Slump Concrete.

D. ACI 214: Recommended Practice for Evaluation of Strength Test Results of Concrete.

E. ACI 301: Specifications for Structural Concrete for Buildings.

F. ACI 305: Hot Weather Concreting.

G. ACI 306: Cold Weather Concreting.

H. ACI 318: Building Code Requirements for Reinforced Concrete.

I. ASTM C 33: Standard Specification for Concrete Aggregates.

J. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

K. ASTM C 88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

L. ASTM C 94: Standard Specification for Ready-Mixed Concrete.

M. ASTM C 117: Standard Test Method for Material Finer than 75µ (No. 200) Sieve in Mineral Aggregates by Washing.

N. ASTM C 138: Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.

O ASTM C 143: Standard Test Method for Slump of Hydraulic-Cement Concrete.

P. ASTM C 150: Standard Specification for Portland Cement.

Q. ASTM C 172: Standard Method of Sampling Freshly Mixed Concrete

R. ASTM C 227: Standard Test Method for Potential Reactivity of Cement-Aggregate Combinations (Mortar Bar Method).

S. ASTM C 231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

T. ASTM C 260: Standard Specification for Air-Entraining Admixtures for Concrete.
U. ASTM C 289: Standard Test Method for Potential Reactivity of Aggregates (Chemical Method).
V. ASTM C 295: Standard Practice for Petrographic Examination of Aggregates for Concrete.
W. ASTM C 441: Standard Test Method for Effectiveness of Mineral Admixtures or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to The Alkali-Silica Reaction.
X. ASTM C 494: Standard Specification for Chemical Admixtures for Concrete.
Y. ASTM C 595: Standard Specification for Blended Hydraulic Cements.
Z. ASTM C 618: Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
AA. ASTM C 1064: Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
BB. ASTM C 1116: Standard Specification for Fiber-Reinforced Concrete and Shot Crete.
CC. ASTM C 1157: Standard Performance Specification for Blended Hydraulic Cement.
DD. ASTM C 1240: Standard Specification for Use of Silica Fume as a Mineral Admixture in Hydraulic Cement Concrete, Mortar, and Grout.
EE. ASTM C 1260: Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
FF. ASTM C 1293: Standard Test Method for Concrete Aggregates by Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
GG. ASTM C 1567: Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
HH. ASTM C 1602: Standard Specification for Mixing Water Used in The Production of Hydraulic Cement Concrete.
I I. ASTM D 1077: Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
J J. ASTM STP 15-C: Manual on Quality Control of Materials.

1.3 SUBMITTALS

A. **Quality Assurance**: Submit names, certification levels, and years of experience of testing agency's laboratory and field technicians that are assigned to the Work. Verify laboratory complies with ASTM and ACI standards.

B. **Mix Design**: Submit.

1. Date of mix design. If older than 365 days, recertify mix design.

2. Cement source, type and chemical composition.
3. Aggregate soundness and potential reactivity.
4. Average Strength (fcr), per quality control chart.
5. Allowable range of slump and air content.
6. Water cement ratio.
7. Proportions of materials in the mix.
8. Unit weight.
9. Analysis of water if water is not potable.
10. Mortar bar test results if a pozzolan is included in the mix.
11. Technical data sheets for additives to be used at the plant and at the job site. Certify additives are compatible with each other.

C. **Pre-approved mix design**, submit name and address of Supplier.

D. **Before changing mix design**, submit a new design and give ENGINEER 10 days to evaluate the changes.

E. **Source Quality Control Inspections and Testing Report**: If requested, submit report describing CONTRACTOR's and Supplier's quality control activities and test results.

1.4 QUALITY ASSURANCE

A. Use a laboratory that follows and complies with ASTM D 1077.

B. Reject concrete that does not meet requirements of this section.

C. Do not change material sources, type of cement, air-entraining agent, water reducing agent, other admixtures except as allowed by mix design.

D. Store bagged and bulk cement in weatherproof enclosures. Exclude moisture and contaminants.

E. Prevent segregation and contamination of aggregate stockpiles.

F. Avoid contamination, evaporation, or damage to admixtures. Protect liquid admixtures from freezing.

G. Use of admixtures will not relax hot or cold weather placement requirements.

1.5 ACCEPTANCE

A. Materials:

1. At the Source: Verify aggregate gradation. Determine percent of combined aggregate passing No. 200 sieve.
2. At the Site: Verify mix identification, batch time, slump, air content, and temperature.
3. At the Laboratory: Verify strength in 28 days.

B. Placement:

1. Concrete in general, Section 03 30 10.
2. Pavement, Section 32 13 13 and 32 01 26.
3. Exterior flatwork, Section 32 16 13 or 32 16 14.

C. Defective Material:
1. Price adjustment, Section 01 29 00 and Section 03 30 10.
2. Dispute resolution, Section 01 35 10.

PART 2 PRODUCTS

2.1 CEMENT

A. General:
1. Do not use air entraining cement except for hand mixed applications.
2. Do not use cement that contains lumps or is partially set.
3. Do not mix cement originating from different sources.

B. Standard Set Cement:
1. Type II cement per tables 1 and 3 in ASTM C 150, or Type V when necessary, or
2. Low-alkali cement per table 2 in ASTM C 150.

C. Rapid Set Cement: As above and as follows.
1. Initial set time: 15 minutes minimum.
2. Color: Acceptable to the ENGINEER.

D. Blended Hydraulic Cement: The following are the cement equivalencies when substituting blended cement for a portland cement.

Table 1 - Cement Equivalencies

ASTM C 150 (Low Alkali)	ASTM C 595	ASTM C 1157
Type I	IP	GU
Type II	IP (MS)	MS
Type III	–	HE
Type IV	–	–
Type V	–	HS

2.2 WATER

A. Clean, non-staining, non-detrimental per ASTM C 1602.
B. Screen out extraneous material.
C. Do not use alkali soil water.

2.3 AGGREGATES

A. Material: Clean, hard, durable, angular, and sound consisting of gravel, crushed gravel,

crushed stone, crushed concrete, slag, sand or combination.

B. Source: Use the following requirements to determine suitability of aggregate source and not for project control.

1. Deleterious Substances and Physical Properties:

a. Coarse Aggregate: Class designation 4S in table 3 in ASTM C 33.

b. Fine Aggregate: Table 1 in ASTM C 33. Organic impurities producing a dark color concrete may cause rejection.

2. Reactivity:

a. Average prism length change in 12 months in an unmodified ASTM C 1293 test is less than 0.04 percent, or

b. Average mortar bar length change at 16 days in an unmodified ASTM C 1260 test is less than 0.10 percent, or

c. Historical data acceptable to ENGINEER, or

d. Petrographic limits per ASTM C 295. 1) Optically strained, micro fractured, or microcrystalline quartz: 5.0% maximum. 2) Chert or chalcedony: 3.0% maximum. 3) Tridymite or cristobalite: 1.0% maximum. 4) Opal: 0.5% maximum. 50 Natural volcanic glass volcanic rocks: 3.0% maximum

2.4 ADMIXTURES

A. Calcium Chloride: Not allowed.

B. Air Entrainment: ASTM C 260. For extrusion enhancement use nonvinsal resin.

C. Set Enhancement and Water Reducing Agents: ASTM C 494.

1. Type A: Water reducing.
2. Type B: Set retarding.
3. Type C: Set accelerating.
4. Type D: Water reducing and set retarding.
5. Type E: Water reducing and set accelerating.
6. Type F: High range water reducing (super plasticizer). *
7. Type G: High range water reducing and set retarding. *

* Keep the relative durability factor of water reducing additives not less than 90 and the chlorides content (as Cl^-) not exceeding 1 percent by weight of the admixtures.

D. Pozzolan:

1. Natural or fly ash per ASTM C 618.
2. Silica fume per ASTM C 1240

E. Special Admixtures: Allowed if mix design submittal is accepted.

1. Lithium nitrate based solution for control of reactive aggregates.
2. Calcium nitrite based solution for corrosion protection of reinforced structures subject to chloride-induced corrosion.
3. Shrinkage reducer for controlling drying shrinkage in concrete.
4. Viscosity modifier for enhancement of self consolidating concrete or for workability.

2.5 **MIX DESIGN**

A. Selection of Cement: ASTM C 150 or C 1157.

1. For sulfate resistance, use Type V portland cement, or Type II with Class F fly ash. Class F fly ash may be used as an addition to Type V portland cement.
2. Do not use fly ash with Type IP(MS) or Type III portland cement.

B. Selection of Aggregates.

1. Maximum Particle Size:

a. 1/5 of narrowest dimension between forms.
b. 1/3 of depth of slab.
c. 3/4 of minimum clear spacing between reinforcing bars.

2. Gradation: ASTM C 33.

a. Coarse Aggregate: Choose from the following grades. Gradations are based upon percent of material passing sieve by weight.

Sieve Size	Grade			
	357 (2")	**467 (1.5")**	**57 (1")**	**67 (3/4")**
2-1/2"	100	–	–	–
2 inch	95 - 100	100	–	–
1-1/2"	–	95 - 100	100	–
1"	35 - 20	–	95 - 100	100
3/4"	–	35 - 70	–	90 - 100
1/2"	10 - 30	–	25 - 60	–
3/8"	–	10 - 30	–	20 - 55
No. 4	0 - 5	0 - 5	0 - 10	0 - 10

b. Fine Aggregate:

Sieve Size	**Percent Passing (by Weight)**
3/8”	100
No. 4	95 to 100
No. 16	45 to 80
No. 50	10 to 30
No. 100	2 to 10

c. Silts and Clays: The amount of material smaller than the No. 200 sieve in any combined gradation sample is limited to the following percentages by weight of the

combined sample.

1. 1.75 percent maximum for concrete subject to abrasion.
2. 3.0 percent maximum for all other concrete. 194

C. Selection of Pozzolan:

1. General: If a blended aggregate passes an unmodified ASTM C 1293 test, use of a pozzolan is CONTRACTOR's choice, otherwise select a pozzolan (or blended cement, or both) and determine the effective dosage to meet one of the following tests.
   a. ASTM C 1567. The expansion of a cement-pozzolan-aggregate job-mix mortar bar is less than or equal to 0.10 percent at 16 days. Do not use this test if a lithium admixture is used in the job-mix.
   b. ASTM C 441. The expansion of a test mixture at 56 days is less than or equal to a control mixture prepared with cement with equivalent alkalis between 0.5 and 0.6 percent.
2. Fly Ash (Class F): Allowed as a cement replacement under the following conditions.
   a Before replacement is made, use the minimum cement content in the design formula to establish the water/cement ratio.
   b. Replace up to 20 percent of the cement by weight on a minimum basis of 1 part fly ash to 1 part cement.
   c. Submit to ENGINEER a quality history of the fly ash identifying a minimum of 20 of the most current ASTM C 618 analysis.
3. Natural Pozzolan (Class N): Allowed as a cement replacement if the 14 day expansion test (ASTM C 1567) with job aggregates, job cement and natural pozzolan does not exceed the 14 day expansion test of job aggregates, job cement and Class F fly ash.
4. Silica Fume: Allowed as a cement replacement if replacement of hydraulic cement on a 1 part silica fume to 1 part cement does not exceed 10 percent, and water/cement ratio is established before cement is replaced with silica fume.

D. Selection of Fiber Reinforcement: The basis for determining material proportions of fiber- reinforced concrete is the Supplier's responsibility per ASTM C 1116 subject to mix property requirements of this Section. Unless specified otherwise provide synthetic fibers.

E. Selection of Mix Properties: Select and proportion mix to produce appropriate strength, durability and workability. Use ACI 211.1, 211.2, or 211.3, and meet the following properties and limitations.

Table 3 - Mix Properties and Limitations					
Properties		**Test Method**	**Class**		
			2000	**3000**	**4000**
Compressive Strength (fc') at 28 days, psi, minimum		ASTM C 39	2000	3000	4000
Compressive Strength at 7 days, psi, (for reference only)		ASTM C 39	1340	2010	2680
Average Strength, psi (fcr)		ACI 214	(a)	(a)	(a)
Cement content, bags, minimum (b)		–	4.5	5.5	6.5
Water-cement ratio (by weight), maximum (d)		ACI 318	(c)	(c)	0.44
Entrained air, percent (based upon aggregate size) (e)	2" 1-1/2" 1" 3/4"	ASTM C 231	3.0 to 6.0 " " "	4.5 to 7.5 " " "	4.0 to 7.0 4.5 to 7.5 5.0 to 7.5 5.0 to 7.5
Slump		ASTM C 143	(c)	(c)	©)

NOTES:
(a) The amount by which average strength (fcr) exceeds compressive strength (fc') is based upon statistical assurance that no more than 1 test in 100 tests will fall below compressive strength (fc').
(b) Unless allowed otherwise by Engineer.
(c) Specific to exposure conditions and finishing need.
(d) Before pozzolan substitution.
(e) Comply with ACI 211.1 if air content is changed.
(f) 1 bag of cement = 94 pounds.

1. Cold Weather: ACI 306. Unless allowed otherwise by ENGINEER, increase cement content in the mix design by 1 bag between **October 1 and March 1,** i.e. 5.5 becomes 6.5, or 6.5 becomes 7.5, etc.
2. Hot Weather: ACI 305. Reduce temperature of mix ingredients or use an admixture appropriate to job conditions when air temperature is over 75 deg. F.
3. Concrete Deposited Under Water: Increase cement content 1 bag per cubic yard greater than the design required for concrete placed above water or use viscosity modifying admixture.

2.6 SOURCE QUALITY CONTROL

A. Once selected, do not change source quality control sampling point.

B. Aggregate:

1. Soundness, ASTM C 88.
2. Alkali-silica Reactivity: ASTM C 289, C 1567, C 227 and C 1293.
3. Petrographically examine fine and coarse aggregate sources once every 3 years per ASTM C 295.

C. Concrete Mix: Obtain samples per ASTM C 172 and run the following tests.

1. Compressive strength, ASTM C 39.
2. Unit weight, ASTM C 138.
3. Slump, ASTM C 143.
4. Air, ASTM C 231.
5. Temperature, ASTM C 1064.

D. Concrete Quality Charts: Comply with ACI 214 and ACI 301. Plot new results and identify trends on quality control charts that comply in form to ASTM STP 15-C. Show the Specified Strength (fc'), the required Average Strength (fcr), and the compressive strength versus date of Sample.

E. Equipment: Certify through the services of a professional engineer that trucks and plant equipment comply with the requirements of the National Ready Mixed Concrete Association. Do so at least every 2 years.

1. Transit Trucks: Equip transit trucks with plates indicating total volume, agitating volume and mix volume.
2. Weights and Measures: Comply with regulatory requirements of State of Utah.

PART 3 EXECUTION

3.1 INSTALLATION

A. Placement, Section 03 30 10.

B. Pavement restoration, Section 33 05 25.

C. Driveways, sidewalks, curb, gutter, Section 32 13 16.

D. Roadway pavement, Section 32 13 13.

3.2 FIELD QUALITY CONTROL

A. Truck Mixed Concrete (Dry Batch): ASTM C 94.

1. Truck Mixer: Fill drum no more than 63 percent of the gross drum volume and no less than 2 cubic yards. Use drum manufacturer's recommended mixing speed (between 12 18 rpm).
2. Truck Agitator: Do not fill drum greater than 80 percent of the gross drum volume. Use drum manufacturer's recommended agitating speed (between 2 – 6 rpm).

B. Mixing Plant: ASTM C 94.

1. Use option C and requirements in this section for preparing ready-mixed concrete.

2. Use scales certified by the State of Utah. Do not use volume measurement except for water and liquid admixtures.
3. Mixing time must exceed 80 seconds after adding air entrainment admixture.

C. Hand Mixing:

1. Do not hand mix batches larger than 0.5 cubic yard.
2. Hand mix only on a watertight platform.
3. Ensure all stones are thoroughly covered with mortar and mixture is of uniform color and consistency prior to adding water.

END OF SECTION

SECTION 03 30 05

CONCRETE TESTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete sampling and testing requirements.

1.2 REFERENCES

A. ACI 318: Building Code Requirements for Reinforced Concrete.

B. ASTM C 31: Standard Practice for Making and Curing Concrete Test Specimens in the Field.

C. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

D. ASTM C 42: Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

E. ASTM C 78: Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).

F. ASTM C 136: Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

G. ASTM C 138: Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.

H. ASTM C 143: Standard Test Method for Slump of Portland Cement Concrete.

I. ASTM C 172: Standard Method of Sampling Freshly Mixed Concrete.

J. ASTM C 173: Standard Test Method for Air Content of Freshly Mixed Concrete by Volumetric Method.

K. ASTM C 231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

L. ASTM C 567: Standard Test Method for Unit Weight of Structural Lightweight Concrete.

M. ASTM C 1064: Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.

N. ASTM D 1077: Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

1.3 SUBMITTALS

A. Concrete Supplier: If requested, submit reports and material certificates verifying concrete quality control.

B. Laboratory: Promptly submit test data results for 7 and 28 day breaks to Supplier, CONTRACTOR and ENGINEER.

1.4 **QUALITY ASSURANCE**

A. Provide an ASTM D 1077 compliant and ACI certified laboratory.

B. Provide level I ACI certified field sampling technicians.

1.5 **SITE CONDITIONS**

A. Assist ENGINEER: Furnish labor to assist ENGINEER in obtaining and handling acceptance samples at site or sources.

B. Store and Cure Test Specimens: Safely store and cure concrete test specimens and acceptance test specimens for first 24 hours.

1. Follow ASTM C 31 in making and curing cylinders or beams at site.
   Do not move the cylinders or beams for the initial 16 hour cure period. Provide initial cure temperature as follows.
   a. 60 to 80 deg. F. for Class 4,000 or less.
   b. 68 to 78 deg. F. for Class 5,000 or greater.
2. Equip storage device with an automatic 24 hour temperature recorder with an accuracy of plus or minus 2 deg. F.
3. Use water containing hydrated lime if water is to be in contact with cylinders or beams.
4. Ensure the device(s) can accommodate the required number of test cylinders or beams. Lack of capacity will cause the placement of concrete to cease.
5. Have the storage devices available at the point of placement at least 24 hours before placement.
6. A 24 hour test run may be required.

1.6 **ACCEPTANCE**

A. At the Site:

1. Sampling: ASTM C 172. Reject non-complying batches until 2 consecutive batches are compliant then proceed in random batch testing for acceptance.
2. Temperature, ASTM C 1064.
3. Air content, ASTM C 231 or ASTM C 173 if lightweight aggregate is used.
4. Slump, ASTM C 143. 200

B. At the Laboratory:

1. Compressive strength, ASTM C 31.
2. Flexure strength, ASTM C 78.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 PRECAST PRODUCTS

A. Obtain composite Samples from different portions of the batch.
B. Make and cure concrete test specimens for acceptance, ASTM C 31.
C. Cure all precast products with water vapor or water.
D. Do not damage precast products by stripping forms or handling before the concrete reaches its specified strength.

3.2 CAST-IN-PLACE PRODUCTS

A. Obtaining Samples:
   1. Batch samples, ASTM C 172.
   2. Core samples, ASTM C 42.
B. Identify location of tests on test reports.
C. Compressive strength , ASTM C 39.
   1. Mold 4 test specimens, ASTM C 31.
   2. For each strength test perform slump, air, unit weight, and temperature test.
   3. Break 1 cylinder at 7 days and 3 cylinders at 28 days. The average strength of 3 cylinder breaks shall be considered the test result.
   4. If any one cylinder in a 28 day test shows definite evidence of improper sampling, molding, handling, curing, or testing, discard the cylinder. The average strength of the remaining cylinders shall be considered the test result.
D. Tensile (flexural) strength, ASTM C 78.
   1. Mold 4 test specimens, ASTM C 31.
   2. For strength test perform slump, air, unit weight, and temperature test.
   3. Break 1 beam at 7 days and 3 beams at 28 days. The average strength of the 3 beam breaks shall be considered the test result.
   4. If any one beam in a 28 day test shows definite evidence of improper sampling, molding, handling, curing, or testing, discard the beam. The average strength of the remaining beams shall be considered the test result.
E. Aggregate, ASTM C 136 for fine and coarse aggregate.
F. Slump test, ASTM C 143.
G. Air Test:
   1. Normal weight concrete, ASTM C 231.
   2. Light weight concrete, ASTM C 173.
H. Unit Weight:
   1. Normal weight concrete, ASTM C 138.
   2. Light weight concrete, ASTM C 567.
I. When requested, test in-place concrete by impact hammer, sonoscope, or other non-destructive device:
   1. To determine relative strengths in various locations in Work.
   2. To aid in evaluating concrete strength.
   3. To select areas to be cored.
   4. To verify quality control in the absence of control testing.

3.3 RETESTING DEFECTIVE CONCRETE

A. If CONTRACTOR desires to do a retest, a request to ENGINEER for retesting must be made within 35 days from time of concrete placement.
No coring or retesting shall be done after 40 days have elapsed from the time of placement.

1. Choose 3 random test locations and verify choice with ENGINEER. Obtain retest samples per ASTM C 42 and test compressive strength per ASTM C 39 or flexure strength per ASTM C 78.
2. Establish a chain of custody for all test samples.
3. If concrete placed in the Work will be dry under service condition, air dry cores for 7 days before tests. Unless otherwise specified, use air temperature 60 to 80 deg. F. and relative humidity less than 60 percent.
4. If concrete placed in the Work will be more than superficially wet under service conditions, test cores after moisture conditioning (liquid or vapor water cure).
5. If more than 1 core shows evidence of having been damaged before testing provide replacement cores, otherwise evaluation will be done on 2 or more core samples.
6. Evaluate cores in accordance with ACI 318 requirements.
7. If core tests are inconclusive, or impractical to obtain, or if structural analysis does not confirm the safety of the Work, load test may be used and evaluated in accordance with ACI 318 requirements.

B. Coat sides of core hole with concrete epoxy resin adhesive. Fill core holes with non-shrink concrete mortar. Match color and texture of surrounding concrete.

C. Within 40 days from time of placement publish the chain of custody record and the results of retesting.

END OF SECTION

SECTION 03 30 10

CONCRETE PLACEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete placement for slabs on grade, slabs on fill, structural building frame, and other concrete components.

1.2 REFERENCES

A. ACI 301: Specifications for Structural Concrete for Buildings.

B. ACI 305: Hot Weather Concreting.

C. ACI 306: Cold Weather Concreting.

D. ACI 309: Standard Practice for Consolidation of Concrete.

E. ASTM C 881: Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

F. ASTM C 1059: Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

1.3 SUBMITTALS

A. Batch Delivery Ticket: For each batch delivered to site, identify.

1. Date and Project description.
2. Producer and plant.
3. Name of contractor.
4. Serial number of ticket.
5. Mix identification.
6. Truck number and time dispatched.
7. Volume of concrete.
8. Type and amount of cement.
9. Total water and water/cement ratio.
10. Water added for receiver of concrete and receiver's initials.
11. Admixture types.
12. Separate weights of fine and coarse aggregate.
13. Statement of whether batch is pre-mixed at plant or mixed in transit.

B. Record of Placed Concrete: Identify record date, location of pour, quantity, air temperature, and CONTRACTOR's quality control test samples taken.

C. Bonding Compound: Identify product name, type, and chemical analysis.

1.4 **QUALITY ASSURANCE**

A. Provide ACI certified finishers.

B. Remove and replace any placed concrete suffering hot or cold weather damage.

C. For control testing follow Section 03 30 05 requirements.

1.5 **ACCEPTANCE** A General:

A.1. Price adjustment, Section 01 29 00. CONTRACTOR may request ENGINEER determine appropriate Modifications or payment adjustments to correct Defective Work.

2. Dispute resolution, Section 01 35 10 and Section 03 30 05.

B. Concrete work that fails to meet any of the following requirements will be considered defective. Replace any Defective Work at no additional cost to the OWNER.

1. Placement:
   a. Reinforcing steel size, quantity, strength, position, damage, or arrangement is not as specified or does not comply with code.
   b. Formwork differs from required dimensions or location in such a manner as to reduce concrete's strength or load carrying capacity or physical esthetics.
   c. Workmanship likely to result in deficient strength.
2. Finishing:
   a. Concrete exposed to view has defects that adversely affect appearance.
   b. Slab tolerances of Section 03 35 00 are not met.
3. Protection:
   a. Method of curing is not as specified.
   b. Inadequate protection of concrete during early stages of hardening and strength development from
      1) temperature extremes.
      2) rapid moisture loss.
   c. Mechanical injury, construction fires, accidents, or premature removal of formwork likely to result in deficient strength development.

PART 2 PRODUCTS

2.1 **MATERIALS**

A. Concrete, Section 03 30 04. Class as indicated.

1. For roadway cuts, Section 33 05 25.

B. Bonding compound, ASTM C 1059. Either polyvinyl acetate base or acrylic base latex.

1. Use type I in areas not subject to high humidity or immersion in water with minimum bond strength of 400 psi.
2. Use type II in areas subject to high humidity or immersion in water with minimum bond strength of 1250 psi.

C. Vapor retarder, 10 mil thick clear polyethylene sheet. Type recommended for below grade application.

D. Forms, Section 03 11 00.

E. Reinforcement, Section 03 20 00.

F. Coverings and curing compound, Section 03 39 00.

G. Shinkage compensating grout, Section 03 61 00.

H. Epoxy adhesive, Section 03 61 00.

PART 3 EXECUTION

3.1 PREPARATION

A. Notify ENGINEER minimum 24 hours prior to commencement of concrete placement operations.

B. Do not allow construction loads to exceed structural capacity.

C. Clean previously placed concrete. Apply bonding compound per manufacturer's instructions.

D. At locations where new concrete is dowelled to existing work, drill, remove dust, insert and pack steel dowels with shrink compensating grout.

3.2 EXAMINATION

A. Verify items to be cast into concrete are accurately placed and held securely.

B. Verify slump, air content range, mix identifty, and batch time on delivery ticket matches mix design.

C. Verify slab steel mats are supported by steel chairs, precast concrete blocks, or other slab bolsters. Do not pour if absent.

3.3 DELIVERY

A. Slump and Air Content: Keep slump and air content within the allowable range.

B. Placement Time:

Air Time	Temperature After Initial Batching
Less than 90 deg. F.	1–1/2 hours
Greater than 90 deg. F.	1–hour (without retarder)
Greater than 90 deg. F.	1–1/2 hours (with retarder)

To increase time past 1-1/2 hours, a hydration stabilizer that is acceptable to Supplier may be used.

C. Tempering:

1. Water may be added if all following conditions are met.

a. The mix design water/cement ratio is not exceeded.
b. The delivery ticket allows for addition of water based upon water/cement ratio.
c. The amount of water added is accurately measured to within 1 gallon of the design addition.
d. Water addition is followed by 3 minutes of mixing at mixing speed prior to discharge.
e. Supplier and CONTRACTOR mutually agree on who is authorized to add water.

2. **Do not add water after 1 cubic yard of concrete has discharged from the delivery vehicle.**

D. Super-plasticizer: Comply with manufacturer's requirements. If none, then as follows.

1. If added at site, add agent using injection equipment capable of rapidly and uniformly distributing the admixture to the concrete. Prior to discharge, mix for a minimum of 5 minutes at a drum rate not less than 12 rpm or more than 15 rpm.
2. If added at plant; do not deliver to site unless batch delivery ticket displays water/cement ratio prior to super-plasticizer addition.

3.4 CONCRETE PLACEMENT

A. Place concrete, ACI 301.

1. Hot Weather Placement: ACI 305. If the rate of evaporation approaches 0.2 lb./ft^2/hr. precautions against plastic shrinkage cracking are necessary. (i.e. dampening Subgrade and forms; placing concrete at the lowest possible temperature; erecting windbreaks and sunshades; fog sprays; use of evaporation retardants; or rescheduling time of placement).
2. Cold Weather Placement: ACI 306. Non-chloride accelerating admixture may be used in concrete work placed at ambient temperatures below 50 deg. F. Use of admixtures will not relax cold weather placement, curing, or protection requirements.

B. Concrete Temperature: Keep mixed concrete temperature at time of placement between 60 deg. F. and 90 deg. F.

C. Do not disturb reinforcement, inserts, embedded parts, and formed joints.

D. Do not break or interrupt successive pours such that cold joints occur.

E. Honeycomb or embedded debris in concrete is not acceptable.

3.5 JOINTS AND JOINT SEALING

A. Steel edging and jointing tools are acceptable. Preferred are magnesium, aluminum or wood tools

B. Pavement joint sealing, Section 32 13 73.

3.6 CONSOLIDATION

A. Keep spare vibrator available during concrete placement operations, ACI 309.

3.7 **FINISHING**

A. Section 03 35 00 and as follows.

3.8 **CURING**

A. Section 03 39 00. Use a membrane forming compound unless specified otherwise.

3.9 **PROTECTION AND REPAIR**

A. Protection: Section 01 66 00.

1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, graffiti, and mechanical injury.
2. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

B. Repair:

1. Modify or replace concrete not conforming to required levels, lines, details, and elevations.
2. Structural analysis and additional testing may be required at no additional cost to OWNER when the strength of a structure is considered potentially deficient.
3. To patch imperfections refer to Section 03 35 00 requirements.
4. Remove graffiti and mechanical injury.

END OF SECTION

SECTION 03 35 00

CONCRETE FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Finishing interior and exterior concrete surfaces.

1.2 REFERENCES

A. ACI 303: Guide to Cast-in-Place Architectural Concrete Practice.

1.3 SUBMITTALS

A. Name, type, chemical analysis and manufacturer's recommended rate of application for liquid chemical hardener.

1.4 PROJECT CONDITIONS

A. Protect adjacent materials and finishes from dust, dirt and other surface or physical damage during finishing operations. Provide protection as required and remove from site at completion of Work.

PART 2 PRODUCTS

2.1 MATERIALS

A. Masonry Mortar and Grout: Section 04 05 16.

B. Dry Shake: Blend of metallic or mineral aggregate with Portland cement concrete in proportions recommended by manufacture.

C. Proprietary Materials: If permitted or required, proprietary compounds may be used in lieu of or in addition to foregoing materials. Use such compounds per manufacturer's recommendations.

D. Liquid-Chemical Hardener: Colorless, aqueous solution containing a blend of magnesium fluosilicate, zinc fluosilicate and a wetting agent. Mixture contains not less than 2 pounds fluosilicate per gallon and does not interfere with adhesives and bonding.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine the areas and conditions under which work of this section will be performed.

B. Correct conditions detrimental to timely and proper finishing.

C. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISHING HORIZONTAL SLABS

A. **Do not apply water (i.e. sprinkle) to any surface of concrete when finishing slabs.**

B. Edges and Joints: Tools may be made out of steel. Preferred is wood, aluminum or magnesium.

C. Tolerances:

1. Class A: 1 in 1000.
2. Class B: 1 in 500.
3. Class C: 1 in 250.

D. Float Finish: After concrete has been placed, consolidated, struck-off, and leveled, do not work further until ready for floating.

1. Begin floating when water sheen has disappeared and surface has sufficient stiffness.
2. During or after first floating, check planeness of entire surface with a 10 feet long straightedge applied at 2 or more different angles.
3. Cut down high spots and fill low spots to the required tolerance.
4. Refloat slab immediately to a uniform sandy texture.

E. Trowel Finish:

1. Do not use steel trowel or a power trowel on exterior concrete or on concrete that contains more than 3 percent air.
2. First troweling shall produce smooth surface relatively free of defects but which may still show some trowel marks.
3. Second troweling after surface has stiffened shall make finished surface essentially free of trowel marks, uniform in texture and appearance.
4. On surfaces intended to support floor coverings, grind off defects that would show through floor covering.

F. Broom or Belt Finish: Sweep surface with brushes, rakes, tines or burlap belt before final set.

G. "Dry Shake" Finish: Give the surface a floated finish. Evenly apply approximately 2/3 of a blended unsegregated material.

1. Begin floating immediately after application of first "dry shake".
2. After material has been embedded by floating, apply remainder of blended material to surface at right angles to previous application.
3. Make second application heavier in any areas not sufficiently covered by first application.
4. Immediately follow with second floating.
5. After selected material has been embedded by second floating, complete operation with a broomed, floated, or troweled finish, as indicated.

H. Non-slip Finish: Give surface a "dry shake" application, using crushed ceramically bonded aluminum oxide particles. Apply at 25 pounds per 100 square feet.

I. Exposed Aggregate Finish: Immediately after surface of concrete has been leveled to tolerance and surface water has dissipated, spread aggregate uniformly over surface to provide complete coverage to the depth of a single stone.

1. Embed aggregate into surface by light tamping.
2. Float surface until embedded aggregate is fully coated with mortar and surface has been brought to tolerance.
3. Start exposure of aggregate after matrix has hardened sufficiently to prevent dislodgment.
4. Flow ample quantities of water, without force, over surface of concrete while matrix encasing aggregate is removed by brushing with a fine bristle brush.
5. Continue until aggregate is uniformly exposed.
6. An approved chemical retarder sprayed onto freshly floated surface may be used to extend working time.

J. Chemical-Hardener Finish: Apply liquid chemical-hardener finish to interior concrete floors where indicated. Do not apply liquid chemical hardener on floor areas scheduled to receive synthetic matrices terrazzo, setting beds for tile, terrazzo, vinyl flooring, or like items. Apply hardener after complete curing and drying of concrete surface per manufacturer's recommendations. Evenly apply each coat, and allow 24 hours for drying between coats. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

3.3 FINISHING FORMED SURFACES

A. General:

1. Allow concrete to cure not more than 72 hours before commencing surface finish operations, unless approved otherwise.
2. Revise the finishes as needed to secure approval.

B. As-Cast Form Finish:

1. Rough: Patch defects, chip or rub off fins exceeding 1/4 inch height.
2. Smooth: Patch tie holes and defects and remove fins completely.
   a. When surface texture is impaired and form joints misaligned, grind, bush-hammer, or correct affected concrete.
   b. Slurry grout areas evidencing minor mortar Leakage to match adjacent concrete.
   c. Repair major mortar Leakage as a defective area.
   d. When workmanship is less than acceptable standard, provide one of rubbed finishes at no additional cost to OWNER.

C. Rubbed Finish:

1. Smooth Rubbed: Remove forms and perform necessary patching as soon after placement as possible.
   a. Finish newly hardened concrete no later than 24 hours following form removal.
   b. Wet surfaces and rub with carborundum brick or other abrasive until uniform color and texture are produced.
2. Grout Cleaned: Undertake no cleaning operations until all

contiguous surfaces are completed and accessible.

a. Wet surface of concrete sufficiently to prevent absorption of water from grout.
b. Apply grout uniformly.
c. Immediately after grouting, scrub surface with cork float or stone to coat surface and fill voids.
d. While grout is still plastic, remove excess grout by working surface with rubber float or sack.
e. After surface whitens from drying, rub vigorously with clean burlap.
f. Keep damp for at least 36 hours after final rubbing.

3. Cork Floated: Remove forms within 2 to 3 days of placement where possible.
   a. Remove ties.
   b. Remove all burrs and fins.
   c. Dampen wall surface.
   d. Apply mortar with firm rubber float or with trowel, filling all surface voids.
   e. Compress mortar into voids.
   f. If mortar surface dries too rapidly to permit proper compaction and finishing, apply a small amount of water with fog sprayer.
   g. Produce final texture with cork float using a swirling motion.

D. Unformed Finish:

1. After concrete is placed, strike smooth, tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces.
2. Float to texture that is reasonably consistent with formed surfaces.
3. Continue final treatment on formed surfaces uniformly across uniformed surfaces.

E. Blasted Finish:

1. Perform abrasive blasting within 24 to 72 hours after casting.
2. Coordinate with form work construction, concrete placement schedule, and formwork removal to ensure that surfaces are blasted at the same age for uniform results.
3. Reapply curing protection after blast finishing

F. Architectural Finish: Refer to ACI 303.

1. Tooled Finish:

   a. Dress thoroughly cured concrete surface with electric, air, or hand tools to uniform texture, and give a bush hammered surface texture.

   b. Remove sufficient mortar to exposed coarse aggregate in relief and to fracture coarse aggregate for tooled finish.

G. Patched Finish:

1. Repair defective areas.

   a. Remove honeycomb and defective concrete to sound concrete.
   b. Make edges perpendicular to surface or slightly undercut.
   c. Featheredges are not permitted.
   d. Dampen area to be patched and at least 6 inches surrounding it to prevent absorption of patching mortar water.

e. Prepare bonding grout.
f. Mix to consistency of thick cream.
g. Brush into surface.

2. Tie Holes: Unless indicated otherwise, after being cleaned and thoroughly dampened, fill tie hole solid with patching mortar.
3. Make any patches in concrete to closely match color and texture of surrounding surfaces. Determine mix formula for patching mortar by trial and obtain a good color match with concrete when both patch and concrete are cured and dry.
   a. Mix white and gray Portland cement as required to match surrounding concrete to produce grout having consistency of thick paint.
   b. Use a minimum amount of mixing water.
   c. Mix patching mortar in advance and allow to stand without frequent manipulation, without addition of water, until it has reached stiffest placeable consistency.
   d. After initial set, dress surfaces of patches manually to obtain same texture as surrounding surfaces.
4. After surface water has evaporated from patch area, brush bond coat into surface.
   a. When bond coat begins to lose water sheen, apply patching mortar.
   b. Thoroughly consolidate mortar into place and strike-off to leave patch slightly higher than surrounding surface.
   c. Leave undisturbed for at least 1 hour before final finish.
   d. Keep patched area damp for 72 hours or apply curing compound.
   e. Do not use metal tools in finishing an exposed patch.
5. Where as-cast finishes are indicated, total patched area may not exceed 1 in 500 of as-cast surface. This is in addition to form tie patches, if ties are permitted to fall within as-cast areas.
6. In any finishing process which is intended to expose aggregate on surface, patched areas must show aggregate.
   a. Outer 1 inch of patch shall contain same aggregates as surrounding concrete.
   b. For aggregate transfer finish, patching mixture shall contain same selected color aggregates.
   c. After curing, expose aggregates together with aggregates of adjoining surfaces by same process.

END OF SECTION

SECTION 03 39 00

CONCRETE CURING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete curing requirements.

1.2 REFERENCES

A. ACI 301: Specifications for Structural Concrete for Buildings
B. ACI 305: Hot Weather Concreting.
C. ACI306: Cold Weather Concreting
D. ASTM C 171: Standard Specification for Sheet Materials for Curing Concrete.
E. ASTM C 1315: Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.3 SUBMITTALS

A. Curing agent data sheet.
B. Curing plan. Describe estimated cure quantity and procedure.
C. Manufacturer certificates, Section 01 33 00 that shows product meets performance criteria.
D. Manufacturer's recommended installation procedures which, when accepted by ENGINEER, will become the basis for accepting or rejecting installed product.

1.4 QUALITY ASSURANCE

A. Use workers knowledgeable of ACI 301, 305, 306.

1.5 PRODUCT HANDLING

A. Protect materials of this section before, during, and after installation.
B. Protect the work and materials of other trades.
C. In the event of damage, immediately make replacements and repair at no additional cost to OWNER.

1.6 WEATHER LIMITATIONS

A. Above 75 deg. F., ACI 305
B. Below 55 deg. F., ACI 306.

PART 2 PRODUCTS

2.1 COVERS

A. Water or Fog-spay: Clean, non-staining and non-detrimental to concrete.

B. Sheet Coverings: White waterproof paper, polyethylene film, or polyethylene coated burlap sheet complying with ASTM C 171.

C. Mat Coverings: Clean roll goods of cotton or burlap fabric.

D. Insulating Coverings: Non-staining curing blankets.

2.2 MEMBRANE FORMING COMPOUND

A. Material.

1. Styrene-acrylic.
2. Styrene-butadiene.
3. Alpha-methylstyrene.

B. Performance Criteria: ASTM C 1315 compound.

1. Type ID Class A (clear with fugitive dye), or
2. Type II Class A or B (white pigmented).

C. Volatile Organic Compounds (VOC): Comply with local, state and federal requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. Do not use membrane forming curing compound on surfaces that are to receive hardeners.

B. Commence curing operation within 20 minutes after finishing.

3.2 APPLICATION – COVERS

A. Water: Apply water-fog spray or ponding.

B. Absorptive Mat: Place absorptive mat to provide coverage of concrete surfaces and edges. Lap over adjacent absorptive covers. Thoroughly saturate with water and keep continuously wet.

C. Moisture-Retaining Sheet: Place cover in widest practicable width with sides and ends lapped and sealed to prevent moisture loss. Repair any holes or tears during curing period.

D. Formed Surface Curing: Cure formed concrete surfaces, including underside of beams, supported slabs and other similar surfaces by moist curing with forms in place for full

curing period. If forms are removed prior to curing completion, applying cure film or penetrant or use methods indicated above, as applicable.

3.3 APPLICATION – MEMBRANE FORMING COMPOUND

A. Apply coating continuously and uniformly. Follow manufacturer's recommendations

B. Protect continuity of film coatings and repair damage during cure period.

C. If forms are removed before expiration of cure period, apply coating to unprotected areas.

3.4 CONCRETE CURE TEMPERATURE

A. During cure period, eliminate thermal shock of concrete by keeping cure temperature even throughout extent and depth of concrete.

3.5 SCHEDULE

A. Concrete Exposed to Potable Water (as in Water Storage reservoirs):

1. Moisture cover curing, or
2. Acrylic cure, or
3. Styreen acrylic silane co-polymer cure.

END OF SECTION

SECTION 03 40 00

PRECAST CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-cast concrete, complete with required connecting and supporting devices.

1.2 REFERENCES

A. ACI 318: Building Code Requirements for Reinforced Concrete. This reference standard includes other ASTM material standards.

B. ASTM A 36: Standard Specification for Structural Steel.

C. ASTM C 478: Standard Specification for Precast Reinforced Concrete Manhole Sections.

D. ASTM C 857: Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

E. ASTM C 858: Standard Specification for Underground Precast Concrete Utility Structures.

F. ASTM C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures.

G. AWS D1.1: Structural Welding Code Steel.

H. AWS D1.4: Structural Welding Code Reinforcing Steel.

I. PCI: Design Handbook.

J. PCI MNL-116: Quality Control and Assurance for Plant Production of Prestressed Concrete.

K. PCI MNL-117: Quality Control and Assurance for Plant Production of Architectural Precast Concrete.

1.3 DESIGN CRITERIA

A. Design structural precast concrete units, ACI 318 and PCI design handbook.

B. Design utility precast units, ASTM C 857 and C 858.

C. Under direct supervision of professional engineer who is fully experienced in design of units.

D. Design units to support required stripping and handling loads, live, dead and construction loads.

E. Design component connections to provide adjustment to accommodate misalignment of structure during installation.

1.4 SHOP DRAWINGS

A. Prepare shop drawings under seal of licensed professional.

B. Submit shop drawings, Section 01 33 00.

C. Indicate unit locations, unit identification marks, fabrication details, reinforcement, connection details, pertinent dimensions, and erection support points. Unit identification marks to appear on all manufactured units.

D. Do not proceed with fabrication until shop drawings have been accepted.

1.5 QUALITY ASSURANCE

A. Manufacture:

1. Prestressed: PCI certified.
2. Precast Concrete Units: PCI or NPCA certified
3. Precast Utility Structures and Pipe: ACPA certified.

B. Transporter: Acceptable to precast or prestressed product manufacturer.

C. Erector:

1. Prestressed: PCI certified.
2. Precast: Has 5 years minimum experience in erecting precast units.

D. Welders: Certified, AWS D1.1 and AWS D1.4.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle precast units in positions consistent with their shape and design. Lift and support only from support points indicated on shop drawings.

B. Embedded Lifting or Handling Devices: Capable of supporting units in positions anticipated during manufacture, storage, transportation, and erection.

C. Block and laterally brace units while stored at manufacturers. Provide lateral bracing that is sufficient to prevent bowing and warping that is clean, nonstaining, and will not inhibit uniform curing of exposed surfaces.

D. Provide edges of units with adequate protection to prevent staining, chipping, or spalling of concrete.

E. Unless otherwise approved in writing, do not deliver units to job site until required for installation.

PART 2 PRODUCTS

2.1 CONCRETE

A. Concrete for Above Ground Structures: 5000 psi minimum, Section 03 30 04 and ACI 318.

B. Concrete for Underground Structures: Class 4000 minimum, Section 03 30 04 and ASTM

C 478 or ASTM C 858.

2.2 ACCESSORIES

A. Connecting and Supporting Devices: Steel, ASTM A 36.
B. Bolts, Nuts, and Washers: High-strength steel, Section 05 05 23.
C. Reinforcement: Grade 60 steel, Section 03 20 00.

2.3 FABRICATION

A. Maintain plant records and quality control program during production of structural precast concrete. Make records available to ENGINEER.

B. Use molds which are rigid and constructed of material that will result in uniform finished products.

C. If self consolidating concrete is NOT used, vibrate concrete to ensure proper consolidation, elimination of unintentional cold joints, and minimize entrapped air on surface.

D. Fabricate required connecting devices, plates, angles, items fit to steel framing members, bolts and accessories.

E. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are sufficiently embedded, anchored and property located.

F. Ensure finished surfaces of precast structural units are uniform.

G. Cure units under identical conditions to develop specified concrete quality, and minimize appearance blemishes such as non-uniformity, staining or surface cracking.

2.4 DESIGN DEVIATIONS

A. Deviation: Provide installation equivalent to basic intent without additional cost to OWNER. Deviations from exact required cross-section will be permitted only with approval.

B. Manufacturer's Proposed Design: Supported by complete design calculations and drawings. When requested, submit design calculations for review bearing seal and signature of professional engineer.

2.5 OPENINGS

A. Provide required openings, 6 inches or larger. If approved, smaller sizes may be field constructed by coring or sawing.

2.6 FINISHES

A. General: The required finish will be described in one of the following paragraphs. If no finish is indicated or selected by ENGINEER, Standard.

B. Standard Finish: Produced in forms such as plastic or metal lined that impart a smooth

finish to the concrete. Small surface holes, normal form joint marks, minor chips and spall are acceptable if approved. Major or unsightly imperfections, honeycomb or structural defects are not acceptable.

C. Commercial Finish: Produced in forms such as plywood or lumber that impart texture to concrete. Remove fins and large projections. Fill holes over 3/8 inch. Make faces true and well defined. Correct exposed ragged edges by rubbing or grinding.

D. Architectural Grade A Finish: Produced in forms such as plastic or metal lined that impart smooth finish to concrete. Fill holes over 1/4 inch in diameter with sand-cement paste. Grind smooth form offsets or fins over 1/8 inch. Coat with neat cement paste using float. After paste coat has dried, rub with burlap to remove loose particles.

E. Architectural Grade B Finish: Produced in forms such as plastic or metal lined that impart smooth finish to concrete. Fill holes over 1/4 inch in diameter with sand-cement paste. Grind smooth form offsets or fins over 1/8 inch.

F. Special Finishes: Sandblasting, acid washing, retarders or form liners as approved by ENGINEER. Special finishes require submittal of two 12 x 12 inch samples showing a representative color and texture to be used.

G. Painted Finishes: On concrete to be painted, use a form release agent acceptable to the paint manufacturer.

2.7 REPAIR

A. Repair of damaged units is acceptable if structural integrity or appearance is not impaired.

2.8 ALLOWABLE TOLERANCES

A. Length: Plus or minus 3/4 inch, or plus or minus 1/8 inch per 10 feet of length, whichever is greater, or as indicated.

B. End Squareness: 1/2 inch maximum.

C. Blockouts: 1 inch of centerline location indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Do not install precast units until concrete has attained its design compressive strength.

B. Install members plumb, level, and in alignment within PCI MNL-116 or PCI MNL-117 and indicated limits of erection tolerances.

C. Clean weld marks or other marks, debris, or dirt from exposed surfaces of units.

D. Install underground utility precast units per ASTM C 891.

3.2 PERFORMANCE REQUIREMENTS

A. Conduct inspections, perform testing, and make repairs or replace unsatisfactory precast units as required.

B. Rejection: Units may be rejected for any one of the following.
   1. Exceeding specified installation tolerances.
   2. Damaged during construction operations.
   3. Exposed-to-view surfaces which develops surface deficiencies.
   4. Other defects as listed in PCI MNL-116 or PCI MNL-117.

END OF SECTION

SECTION 03 61 00

CEMENTITIOUS GROUTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-mixed non-metallic shrinkage resistant grout, pre-mixed water stop hydraulic cement grout, epoxy grout, and portland cement grout.

1. Grout for leveling beds of structural steel plates.
2. Sealing of joints and gaps between piping and structures.
3. Sealing of joints between construction components.

1.2 REFERENCES

A. ASTM C 109: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).

B. ASTM C 144: Standard Specification for Aggregate for Masonry Mortar.

C. ASTM C 150: Standard Specification for Portland Cement.

D. ASTM C 190: Standard Test Method for Tensile Strength of Hydraulic Cement Mortars.

E. ASTM C 207: Standard Specification for Hydrated Lime for Masonry Purposes.

F. ASTM C 472: Standard Methods for Physical Testing of Gypsum Plasters and Gypsum Concrete.

G. ASTM C 595: Standard Specification for Blended Hydraulic Cements.

H. ASTM C 881: Standard Specification for Epoxy -Resin -Base Bonding Systems for Concrete.

I. ASTM C 1090: Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout.

J. ASTM C 1107: Standard Specification for Packaged Dry Hydraulic Cement (Non-Shrink).

K. ASTM C 1157: Standard Performance Specification for Blended Hydraulic Cement.

L. ASTM D 570: Standard Test Method for Water Absorption of Plastics.

M. ASTM D 638: Standard Test Method for Tensile Properties of Plastics.

N. ASTM D 695: Standard Test Method for Compressive Properties of Rigid Plastics.

1.3 SUBMITTALS

A. Grout mix components. Indicate proportions used, environmental conditions, and admixture limitations. Indicate material "Type", "Grade", and "Class" which suits Project requirements.

B. Manufacturer's data for latex bonding agent.

PART 2 PRODUCTS

2.1 MATERIALS -GENERAL

A. Cement:

1. ASTM C 150 natural color Type II (normal) or Type IIA (air entrained).
2. ASTM C 595, or C 1157: Blended.

B. Lime: ASTM C 207, Type S, hydrated.

C. Water: Clean, non-staining and non-detrimental.

D. Grout Aggregate: ASTM C 144, standard masonry type.

2.2 PORTLAND CEMENT GROUT

A. Proportions by Volume: 1 part Portland cement, and sand equal to 2-1/2 to 3 times sum of volumes of cement and lime.

B. Mix thoroughly with water to form a stiff workable plastic putty.

C. Compressive Strength: ASTM C 109, 2800 psi in 28 days.

2.3 GYPSUM PLASTER GROUT

A. Premixed, prepackaged, wood fiber gypsum plaster with an ASTM C 472 minimum average dry compressive strength of 2000 psi in 28 days.

B. Mix with water per manufacturer's instructions for intended use to form a stiff plastic mix required for workability.

2.4 CEMENT BASED SHRINKAGE RESISTANT GROUT

A. Grade B or grade C premixed, non-metallic, non-gaseous product; ASTM C 1107 at a fluid consistency (flow cone) of 20 to 30 seconds. Thirty-minute-old grout shall flow through flow cone after slight agitation, in temperatures of 40 deg. F. to 90 deg. F.

B. Bleeding: None.

C. Compressive Strength: 6500 to 9000 psi, ASTM C 109 in 28 days.

D. Non-shrink percentage: 0.5 percent, ASTM C 1090.

2.5 EPOXY ADHESIVE GROUT

A. Two component material suitable for use on dry or damp surfaces, 100 percent solids, high modulus, moisture insensitive, complying with ASTM C 881.

1. Tensile Strength: ASTM D 638, 5000 psi, minimum in 14 days.
2. Tensile Elongation: ASTM D 638, 2 percent minimum.

3. Compressive Strength: ASTM D 695, 6500 psi minimum in 24 hours and 70 deg. F., 12,500 psi in 28 days and 70 deg. F.
4. Water Absorption: ASTM D 570, 1 percent maximum.
5. Bond Strength:
   a. Direct Shear: 400 psi.
   b. Direct Tension: 250 psi.
   c. Beam Break: 800 psi.
6. Pot Life: 5 minutes maximum at 70 deg. F.

2.6 BONDING GROUT

A. Of approximately 1 part cement to 1 part fine sand passing a No. 30 sieve with approved latex bonding agent when allowed.

2.7 PNEUMATICALLY PLACED PLASTER ("GUNITE" OR "SHOTCRETE")

A. Materials: Portland cement, lime, water and sand.

B. Compressive Strength: ASTM C 109, 2800 psi in 28 days.

C. Proportioning: 1 part cement to not more than 5 parts sand.

PART 3 EXECUTION

3.1 INSTALLATION

A. Fill joints, voids, and pockets, completely.

B. Comply with manufacturer's instructions and UBC Chapter 47.

C. Finish surfaces exposed to view smooth.

D. Pneumatically Placed Plaster: Screened and reused rebound material in an amount not greater than 25 percent of the total sand in any batch.

END OF SECTION

SECTION 04 05 16

MASONRY MORTAR AND GROUT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Mortar and grout for masonry work.

1.2 REFERENCES

A.ASTM C 144: Standard Specification for Aggregate for Masonry Mortar.

B. ASTM C 150: Standard Specification for Portland Cement.

C. ASTM C 207: Standard Specification for Hydrated Lime for Masonry Purposes.

D.ASTM C 270: Standard Specification for Mortar for Unit Masonry.

E. ASTM C 404: Standard Specification for Aggregates for Masonry Grout.

F. ASTM C 476: Standard Specification for Mortar and Grout for Reinforced Masonry.

G. ASTM C 780: Standard Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

H. ASTM C 1019: Standard Method of Sampling and Testing Grout.

1.3 SUBMITTALS

A. Certification of Material: Submit manufacturer's mill test certificates covering materials shipped. Bags shall show the contents meet specifications herein.

B. Design Mix: Indicate proportions of Portland cement, hydrated lime and sand to be used, required environmental conditions, and admixture limitations.

1.4 DELIVERY, STORAGE AND HANDLING

A. Maintain packaged materials clean, dry and protected against dampness, freezing and foreign matter.

B. Maintain materials and surrounding air temperature to minimum 50 deg. F. prior to, during and 48 hours after completion off masonry work.

C. Use mortar or grout within 2 hours after mixing at temperatures of 80 deg. F. or 2-1/2 hours at temperatures under 50 deg. F.

D. Use fine grout for filling concrete masonry unit cores and when pumping is required.

E. Use fine or coarse grout for bond beams or where grout does not have to pass through openings less than 2 inches.

1.5 **QUALITY ASSURANCE**

A. Follow ASTM C 780 for testing mortar mix.

B. Follow ASTM C 1019 for testing grout mix.

PART 2 PRODUCTS

2.1 **MATERIALS**

A. Cement: ASTM C 150, natural color, Type II (normal) or Type IIA (air entraining).

B. Hydrated Lime: ASTM C 207, Type S, no substitutes permitted.

C. Mortar Aggregate: ASTM C 144, standard masonry type except containing not more than 10 percent material passing through No. 100 sieve. Measure damp and loose throughout batches.

D. Water: Clean, non-staining and non-detrimental.

E. Grout Aggregate: ASTM C 404, fine aggregate -size 2, No. 4 through No. 100 sieves. Coarse aggregate -Size 8, 1/2 inch through No. 16 sieves.

2.2 **MORTAR MIXES**

A. Refer to ASTM C 270. Vary volumes of materials in mix design only slightly to assist workability.

1. Type S Mix (1,800 psi at 28 days): For reinforced masonry with high flexural bond strength. Use for all walls.
2. Type M Mix (2,500 psi at 28 days): For structural masonry, frost resistance, below grade masonry and masonry in contact with earth.
3. Mixing: Mix for a minimum of 3 minutes.

B. Admixtures: Not permitted.

C. Color: Natural gray.

2.3 **GROUT MIXES**

A. Refer to ASTM C 476. Vary volumes of materials in mix design only slightly to assist workability.

1. Reinforced masonry; 2,000 psi at 28 days.
2. Do not use antifreeze additives.

B. Mixing: Mix for a minimum of 5 minutes. Mix grout to have a slump of 10 inches 1 inch at time of placement.

C. Admixtures: Not permitted.

D. Color: Natural gray.

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 04 21 00

CLAY UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Clay unit masonry, reinforcement anchorages and accessories.

1.2 REFERENCES

A. ASTM A 615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

B. ASTM C 62: Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale).

C. ASTM C 216: Standard Specification for Facing Brick (Solid Masonry Units Made From clay or Shale).

D. BIA Publication A606: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 SUBMITTALS

A. Submit 10 samples of units to illustrate color range and texture. Refer to Section 01 33 00.

B. Submit manufacturer's certificate that brick masonry units and reinforcing steel materials meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Mock up: When indicated, construct for review of laying, and jointing of units:

1. 4 x 6 feet minimum.
2. If not acceptable, construct additional walls until acceptable.
3. Preserve wall during construction as a standard of quality.
4. Remove when directed.
5. Sample wall may be built into permanent wall provided sample area is readily identifiable during construction.

B. Inspect masonry units upon delivery to ensure color matches sample wall.

C. Deliver units on pallets with tight covers or deliver in cubes and store in dunnage.

D. Maintain coverings in place until use.

1.5 PROJECT CONDITIONS

A. Cold Weather: In accordance with BIA Publication A606 requirements protect from

damage by rain, snow, inclement weather, wind, freezing temperatures, and other trades. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrate.
Remove and replace masonry damaged by frost or freezing. No antifreeze materials permitted.

B. Protection:
   1. Cover tops of masonry walls with tarp or reinforced plastic each day at end of work and when work is not in progress. Keep walls covered and protected until final wall copings are installed.
   2. Brace and protect walls during erection against damage by storm and wind. Maintain bracing in place until permanent floors, walls and roof framing are installed.

C. Temperature: Temperature of masonry units when laid shall not be less than 20 deg. F. Maintain masonry work above 50 deg. F. prior to, during, and 48 hours after completion. Do not use salamander heaters or other Petroleum type heaters that cause excessive drying or smoke. Use heaters on both sides of wall under construction.

D. Heating Materials: Heat materials to at least 50 deg. F. but not more that 160 deg. F. to produce material temperature of between 50 deg. F. and 120 deg. F.

PART 2 PRODUCTS

2.1 BRICK UNITS MADE FROM SHALE OR CLAY

A. Facing Brick: ASTM C 216, type FBS (normal size and color variations), Grade SW; modular sized to 2-1/4" x 3-3/4" x 8"; color selected by ENGINEER.

B. Building (Common) Brick: ASTM C 62, Grade SW, Type F, size and color selected by ENGINEER.

C. Special Shape: Of same brick type as above, shaped to profile indicated, surface texture on one side and end.

2.2 REINFORCEMENT, ANCHORS AND TIES

A. Joint Reinforcement: Truss type galvanized steel construction; 3/16 inch side rods with No. 9 cross ties. Do not use drip cross ties.

B. Anchors: Flexible 2 piece steel; 0.1875 inch diameter minimum 0.25 inch maximum.

C. Wall Ties: Bent wire 0.1875 inch minimum but not greater than 1/2 mortar joint thickness.

D. Reinforcement: ASTM A 615, grade 60, deformed steel rebar, plain finish.

2.3 MASONRY FLASHINGS

A. Plastic Flashings: Sheet polyethylene or PVC; 10 mil.

B. Copper/Kraft Paper Flashings: 2 ounces per square foot copper bonded to layer of fiber reinforced asphalt and backed with Kraft paper.

C. Sheet Metal Flashing: Galvanized steel, 22 gage minimum.

D. Plastic/Kraft Paper Flashings: 3 mil thick sheet polyethylene bonded to layer of fiber reinforced asphalt and backed with Kraft paper.

2.4 ACCESSORIES

A. Control Joints: Preformed neoprene.

B. Joint Filler: Closed cell polyethylene oversized 50 percent, Self-expanding; 1 inch wide by maximum length.

C. Nailing Strips: Western softwood, preservative treated, Sized to masonry joints.

D. Weep Holes: PVC tubes or open vertical joints between units on bottom course.

2.5 MORTAR AND GROUT

A. Section 04 05 16.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify that items provided by other sections of work are properly sized and located.

B. Establish lines, levels, and coursing. Protect from disturbance.

C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.

3.2 COURSING

A. Place brick to lines and levels required.

B. Maintain brick courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.

C. Unless indicated otherwise, lay brick units in running or stacked bond as indicated, course 3 brick courses and 3 mortar joints to equal 8 inches. Form concave, raked, flushed, or beveled joints as required.

3.3 PLACING AND BONDING

A. Lay masonry in full bed of mortar, properly jointed with other work. Do not butter corners of joints or make deep or excessive furrowing of mortar joints.

B. Fully bond intersections, external and internal corners.

C. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made remove mortar and replace.

D. Remove excess mortar.

E. Perform job site cutting with masonry saws to provide straight unchipped edges. Do not break masonry unit corners or edges.

F. Do not install broken or cracked units.

3.4 CAVITY SPACE

A. Do not let mortar fall into cavity air space or plug weep holes; clean out promptly if any occurs.

B. Install cavity vents or weep holes in veneer as indicated or as approved.

3.5 TOLERANCES

A. Alignment of Columns and Pilasters: Maximum 1/4 inch from true lines.

B. Variation from Unit to Adjacent Unit: 1/32 inch maximum.

C. Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

D. Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch maximum in two stories or more.

E. Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.

F. Variation of Joint Thickness: 1/8 inch in 3 feet.

G. Maximum Variance from Cross-Sectional Thickness of Walls: Plus or minus 1/4 inch.

3.6 REINFORCEMENT AND ANCHORAGES

A. Unless indicated otherwise, install horizontal joint reinforcement 16 inch on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 16 inches minimum each side of opening.

C. Place joint reinforcement continuous in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inch. Extend 16 inch minimum each side of opening.

E. Verify that anchorages embedded in concrete or attached to structural steel members are properly placed. Embed anchorages in every second joint.

F. Secure wall ties to backup for veneer with a minimum of one tie for each 2 square feet of wall. Place at maximum 3 inches of each way around perimeter of openings, within 12 inches of openings.

G. Reinforce joint corners and intersections with strap anchors 16 inches on center.

H. Use clips only where ties cannot be used.

I. Place horizontal and vertical wall reinforcement as indicated.

3.7 MASONRY FLASHINGS

A. Extend flashings through veneer, turn up minimum 8 inches and bed into mortar joints of masonry, seal to substrate as required.

B. Lap end joints minimum 6 inches and seal watertight.

C. Use flashing manufacturer's recommended sealant.

3.8 LINTELS

A. Supply and install loose steel lintels as indicated.

B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled. Construct or shop fabricate lintels using grout fill and reinforcing. Maintain minimum 8 inches bearing on each side of opening.

C. Use reinforcing bars of one piece lengths only.

D. Place and consolidate grout fill without disturbing reinforcing.

E. Allow lintels to reach strength before removing temporary supports.

3.9 CONTROL JOINTS

A. Do not continue horizontal joint reinforcing across control joints.

B. Install resilient control joint in continuous lengths. Heat or solvent weld butt and corner joints in accordance with manufacturer's instructions.

3.10 BUILT-IN WORK

A. Build in metal door frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items.

B. Build items plumb and level.

C. Do not build in organic materials.

3.11 CUTTING AND FITTING

A. Modify completed work for chases, pipes, conduit, sleeves, grounds, and others items as required. Cooperate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to modifying any area not indicated or where appearance or strength of masonry work may be impaired.

3.12 CLEANING AND PROTECTION

A. Brush off excess mortar as work progresses. Dry brush at end of each day's work.

B. Final Cleaning: After mortar is thoroughly set and cured and damaged surfaces are repaired, clean a sample wall area of approximately 20 square feet. Obtain

ENGINEER's approval of sample cleaning before proceeding to clean masonry work.

1. Dry clean to remove large particles of mortar using wood paddles and scrapers. Use chisel or wire brush if necessary.
2. Scrub down wall with stiff fiber brush and either a solution of 1/2 cup of trisodium phosphate and 1/2 cup of household detergent dissolved in 1 gallon water, or approved masonry cleaner.
3. Rinse walls by washing off cleaning solution, dirt, and mortar crumbs using clean, 100 percent soluble pressurized water.

C. Sealing: Section 07 19 00, poly-siloxane or cured silicone rubber on indicated surfaces.

D. Protection: Maintain conditions acceptable to installer to ensure unit masonry work remains undamaged.

END OF SECTION

SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete masonry units, reinforcement, anchorages and accessories.

1.2 REFERENCES

A. ACI 315: Details and Detailing of Concrete Reinforcement.

B. ASTM A 615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

C. ASTM C 55: Standard Specification for Concrete Building Brick.

D. ASTM C 90: Standard Specification for Hollow Load-Bearing Concrete Masonry Units.

E. ASTM C 145: Standard Specification for Solid Load-Bearing Concrete Masonry Units.

F. ASTM D 226: Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

G. ASTM D 1056: Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber.

H. ASTM D 2000: Standard Classification System for Rubber Products in Automotive Applications.

I. ASTM D 2287: Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.

J. AWS D1.1: Structural Welding Code Steel.

K. BIA Publication A606: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

L. UBC Chapter 24: Masonry.

1.3 SUBMITTALS

A. Submit 10 samples of units to illustrate color range and texture, Section 01 33 00.

B. Indicate bar sizes, spacing, locations, and quantities of reinforcing steel, and wire fabric, bending and cutting schedules, and support and spacing devices.

C. Prepare Shop Drawings under seal of professional engineer who complies with Utah licensing law and who is acceptable to OWNER.

D. Submit manufacturer's certificate that concrete masonry units and reinforcing steel materials meet or exceed specified requirements.

1.4 PROJECT CONDITIONS

A. Cold weather: In accordance with BIA Publication A606 requirements protect from damage by rain, snow, inclement weather, wind, freezing temperatures, and other trades. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrate. Remove and replace masonry damaged by frost or freezing. No antifreeze materials permitted.

B. Protection:

1. Cover tops of masonry walls with tarp or reinforced plastic each day at end of work and when work is not in progress. Keep walls covered and protected until final wall copings are installed.
2. Brace and protect walls during erection against damage by storm and wind. Maintain bracing in place until permanent floors, walls and roof framing are installed.

C. Temperature: Temperature of masonry units when laid shall not be less than 20 deg. F. Maintain masonry work above 50 deg. F. prior to, during, and 48 hours after completion. Do not use salamander heaters or other Petroleum type heaters that cause excessive drying or smoke. Use heaters on both sides of wall under construction.

D. Heating Materials: Heat materials to at least 50 deg. F. but not more that 160 deg. F. to produce material temperature of between 50 deg. F. and 120 deg. F.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Hollow Load Bearing Units: ASTM C 90, Grade N, Type I, light weight.

B. Solid Load Bearing Units: ASTM C 145, Grade N, Type I, light weight.

C. Decorative Units: Grade S, Type I, for interior locations in accordance with ASTM C 90 or C 145, single scored horizontally, single scored vertically, double scored vertically, triple scored vertically, ribbed or ribbed and split as indicated. For exterior locations use Grade N units.

D. Concrete Brick: ASTM C 55, Grade N, Type I, normal weight.

E. Masonry Units: Modular sized to 7-5/8 x 7-5/8 x 15-5/8 inches or as indicated; provide special units for 90 degree corners, bond beams, lintels, covered base, and bull-nose corners as required.

2.2 REINFORCEMENT, ANCHORS AND TIES

A. Single Wythe Joint Reinforcement: Truss type, galvanized steel, 3/16 inch side rods with No. 9 cross ties.

B. Double wythe walls without drip cross ties.

C. Reinforcement: ASTM A 615, 60 ksi yield grade, deformed billet steel bars, plain finish.

2.3 MASONRY FLASHINGS

A. Plastic Flashings: Sheet polyethylene or PVC; 10 mil thick.

B. Copper/Kraft Paper Flashings: 2 ounces per square foot copper bonded to layer of fiber reinforced asphalt and backed with Kraft paper.

C. Sheet Metal Flashing: Galvanized steel, 22 gage minimum.

D. Plastic/Kraft Paper Flashings: 3 mil thick sheet polyethylene bonded to layer of fiber reinforced asphalt and backed with Kraft paper.

2.4 ACCESSORIES

A. Nonmetallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips complying with ASTM D 1056, Grade RE41E1, capable of compression up to 35 percent of width and thickness indicated.

B. Premolded Control Joint Strips: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall, Size and configuration as indicated.

1. Styrene-butadiene rubber compound complying with ASTM D 2000, Designation 2AA-805, or
2. Polyvinyl chloride compound complying with ASTM D 2287, General Purpose Grade, Designation PVC-63506.

C. Bond Breaker Strips: Asphalt-saturated organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Joint Filler: Closed cell polyethylene oversized 50 percent, self expanding, 1 inch wide by maximum lengths.

E. Building Paper: Asphalt saturated felt, ASTM D 226, 16 pound type.

F. Nailing Strips: Western softwood, preservative treated, sized to masonry joints.

G. Weep Holes: PVC tubes or open vertical joints between units on bottom course.

2.5 MORTAR AND GROUT

A. Masonry, Section 04 05 16.

PART 3 EXECUTION

3.1 PREPARATION

A. Supply metal anchors to framing or structural erector where required and direct the placement of the anchors for anchoring the masonry work to other structural members.

B. Verify items provided by other sections of work are properly sized and located.

C. Establish lines, levels, and coursing. Protect from disturbance.

D. Provide temporary bracing during erection of masonry work. Maintain in place until

building structure provides permanent bracing.

E. Provide safe and secure scaffolding, staging, and ladders that conform to current Laws and Regulations.

3.2 COURSING

A. Place masonry to lines and levels required.

B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.

C. Unless indicated otherwise, lay concrete masonry units in running or stacked bond as indicated. Course one block unit and one mortar joint to equal 8 inches. Form concave, raked, flush, or bevelled mortar joints as required.

3.3 PLACING AND BONDING

A. Lay masonry in full bed of mortar, properly jointed with other work. Do not butter corners of joints or make deep or excessive furrowing of mortar joints.

B. Fully bond intersections, external and internal corners.

C. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.

D. Remove excess mortar.

E. Perform job site cutting with masonry saws to provide straight unchipped edges. Do not break masonry unit corners or edges.

F. Do not install broken or cracked units.

G. Strike mortar joints of concrete masonry units flush where bitumen damp-proofing is applied.

3.4 REINFORCEMENT AND ANCHORAGES

A. Unless indicated otherwise, install horizontal joint reinforcement 16 inches on center; 24 inches on center if used in veneer. Joint reinforcement is in addition to bond beams.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 16 inches minimum each side of opening.

C. Bond beams at all floors, roofs, 48 inches on center maximum, and at top of walls.

D. Lap joint reinforcement ends minimum 6 inches. Extend 16 inches minimum each side of opening.

E. Embed wall ties in masonry backup for veneer at maximum 16 inches on center vertically and 18 inches on center horizontally. Place so that no single tie will support more than 2 square feet of veneer. Place at maximum 3 inches on center each way around perimeter of opening within 12 inches of openings. Use joint reinforcement for veneer ties on masonry

walls.

F. Reinforce joint corners and intersections with reinforcement anchor systems.

3.5 REINFORCING STEEL

A. Place reinforcement, ACI 315 and UBC Chapter 24.

B. Locate reinforcing splices at points of minimum stress. Review location of splices with ENGINEER.

C. Weld reinforcement, AWS D1.1.

D. Place reinforcing bars supported and secured against displacement. Maintain position within 1/2 inch of true dimension.

E. Verify reinforcement is clean, free of scale, rust, dirt, and other foreign coatings that would reduce bond to grout.

3.6 TOLERANCES

A. Alignment of Columns and Pilaster: 1/4 inch maximum from true line.

B. Variation from Unit to Adjacent Unit: 1/32 inch maximum.

C. Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

D. Variation from Plumb: 1/4 inch per story non-cumulative, 1/2 inch maximum in two stories or more.

E. Variation from Level Coursing: 1/8 inch in 3 feet, 1/4 inch in 10 feet, 1/2 inch maximum.

F. Variation of Joint Thickness: 1/8 inch in 3 feet.

G. Maximum Variance from Cross-Sectional Thickness of Walls: 1/4 inch plus or minus.

3.7 MASONRY FLASHINGS

A. Extend flashings through veneer, turn up minimum 8 inch and bed into mortar joints of masonry, seal substrate as required.

B. Lap end joints 6 inches minimum and seal watertight.

C. Use flashing manufacturer's recommended sealant.

3.8 LINTELS

A. Furnish and install steel lintels as indicated.

B. Install precast concrete lintels as indicated.

C. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled. Construct or shop fabricate lintels using grout fill and reinforcing. Maintain 8 inches minimum bearing or each side of opening.

D. Do not splice reinforcing bars in lintels.

E. Allow lintels to reach full strength before removing temporary supports.

3.9 GROUTED COMPONENTS

A. Reinforce bond beams as indicated. Use "H" blocks for bond beams and "U" blocks for lintels.

B. Reinforce pilaster as indicated.

C. Lap splices minimum 40 bar diameters.

D. Place and consolidate grout fill without disturbing reinforcing. Grout lifts greater than 8 inch shall be mechanically vibrated. Do not consolidate by rodding or shaking the vertical bars.

E. At bearing points fill masonry cores with grout a minimum of 24 inches wide from bearing point to lower support member or bond beam.

3.10 CONTROL JOINTS

A. Do not continue horizontal joint reinforcing across control joints.

B. Form control joint by use of sheet building paper bond breaker one side fitted to hollow contour of block unit end. Fill created core with grout fill. Rake joint at exposed faces of rod and sealant.

C. Install resilient control joint in continuous lengths. Heat or solvent weld butt and corner joints in accordance with manufacturer's instructions.

3.11 BUILT-IN WORK

A. Build in metal door frames, fabricated metal frames, window frames, wood nailing strips, anchor bolts, plates, and other items. Place all anchor bolts in solid grouted cores.

B. Build items plumb and level.

C. Bed anchors of metal door and glazed frames in mortar joints. Fill frame voids solid with mortar. Fill masonry cores with grout for one core from framed openings.

D. Do not build in organic materials.

3.12 CUTTING AND FITTING

A. Modify completed work for chases, pipes, conduit, sleeves, grounds, and other items as required. Cooperate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to modifying any area not indicated or where appearance or strength of masonry work may be impaired.

3.13 CLEANING AND SEALING

A. Brush off excess mortar as work progresses. Dry brush at end of each day's work.

B. Final Cleaning: After mortar is thoroughly set and cured and damaged surfaces are

repaired, clean sample wall area of approximately 20 square feet. Obtain ENGINEER's approval of sample cleaning before proceeding to clean masonry work.

1. Dry clean to remove large particles of mortar using wood paddles and scrapers. Use chisel or wire brush if necessary.
2. Scrub down wall with stiff fiber brush and either a solution of 1/2 cup of trisodium phosphate and 1/2 cup of household detergent dissolved in 1 gallon of water, or approved masonry cleaner.
3. Rinse walls by washing off cleaning solution, dirt, and mortar crumbs using clean, 100 percent soluble pressurized water.

C. Sealing: Siloxane, Section 07 19 00 on indicated surfaces.

3.14 PROTECTION

A. Maintain protective boards at exposed external corners that may be damaged by construction activities.

B. Provide protection without damaging completed work.

C. At day's end, cover unfinished walls to prevent moisture infiltration.

D. Protect adjacent finished surfaces from damage.

END OF SECTION

SECTION 05 05 10

METAL GALVANIZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of a zinc coating on fabricated metal items.
B. Repair of damaged galvanized surfaces.

1.2 REFERENCES

A. ASTM A 123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
B. ASTM A 153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
C. ASTM A 780: Standard Practice for Repair of Damaged Hot-Dip Galvanized Coatings.
D. ASTM B 6: Standard Specification for Zinc (Slab Zinc).
E. ASTM E 376: Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods.
F. FS TT-P-641: Primer Coating, Zinc Dust -Zinc Oxide (for Galvanized Surfaces).
G. MIL P-21035: Paint, High Zinc Dust Content, Galvanizing Repair.

1.3 QUALITY ASSURANCE

A. When requested, verify weight of zinc coating in accordance with ASTM E 376.

PART 2 PRODUCTS

2.1 ZINC METAL

A. Use zinc for coating that conforms to ASTM B 6 and is at least equal to the grade designated as "Prime Western".

PART 3 EXECUTION

3.1 GALVANIZING

A. Provide a zinc coating for those items indicated or specified to be galvanized as

follows:

1. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strips 1/8 inch thick and heavier.
2. ASTM A 153 for galvanizing iron and steel hardware.

3.2 WEIGHT OF COATING

A. Apply zinc on 1/8 inch to 3/16 inch thick steel at a rate of at least 2ounces per square foot of surface area.

B. Apply zinc on 1/4 inch and thicker steels at a rate of at least 2.3 ounces per square foot with no individual test measuring less than 2-ounces per square foot of surface area.

3.3 REPAIR OF DAMAGED COATING

A. Repair all shop damaged galvanized surfaces by the metallizing, hot stick or zinc rich paint, ASTM C 780 process.

B. Repair field damaged, cut, burned or uncoated surfaces in the field by coating with a dust-zinc oxide paint conforming to FS TT-P-641 or MIL P-21035.

END OF SECTION

SECTION 05 05 23

BOLTS, NUTS AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel bolts, nuts, washers, clamps, straps, rods and accessories.
B. Galvanize bolts, nuts and accessories unless specified otherwise.

1.2 REFERENCES

A. AISC M011: Manual of Steel Construction.
B. ASME B1.1: Unified inch Screw Threads (UN and UNR Thread Form), Supplement.
C. ASTM A 126: Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
D. ASTM A 197: Standard Specification for Cupola Malleable Iron.
E. ASTM A 307: Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
F. ASTM A 325: Standard Specification for High-Strength Bolts for Structural Steel Joints.
G. ASTM A 506: Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, Regular Quality and Structural Quality.
H. ASTM A 575: Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
I. ASTM F 593: Standard Specifications for Stainless Steel Bolts, Hex Cap Screws, and Studs.

PART 2 PRODUCTS

2.1 MATERIALS

A. Bolts, Nuts, Accessories: Galvanized steel, Section 05 05 10 (except if stainless steel).
B. All sizes bolts and nuts, American Standard machined heavy hexagon heads with class 2 fit and threads, ASME B1.1.
C. Standard Bolts: Steel, ASTM A 307.
D. High Strength Bolts: Steel, ASTM A 325.
E. Anchor Bolts: Steel, ASTM A 307, or ASTM F 593 stainless steel when indicated.
F. Washers: Grey iron, ASTM A 126.
G. Clamps and Straps: Steel, ASTM A 506.

H. Rods: Steel, ASTM A 575.
I. Rod Coupling: Mallable iron, ASTM A 197.

PART 3 EXECUTION

3.1 INSTALLATION

A. Torque all nuts and bolts by procedures contained in AISC M011 to secure items requiring fastening.

B. Extend bolt through nut not less than 1/4 inch beyond nut.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members, structural steel support members, struts, and miscellaneous structural steel members with required bracing, welds, and fasteners.

B. Base plates, shear stud connectors, expansion joint plates, and related structural steel items.

1.2 REFERENCES

A. AISC S302: Code of Standard Practice for Steel Buildings and Bridges.

B. AISC S326: Specification for Design, Fabrication and Erection of Cold-Formed Structural Members for Buildings.

C. AISC S329: Specification for Structural Joint Using ASTM A 325 or A 490 Bolts.

D. ASTM A 6: Standard Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.

E. ASTM A 27: Standard Specification for Steel Castings, Carbon, for General Application.

F. ASTM A 36: Standard Specification for Structural Steel.

G. ASTM A 53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

H. ASTM A 242: Standard Specification for High-Strength Low-Alloy Structural Steel.

I. ASTM A 307: Standard Specification for Carbon Steel, Bolts and Studs, 60,000 psi Tensile Strength.

J. ASTM A 325: Standard Specification for High-Strength Bolts for Structural Steel Joints.

K. ASTM A 441: Standard Specification for High-Strength Low-Alloy Structural Manganese Vanadium Steel.

L. ASTM A 446: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

M. ASTM A 490: Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi (1035 MPa) Minimum Tensile Strength.

N. ASTM A 500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

O. ASTM A 501: Standard Specification for Hot-Formed Welded and Seamless Carbon

Steel Structural Tubing.

P. ASTM A 502: Standard Specification for Steel Structural Rivets.

Q. ASTM A 570: Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.

R. ASTM A 606: Standard Specification for Steel Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.

S. ASTM A 607: Standard Specification for Steel Sheet and Strip, High-Strength, Low-Alloy, Columbium and or Vanadium, or Both, Hot-Rolled and Cold-Rolled.

T. ASTM A 611: Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural Quality.

U. AWS D1.1: Structural Welding Code Steel.

V. FS TT-P-31: Paint, Oil: Iron Oxide, Ready-Mixed, Red and Brown.

W. SSPC: Steel Structures Painting Council.

1.3 SUBMITTALS

A. Heat of Steel or Iron: Before fabrication, submit a mill certified test report for each heat of steel or iron from which the material is to be fabricated containing the results of chemical and physical tests required by ASTM specifications for the materials. Select the material from as few heat numbers as possible and furnish certified mill test reports for each of the heat numbers. Submit 2 samples from each heat number; one for the tension test and one for the cold-bend test. If the heat numbers cannot be identified the ENGINEER may select random specimens from unidentifiable heats.

B. Certification of Welders: Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within the previous 12 months on the same type of work to be done. If recertification of welders is required, retesting will be CONTRACTOR's responsibility.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following, except as indicated otherwise.

1. AISC S302, AISC S326, AISC S329.
2. ASTM A 6 and AWS D1.1.

B. Qualify welding processes and welding operators in accordance with AWS.

C. Supplementary Tests:

1. ENGINEER reserves right to require or make additional mill and laboratory tests. The number of such additional tests will be limited as follows, except that in case of Failure of the material to comply with ASTM requirements, more tests may be made or the materials rejected:

a.. Structural Steel: One complete test for each heat number or each 10 tons of

identifiable stock.

b. Rivets: One complete test for each size.

c. Bolts: One complete test for each lot.

2. "Identifiable stock" is material for which authentic records of the chemical and physical properties are available.

3. Cut and machine test specimens in accordance with ASTM specifications for material to be tested.

D. When fabrication is to be done using material already in stock, obtain approval prior to fabrication.

E. Furnish steel with rolling and cutting tolerances, permissible variations in weight and dimensions, defects, and imperfections that meet the limits contained in ASTM A 6.

1.5 SHOP DRAWINGS

A. Submit shop drawings; Section 01 33 00.

B. Indicate profiles, sizes, spacing, and locations of structural members, connections, attachments, fasteners, cambers, loads, and any special details.

C. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

D. Under seal of a structural professional engineer prepare shop drawings structural connections, setting drawings, templates, and directions for installation or anchor bolts and other anchorages to be installed by others.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver anchor bolts and anchorage devices which are to be embedded in concrete or masonry in ample time to not delay work.

B. Store materials to permit easy access for Inspection and identification. Keep steel members off the ground using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

C. Do not store materials on structure in a manner that might cause deterioration or damage to members or supporting structures. Repair or replace damaged materials or structures.

PART 2 PRODUCTS

2.1 GENERAL

A. For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness.

B. Remove blemishes by grinding or by welding and grinding prior to cleaning, treating, and application of surface finishes.

2.2 STRUCTURAL STEEL FRAMING MATERIALS

A. Stock Materials: Select the material intended for use from stock and place it in a location apart from other stock material and accessible for Inspection and sampling.

B. Structural Steel Shapes, Plates, and Bars: ASTM A 36 steel.

C. High Strength Low-Alloy Structural Steel: In accordance with ASTM A 242, A 441, A 606, A 607, or A 446 (Grades C, D, or E) as indicated.

D. Tubing: Cold-formed steel, ASTM A 500, Grade B. Hot-formed steel, ASTM A 501.

E. Pipe: ASTM A 53 steel Type E or S, Grade B with black finish, except where indicated to be galvanized.

F. Copper Bearing Structural Steel: ASTM A 36, A 446, A 570, or A 611 as indicated.

G. Castings: ASTM A 27 Grade 65-35, medium strength carbon steel.

2.3 STEEL ACCESSORIES

A. Anchor Bolts: Galvanized steel; Section 05 05 23.

B. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low carbon steel bolts and nuts with hexagonal heads and nuts for all connections.

C. High Strength Threaded Fasteners: Heavy Hexagon structural bolts, heavy hexagon nuts, and hardened washers. Quenched and tempered medium carbon steel bolts, nuts, and washers complying with ASTM A 325. For high strength low alloy steel, provide Type 3 fasteners of similar composition as members to be connected.

D. Rivets: ASTM A 502, high strength, hot-driven type or carbon-manganese steel.

E. Welding Materials: Refer to AWS D1.1; type required for materials being welded. For high strength, low alloy steel provide electrodes, welding rods, and filler metals equal in strength and compatible in appearance with parent metal joined.

F. Primer: FS TT-P-31, red paint.

2.4 FABRICATION

A. Fabricate structural steel members in accordance with AISC specifications and as indicated on approved Shop Drawings.

B. Fabricate and assemble structural members in shop to greatest extent possible. Provide camber in structural members where indicated. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials. Where finishing is required, complete assembly, including welding of units before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

C. Connections: Weld or bolt shop connections as indicated. Bolt field connections except where welded connections or other connections are indicated. Provide high strength,

threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.

D. High Strength Bolted Construction: Install high strength, threaded fasteners in accordance with AISC S329.

E. Welded Construction: Comply with AWS welding code for procedures, appearance, and quality of welds and methods used in correcting welding work. For high strength, low alloy steels follow welding procedures recommended by steel producer for exposed and concealed connections.

F. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members as shown on approved Shop Drawings. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work. Cut, drill, or punch items as indicated to receive other work. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.5 SHOP PAINTING

A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2 inches of embedded areas only. Do not paint surfaces which are to be welded or high strength bolted with friction type connections. Do not paint surfaces of exposed high strength, low alloy steel members. Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

B. Surface Preparation: After Inspection and before shipping clean steel work to be painted. Remove loose rust, loose mill scale, spatter, slag, or flux deposits. Clean steel per SSPC standards.

2.6 NON-SHRINK GROUT

A. Cement Based, Section 03 61 00.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which structural steel work is to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Erect structural steel in accordance with AISC Specifications.

B. Have all torque wrenches or impact wrenches certified by a testing laboratory prior to starting erecting.

C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

D. Do not field cut or alter structural members without approval.

E. Clean concrete and masonry bearing surfaces. Clean bottom surface of base and bearing plates. Set loose and attached base plates and bearing plates for structural members on jack nuts for leveling adjustments.

F. Tighten anchor bolts after supported members have been positioned and plumbed.

G. Pack non-shrink grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

H. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure within specified AISC tolerances.

I. Establish required leveling and plumbing measurements on mean operating temperature of structure.

J. Splice members only where indicated and accepted on Shop Drawings.

K. On exposed welded construction remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

L. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

M. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

N. Do not use gas cutting torches for correcting fabrication errors in structural framing.

O. Immediately after erection clean field welds, bolted connections, and abraded area of shop paint. Apply paint to exposed area with same materials as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2. mils.

END OF SECTION

SECTION 05 51 00

METAL STAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel stair frame of structural sections with open or closed risers and balusters and handrailing.

B. Open grate, checkered plate, pan to receive concrete fill, shop cast concrete, stair treads, and landings.

1.2 REFERENCES

A. ANSI A202.1: Metal Bar Grating.

B. ASTM A 36: Standard Specification for Structural Steel.

C. ASTM A 53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

D. ASTM A 446: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.

E. ASTM A 500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

F. ASTM A 501: Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

G. AWS D1.1: Structural Welding Code Steel.

H. FS TT-P-636: Paint, Coating, Alkyd, Wood and Ferrous Metal.

I. FS TT-P-641: Primer Coating, Zinc Dust -Zinc Oxide (for Galvanized Surfaces).

1.3 STRUCTURAL REQUIREMENTS

A. Unless indicated otherwise, fabricate stair assembly to support uniform live load of 100 pounds per square foot with deflection of stringer not to exceed L/180 of span, minimum or a concentrated load of 300 pounds.

B. Unless indicated otherwise, railing assembly, wall rails, and attachments to resist lateral force of 50 pounds minimum per lineal foot or a 200 pound vertical or horizontal concentrated load without damage or permanent set.

1.4 SHOP DRAWINGS

A. Submit shop drawings; Section 01 33 00.

B. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, openings, size and type of fasteners, and accessories.

C. Include erection drawings, elevations, and details where applicable.

D. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

E. Prepare shop drawings under seal of a structural professional engineer.

1.5 **SAMPLES**

A. Submit Samples, Section 01 33 00.

B. Submit 12 inch long Sample of plastic handrail covering when used.

PART 2 PRODUCTS

2.1 **MATERIALS**

A. Steel Section: ASTM A 36.

B. Tubing: Steel, ASTM A 500, Grade B, ASTM A 501, or ASTM A 53, Grade B, Schedule 40.

C. Sheet Steel: Supply ASTM A 446, Grade B, structural quality with 0.25 ounce/square foot, galvanized, Section 05 05 10 when indicated.

D. Plastic Handrail Cover: Extruded PVC of the shape and color indicated.

E. Bolts, Nuts, and Washers: Steel; Section 05 05 23.

F. Gratings: Steel or aluminum as indicated and per ANSI A202.1.

G. Welding Materials: Type required for materials being welded, AWS D1.1.

H. Primer: Red; for shop application and field touch-up,; FS TT-P-636,

I. Touch-up for Galvanized Surfaces: FS TT-P-641 primer.

J. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure.

K. Stair Treads: Shop cast concrete in metal pan as indicated.

2.2 **FABRICATION -GENERAL**

A. Verify dimensions indicated prior to shop fabrication.

B. Fabricate items with joints tightly fitted and secured.

C. Fit and shop assemble sections in largest practical sizes for handling through building openings.

D. Grind exposed welds flush and smooth with adjacent finished surface. Ease exposed edges to small uniform radius.

E. Make exposed joints butt tight, flush, and hairline.

F. Accurately form components required for anchorage of stairs, landings, and railing to each other and to structure.

G. Install continuous plastic handrail cover if indicated. Heat weld joints and trim smooth.

2.3 FABRICATION -PAN STAIRS AND LANDINGS

A. Fabricate stairs with closed or open risers and treads of pan construction to receive concrete as indicated.

B. Form treads and risers from minimum 12 gage sheet stock.

C. Secure tread pans to stringers by welding or bolting in place.

D. Form stringers of rolled steel channels or rectangular hollow sections as indicated.

E. Form landings from minimum 7 gage sheet stock. Reinforce underside with angles or metal tees to attain design load requirements.

F. Form balusters of 1-1/2 inch diameter or square steel sections, weld or bolt to stringers.

G. Prime paint components.

2.4 FABRICATION -CHECKERED PLATE STAIRS AND LANDINGS

A. Form treads from minimum 7 gage checkered steel plate; primer paint or galvanize as indicated. Weld or bolt to stringer support clips. Bend nosing to a 1 inch radius and return down 1-1/2 inch.

B. Form stringers of rolled steel channels or rectangular hollow sections, and prime paint or galvanize as indicated.

C. Form landings from minimum 7 gage checkered steel plate; prime paint or galvanize finish as required. Reinforce underside with angles or metal tees to attain design load requirements.

D. Form balusters of 1-1/2 inch diameter or square steel sections, and weld or bolt to stringers; prime paint or galvanize finish as required.

2.5 FABRICATION -OPEN GRATING STAIRS AND LANDINGS

A. Fabricate treads 1 inch thick in accordance with ANSI A202.1 of welded steel bars, welded or bolted to supports; galvanized finish.

B. Form stringers of rolled steel channels or rectangular hollow sections; galvanize finish.

C. Form landings 1 inch thick in accordance with ANSI A202.1 (same as treads); galvanized finish. Reinforce underside with angles or metal tees to attain design load requirements.

D. Form balusters of 1-1/2 inch diameter or square steel sections, welded or bolted to stringers; galvanized finish.

2.6 FABRICATION -UNIT STAIR TOWERS

A. Fabricate self-supporting steel stair towers with formed treads and risers, Steel channel stringers; landing platforms, Sectioned for transport; corner structural support members designed to support full weight of complete stair tower plus design live load; with steel railings, posts, and balusters.

B. Fabricate stair towers in height not exceeding 40 feet, designed for stacking to height of building as a self-supporting structure.

2.7 FINISH

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with fresh concrete or where field welding is required.

C. Prime paint items specified with one coat.

D. Galvanize items to minimum 1.25 ounces per square foot zinc coating.

PART 3 EXECUTION

3.1 ERECTION

A. Erect stairs level and plumb, free from distortion or defects detrimental to appearance or performance.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Verify alignment with adjacent construction. Coordinate related work.

D. Do not field cut or alter members.

E. Field bolt and weld to match standard of shop bolting and welding. Hide bolts and screws whenever possible. Where not hidden, use flush countersunk fastenings.

F. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.

END OF SECTION

SECTION 05 53 00

GRATINGS AND FLOOR PLATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grating, floor plates, and seats.

1.2 REFERENCES

A. ASTM A 36: Standard Specification for Structural Steel.

B. ASTM D 1187: Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.

C. FS TT-P-636: Paint, Coating, Alkyd, Wood and Ferrous Metal.

1.3 SUBMITTALS

A. Prior to ordering or fabrication of grating, floor plates, or seats, submit Shop Drawings of all pieces with positioning diagram for approval, Section 01 33 00.

1.4 STRUCTURAL REQUIREMENTS

A. Unless otherwise noted, fabricate gratings and floor plates to support uniform live load of 100 pounds per square foot with deflection not to exceed L/240 of span, minimum or a concentrated load of 400 pounds.

B. Maximum weight of grating and floor plate units 100 pounds unless indicated otherwise.

PART 2 PRODUCTS

2.1 MATERIALS

A. Grates: Aluminum, galvanized steel, or fiberglass grating as indicated. Furnish grating of the type, dimensions, and weights as required.

B. Floor Plates: Floor plates fabricated from ASTM A 36 steel with checkered pattern of the dimensions and thickness indicated.

C. Seats: Seats for all grating and floor plates as indicated. Fabricate seats for steel grating, fiberglass grating, or steel floor plates from steel sections as indicated. Fabricate seats for aluminum grating from aluminum sections as indicated.

2.2 **FABRICATION**

A. Band all grating.

B. Cut grating so that grating pattern matches adjacent sections.

C. Fabricate grating, floor plates, and seats so that adequate clearance is maintained.

PART 3 EXECUTION

3.1 **CONSTRUCTION**

A. Install gratings, floor plates, and seats as indicated.

B. Coat all aluminum surfaces in contact with concrete with ASTM D 1187 bituminous coating FS TT-P-636 zinc chromate primer.

C. Block all seats during the placing of concrete so that clearances are maintained.

END OF SECTION

SECTION 05 56 00

METAL CASTINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Castings for grates, frames and covers for Manholes, catch basins, tree wells, monument boxes, water meters, etc.

1.2 REFERENCES

A. ASTM A 27: Standard Specification for Steel Castings, Carbon, for General Application.

B. ASTM A 48: Standard Specification for Gray Iron Castings.

C. ASTM A 148: Standard Specification for Steel Castings, High-Strength, for Structural Purposes.

D. ASTM B 22: Standard Specification for Bronze Castings For Bridges and Turntables.

E. ASTM B 584: Standard Specification for Copper Alloy Sand Castings For General Applications.

F. ASTM D 1187: Standard Specification for Asphalt-Base Emulsion for Use as Protective Coatings for Metal.

G. ASTM E 10: Standard Test Method for Brinell Hardness of Metallic Materials.

1.3 SUBMITTALS

A. Submit shop drawings; Section 01 33 00.

B. Submit manufacturer's affidavit certifying materials comply with Part 2 requirements. (X-ray certification mandatory).

1.4 QUALITY ASSURANCE

A. Make castings true to pattern in form and dimension and free from defects that would affect the service value of the casting.

B. Repair minor defects that do not impair the strength of a casting.

C. Reject castings that show injurious defects revealed by X-ray or machining operations.

1.5 PRODUCT DELIVERY, HANDLING AND STORAGE

A. Deliver and handle castings and gratings to prevent warping, rusting and damage.

B. Store all items on flexible surface and protect items from adverse environmental

conditions.

PART 2 PRODUCTS

2.1 STEEL CASTINGS

A. High Strength Steel Castings For Structural Purposes: ASTM A 148, Grade 80-50, except that the steel shall contain not less than 0.60 percent of manganese and not less than 0.20 percent silicon.

B. Mild-to-Medium Carbon Steel Castings For General Applications: ASTM A 27 Grade 65-35 with a minimum Brinell hardness number of 130 when tested in accordance with ASTM E 10.

2.2 GRAY IRON CASTINGS

A. All castings not specifically classified below shall conform to the requirements of ASTM A 48, Class 30.

1. Grate, frame and cover castings sets; ASTM A 48, Class 35.
2. Railings, railing posts and wheel guards; ASTM A 48, Class 40.
3. Rockers, rocker plate bearings and bearing plates for bridges; ASTM A 48, Class 50.

2.3 BRONZE CASTINGS

A. Expansion and Bearing Plates: ASTM B 22, Alloy C.

B. Ornamental Tablets, Railings, Miscellaneous Ornaments and Fixtures: ASTM B 584, Alloy 1B.

PART 3 EXECUTION

3.1 PREPARATION

A. Fit bearing surfaces of flush fitting machined castings together firmly without rocking. ENGINEER reserves the right to reject rocking sets.

B. Ensure castings are boldly filleted at angles and the arises are sharp and true. Unless indicated otherwise all letters shall be heavily raised and spaced to secure a uniform and balanced effect over the entire area of the panel.

C. Before castings are removed from the foundry, ensure they are cleaned and the parting lines, gates, and risers are ground flush.

D. Ensure sets are coated in quality ASTM D 1187 asphalt paint unless galvanized or bronze sets are specified or required.

3.2 INSTALLATION

A. Furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation of castings.

B. Adjust Street Fixture elevation; Section 33 05 14.

C. Install countersunk flat head screw security bolts flush with top of grate.

3.3 CLEANING

A. Clean all castings free of grease, dirt, burrs, etc.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rough carpentry work not specified as part of other sections that is generally not exposed, except as otherwise indicated, and includes but is not limited to:

1. All wood framing and sheathing.
2. Furring.
3. Blocking for roofing system and related metal flashings.
4. Blocking for roof mounted items.
5. Wood posts and beams.
6. Wood grounds, nailers, blocking, and sleepers.
7. Subflooring and underlayment.
8. Preservative wood treatment where required.

1.2 REFERENCES

A. ANSI A208.1: Mat-Formed Wood Particleboard.

B. APA E 304: Design/Construction Guide Residential and Commercial.

C. ASTM D 226: Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

D. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

E. AWPA M4: Care of Pressure Treated Wood Products.

F. AWPB LP-2: Quality Control and Inspection Procedures for Soft Wood Lumber, Timber, Plywood, Pressure Treated With Waterborne Preservatives for Above Ground Use.

G. AWPB LP-22: Quality Control and Inspection Procedures for Soft Wood Lumber, Timber, Plywood, Pressure Treated With Waterborne Preservatives for Ground Contact Use.

H. FS TT-W-571: Wood Preservative, Treating Practices.

I. N.F.P.A. Publication: Manual for House Framing.

J. NPA: National Particleboard Association.

K. PS 1: Construction and Industrial Plywood.

L. PS 20: Softwood Lumber.

M. PS 51: Hardwood Lumber.

N. UL 790: Tests for Fire Resistance of Roof Covering Materials.

1.3 SUBMITTALS

A. Certificate of Pressure Treatment: Chemical solutions used, salt retention, and conformance. Include statement that moisture content of treated materials was reduced to maximum of 15 percent prior to shipment.

B. Certificate of Preservative and Fire-retardant Treatment: Plant certification that material complies with this specification and will not bleed through finished surfaces.

1.4 QUALITY ASSURANCE

A. Lumber Grading Rules and Species: PS1.

B. Plywood Grading Rules and Recommendations: PS 20, PS 51.

C. Factory-marking:

1. Type, grade, moisture content, inspection service and producing mill.
2. Marking may be omitted if certificate of inspection is provided for each shipment.

D. Underwriters' Laboratories, Inc.

E. Preservative and Pressure Treatment Standards: American Wood Preservers' Association.

1.5 PRODUCT DATA

A. Where dimensional lumber is required to comply with minimum allowable unit stresses, submit listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in form of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.

B. For woods requiring preservative treatment, submit manufacturer's treatment literature and instructions for use and certification by treating plant stating chemicals and process used, net amounts of preservative retained, compliance with applicable standard, and expected Service Life.

C. For woods requiring fire-retardant treatment, submit manufacturer's treatment literature and instructions for use and certification by treating plant that the treated woods comply with the applicable requirement and that the treating chemicals will not bleed out or affect finished surfaces.

1.6 PRODUCT HANDLING AND STORAGE

A. Keep wood covered, well ventilated, dry, and not in contact with earth when not being used.

B. Store wood to protect from warpage or delamination. Do not use woods damaged by improper protection.

C. Protect fire-retardant treated materials against high humidity and moisture during

storage and erection.

D. Time delivery and installation to avoid delaying progress of other work.

E. Handle treated lumber and plywood and treat penetration damage per AWPA M4.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Factory mark each piece of lumber with type, grade, mill and grading agency.

B. Provide dimensioned lumber; PS 20.

C. Provide dressed lumber, S4S, unless otherwise indicated.

D. Provide seasoned lumber with 19 percent maximum moisture at time of dressing and shipment for sizes 2 inches or less unless indicated otherwise.

E. For light bearing walls and framing use construction grade Hemlock-fir North or better.

F. For interior nonbearing partition walls use stud grade Hemlock-fir North or better unless indicated otherwise.

G. For structural framing use No. 2 grade Douglas-fir or Larch or any species or grade meeting the following requirements:
1. Fb: 1,250 psi minimum.
2. E: 1,700,000 psi minimum.

2.2 PLYWOOD MATERIALS

A. Factory mark each sheet of plywood or particleboard with the appropriate trademark and grade.

B. Use plywood for subflooring, roofing, bracing, or other concealed areas that is APA performance rated, complying with the requirements indicated for grade designation, span rating, exposure durability classification, edge detail, and thickness.

C. Subflooring: Tongue and groove exterior rated sheathing thickness and span as indicated.

D. Wall sheathing: C-D exterior rated; thickness as indicated.

1. 5 ply minimum, for use behind any veneer.
2. 4 ply minimum, for all other uses.

E. For roof sheathing use C-D exterior rated plywood, thickness and span as indicated.

F. Provide mat-formed particleboard, Grade 1-M-1, complying with ANSI A208.1, in thickness indicated.

2.3 ACCESSORIES

A. Nails, Spikes, and Staples: Galvanized for exterior, high humidity locations, and treated wood, cement coated for other interior locations, Size and type to suit application.

B. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; Section 05 05 23, Size and type to suit application; galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations.

C. Fasteners:

1. Toggle bolt type for anchorage to hollow masonry.
2. Expansion shield and lag bolt type for anchorage to grouted masonry or concrete.
3. Bolts or power activated type for anchorage to steel.

D. Building Paper: 30 pound density asphalt saturated felt, non-perforated, ASTM D 226.

E. Metal Framing Devices: Provide metal framing devices indicated.

F. Sound Board: Cellulose fiber board, specifically produced for sound deadening properties, thickness as indicated.

2.4 WOOD TREATMENT MATERIALS

A. Preservative Treatment: Where lumber or plywood is indicated as PT or "Treated", comply with applicable standard C2 (lumber) and C9 (plywood) of AWPB Standards listed below. Mark each treated item with the AWPB Quality Mark Requirements.

B. Pressure treat above ground items with water-borne preservatives complying with AWPB LP-2. After treatment, kiln dry to a maximum moisture content of 15 percent. Treat indicated items and the following:

1. Wood cants, nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing, vapor retarders, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches above grade.
4. Any wood framing members or elements exposed to weather.

C. Pressure-treat wood in contact with ground or fresh water with water-borne preservatives for gound contact use complying with AWPB LP-22.

D. If cut after treatment, coat cut surface with heavy brush coat of same chemical used for treatment and to comply with AWPA M4.

E. Complete fabrication of items that require treatment prior to the treatment step where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

F. Fire Retardant Treatment: Where "FR-S" lumber or plywood is indicated, provide materials which comply with AWPA standards for pressure impregnation with fire-retardant chemicals, and ASTM E 84, and show no increase in flame spread and significant progressive combustion upon continuation of test for additional 20 minutes.

1. Where treated items are exposed to exterior or to high humidities or are to have a transparent finish in the form of stain or sealer, provide materials which show no change in fire-hazard classification when subjected to standard rain test (UL 790).

2. Use fire-retardant treatment which will not bleed through or adversely affect type of finish indicated and which does not require brush treatment of field-made end cuts to maintain fire-hazard classification.
3. Kiln-dry treated items to maximum moisture content of 19 percent.

G. Inspect each piece of treated lumber or plywood after drying and discard all defective pieces.

2.5 SOURCE QUALITY CONTROL

A. Shop pressure treat wood materials requiring UL fire rating or pressure impregnated preservatives to FS TT-W-571, Table 3.

B. Provide fire resistant treated materials with UL approved identification on each piece.

C. Deliver fire retardant treated materials cut to required sizes to minimize field cutting.

PART 3 EXECUTION

3.1 SITE TREATMENT OF WOOD MATERIALS

A. Brush or spray 2 coats of preservative treatment for wood in contact with cementitious materials, roofing, metal flashings, and within 18 inches of the ground.

B. Apply preservative treatment per manufacturer's instructions.

C. Treat site-sawn ends. Allow preservative to cure prior to placing members.

D. Preservative treat items indicated as "PT", and fire retardant treated items indicated as "FR-S".

E. Prime paint surfaces in contact with cementitious materials with an exterior wood paint primer.

3.2 INSTALLATION -GENERAL

A. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.

B. Set carpentry work accurately to required levels and lines with members plumb and true and accurately cut and fitted.

C. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads and fill holes in exposed carpentry work.

D. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

E. Refer to Uniform Building Code Table 25Q nailing requirements unless indicated otherwise.

3.3 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Attach to substrates as required to support applied loading. Do not countersink bolts and nuts unless otherwise shown. Where possible, anchor to form work before concrete placement.

C. Provide permanent ground of dressed, preservative treated, key-bevelled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.4 STUD FRAMING

A. General: Provide stud framing, size and spacing indicated. Provide single bottom plate and double-top plates 2 inches thick by width of studs; except single top plate may be used for non-load bearing partitions. Nail or anchor plates to supporting construction.

B. Construct corners and intersection with not less than 3 studs. Provide miscellaneous blocking and framing indicated and as required for support of facing materials, fixtures, and specialty items and trim.

C. Provide continuous horizontal blocking row at mid-height of single-story partitions over 8 feet high and at midpoint of multi-story partitions using 2 inches thick members of same width as wall or partitions.

D. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.

E. For nonbearing partitions provide double-jamb studs and headers not less than 4 inches deep for openings 3 feet and less in width, and not less than 6 inches deep for wider openings.

F. For load bearings partitions provide double-jamb studs for openings 6 feet and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated, or if not, provide as recommended by N.F.P.A “Manual for House Framing.”

G. Plywood Sheathing: 4 feet wide panels vertical or horizontal. Fasten to framing as indicated. Block all edges with 2 x 4 minimum, flat.

3.5 FLOOR JOIST FRAMING

A. General: Provide framing of sizes and spacing indicated. Install with crown edge up and support ends of each member with not less than 1-1/2 inches of

bearing on wood or metal, or 3 inches on masonry. Attach to wood bearing members by toe nailing or metal connectors; frame to wood supporting members with wood ledgers indicated, or if not with metal connectors. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 4 feet. Provide solid blocking (2 inches thick by depth of joist) at end of joists unless nailed to header or end member. Do not cut, bore, notch, or drill holes in any joists without ENGINEER's approval.

B. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking (2 inches thick by depth of joist) over supports.

C. Under jamb studs at openings provide solid blocking between joist.

D. Under non-load bearing partitions provide double joists separated by solid blocking equal to depth of studs above.

E. Provide triple-joists separated as above under partitions receiving ceramic tile and similar heavy finishes or fixtures unless otherwise shown.

F. Provide bridging between joists where nominal depth-to-thickness ratio exceeds 4, at intervals of 8 feet. Use bevel cuts 1" x 4" or 2" x 3" wood bracing, double-crossed, and nailed both ends to joists, or use solid wood bridging 2 inches thick by depth of joist, end nailed to joist, or use steel cross bridging of equivalent strength.

G. Stair Framing: Provide stair framing members of size, space, and configuration indicated, or if not otherwise indicated, as required to support a minimum uniform live load of 100 psf and minimum concentrated load of 300 pounds applied to an area of 4 square inches at center of tread. Fabricate stair framing members to provide exact fit with treads and risers with no change in dimensions between landings.

3.6 PLYWOOD INSTALLATION

A. General: Comply with APA E 304 for types of plywood products and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Subflooring: Glue-nail to framing.
2. Plywood Backing Panels: Nail to supports.

C. Particleboard Underlayment: Install in compliance with the recommendations of the NPA for the type of subfloor indicated. Fill and sand gouges, gaps, and chipped edges. Sand uneven joints flush. Glue-nail underlayment to subflooring.

D. Sound Board: Glue and nail per manufacturer's instructions.

END OF SECTION

SECTION 07 19 00

WATER REPELLANT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Penetrating sealer over concrete and masonry.

1.2 REFERENCES

A. ASTM C 67: Standard Methods of Sampling and Testing Brick, and Structural Clay Tile

B. ASTM C 140: Standard Methods of Sampling and Testing Concrete Masonry Units

C. ASTM C 642: Standard Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete.

D. ASTM C 672: Standard Test Method for Sealing Resistance of Concrete Surfaces Exposed to Deicing Chemicals.

E. NCHRP 244 Series IV: Concrete Sealers for Protection of Bridge Structures, National Cooperative Highway Research Program, Report 244, Dec 1981, Transportation Research Board, Washington D.C.

1.3 SUBMITTALS

A. Manufacturer's recommended installation procedures.

B. Performance criteria data sheet showing compliance.

PART 2 PRODUCTS

2.1 PENETRATING COMPOUND

A. Material: CONTRACTOR's choice of the following.

1. Organo-silane,
2. Organo-siloxane,
3. Silocanate,
4. Potassium silicate.
5. Styrene acrylic silane co-polymer

B. Performance Criteria:

1. Water Absorption Reduction, ASTM C 67, ASTM C 140, or ASTM C 642: 75 percent minimum

2. Scaling Resistance, ASTM C 672: Weight loss less than 2 percent when subject to 500 cycles of freeze-thaw.
3. Chloride Ion Reduction: 75% minimum; NCHRP 244 series IV.
4. Moisture Vapor Permeability: 100% minimum; NCHRP 244 series IV.
5. Maximum Drying Time: 1-1/2 hours.

C. Volatile Organic Compounds (VOC): Comply with local, state and federal requirements.

PART 3 EXECUTION

3.1 PREPARATION

A. Do not use water repellant on surfaces that are to receive hardeners. Refer to Section 03 35 00.

B. Cure new concrete for 28 days prior to sealer application.

C. Remove curing compound before applying sealer. Do not expose large aggregate.

D. Make surfaces dry and free of laitance, dirt, dust, paint, grease, oil, rust, and other contaminants.

3.2 APPLICATION

A. Apply coating continuously and uniformly. Keep surface wet for 30 to 45 minutes.

END OF SECTION

SECTION 07 21 00

INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiber fill, rigid, batt, spray, or granular insulation for:
   1. Insulation under slabs on grade.
   2. Foundation wall insulation (and supporting backfill).
   3. Block/board cavity wall insulation.
   4. Loose cavity wall insulation.
   5. Concealed and exposed board type building insulation.
   6. Blanket type building insulation.
   7. Loose fill building insulation.

1.2 REFERENCES

A. ASTM C 209: Standard Method of Testing for Insulation Board (Cellulosic Fiber), Structural and Decorative.

B. ASTM C 516: Standard Specification for Vermiculite Loose Fill Insulation.

C. ASTM C 549: Standard Specification for Perlite Loose-Fill Insulation.

D. ASTM C 665: Standard Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufacturer Housing.

E. ASTM C 764: Standard Specification for Mineral Fiber Loose-Fill Insulation.

F. ASTM D 2842: Standard Test Method for Water Absorption of Rigid Cellular Plastics.

G. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

H. FS HH-I-530: Insulation Board, Thermal, Unfaced Polyurethane or Polyisocyanurate.

I. FS HH-I-558: Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering Thermal (Mineral Fiber, Industrial Type).

J. FS HH-I-1030: Insulation, Thermal (Mineral Fiber, for Pneumatic or Poured Application).

1.3 SUBMITTALS

A. Manufacturer's product installation instructions.
B. Product data.

PART 2 PRODUCTS

2.1 MOLDED BEAD POLYSTYRENE INSULATION

A. Thermal resistance "R" per inch of 3.7 aged in service value; minimum compressive strength of 10 psi; water absorption by volume, ASTM D 2842, 2.5 percent maximum, Square edges; board size of manufacturer's standard size by thickness indicated.

2.2 EXTRUDED CELLULAR POLYSTYRENE INSULATION

A. Thermal resistance "R" per inch of 5.56 aged in service value; minimum compressive strength of 30 psi; water absorption by volume, ASTM D 2842, 0.3 percent, Square edges; board size of manufacturer's standard dimensions by thickness indicated.

2.3 EXPANDED CELLULAR URETHANE INSULATION

A. Thermal resistance "R" per inch of 5.56 aged in service value; minimum compressive strength of 25 psi; water absorption by volume, ASTM D 2842, 3 percent; factory applied skin of aluminum foil both faces, Square edges board size of manufacturer's standard sizes by thickness indicated; FS HH-I-530.

2.4 CLOSED CELL POLYISOCYANURATE INSULATION

A. Thermal resistance "R" per inch of 5.56 aged in service value; minimum compressive strength of 25 psi; water absorption by volume, ASTM C 209, less than 1-1/2 percent; factory applied skin of aluminum foil on both bases, Square edges; board size of manufacturer's standard dimensions by thickness indicate.

2.5 GLASS FIBER REINFORCED POLYISOCYANURATE FOAM INSULATION

A. Plastic core faced on exposed side with 0.019 inch aluminum sheet laminated over foil and faced on reverse side with reflective foil, thickness or R-Value as indicated. Provide interlocking PVC strips of proper size for mounting boards and covering joints.

2.6 FIBER GLASS BATT INSULATION

A. Preformed glass fiber batt or roll friction fit type without membrane.

2.7 FIBER FILL INSULATION

A. Mineral wool modulated for pour or bulk for pneumatic placement; "R" value as indicated; FS HH-I-1030.

2.8 MINERAL FIBER INSULATION

A. A maximum thermal conductivity "K" value of 0.26, and when tested, ASTM E 84 a flame spread of 25 or less, a fuel contribution of 15 or less, smoke developed rating of

20 or less, ASTM C 764. Where exposed, the color shall be white with a minimum light reflectance of 70 percent.

2.9 GRANULAR INSULATION

A. Water repellent; fire resistant; flame/fuel/smoke contribution of 0/0/0,, ASTM E 84.

1. Vermiculite type, ASTM C 516.
2. Perlite type, ASTM C 549.

2.10 MINERAL FIRE-PROOFING AND SAFING

A. Noncombustible, 4 pounds per cubic foot density, mineral fiber, ASTM C 665 or FS HH-I-558.

2.11 ADHESIVE MATERIALS

A. Gun grade, mastic type, compatible with insulation and substrate, or type recommended by insulation manufacturer for application.

2.12 ACCESSORIES

A. Vapor and Air Retarder: Translucent polyethylene film for above grade application; 6 mil thick.

B. Nails or Staples: Steel wire; galvanized; type and size to suit application, at least 1/2 inch longer than thickness of insulation.

C. Tape: Bright aluminum self-adhering; 2 inches wide.

D. Rigid Insulation Fasteners: Impale clip type of wood or galvanized steel; of type to be mechanically fastened to surface to receive insulation; length to suit insulation thickness; capable of securely and rigidly fastening insulation in place.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify substrate and adjacent materials and insulation board are dry and ready to receive insulation and adhesive.

B. Verify substrate surface is flat, free of honeycomb, fins, irregularities, or materials that will impair adhesive bond.

C. Verify insulation boards are unbroken, free of damage, with face membrane undamaged.

D. Verify mechanical and electrical services within walls have been installed and tested.

3.2 INSTALLATION -FIBER FILL INSULATION

A. Install by pneumatic or pouring placement methods through access holes as required.

B. Place fiber fill insulation per manufacturer's instructions.

C. Place insulation tightly in stud, joist, rafters, spaces and tight to and behind mechanical and electrical services within the plan of insulation.

D. Completely fill intended spaces. Leave no gaps and voids.

3.3 INSTALLATION -RIGID INSULATION

A. Foundation Perimeter:

1. Adhere a 6 inches wide strip of polyethylene sheet over joints with double beads of adhesive each side of joint. Tape seal joints between sheets. Extend sheet full height of joint.
2. Install boards on foundation wall perimeter, horizontally. Place boards in a method to maximize contact Bedding. Stagger end joints. Butt edges and ends tight to adjacent board and to protrusions.
3. Extend boards over expansion joints, unbonded to foundation 12 inches either side of joint.

B. Exterior Walls:

1. Apply adhesive in 3 continuous beads per board length. Daub adhesive tight to protrusions.
2. Install boards on wall surface perimeter, vertically. Place membrane surface of insulation against adhesive.
3. Place boards in a method to maximize contact Bedding. Stagger side joints. Butt edges and ends tight to adjacent board and to protrusions.
4. Place 24" wide polyethylene sheet at perimeter of wall openings from adhesive vapor and air retarder bed to window and door frames. Tape seal in place to ensure continuity of vapor and air retarder.

C. Cavity Walls:

1. Secure impale fasteners to substrate at a frequency of 6 per insulated board.
2. Apply adhesive in 3 continuous beads per board length. Daub adhesive tight to protrusions to ensure continuity of vapor and air retarder.
3. Install boards horizontally between wall reinforcement.

D. Under Concrete Slabs:

1. Place insulation under slabs on grade after base for slab has been compacted.
2. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.4 INSTALLATION -BATT INSULATION

A. Install batt insulation and vapor retarder per manufacturer's instructions.

B. Install batt insulation without gaps or voids.

C. Trim insulation neatly to fit spaces. Use batts free of damage.

D. Fit insulation tight in spaces airtight to exterior side of mechanical and electrical

services within the plane of insulation.

E. Protect all insulation materials during storage and insulation from moisture, tears or other damage. All damaged material shall be replaced at no additional cost to the OWNER.

3.5 INSTALLATION -SPRAY ON INSULATION

A. Surfaces to receive spray-on insulation shall be free of dirt, grease, oil, loose paint, excessive rust scale, or other foreign material which would prevent adequate adhesion. Application shall not proceed until unsatisfactory conditions are corrected. Ambient temperature shall be between 40 and 155 deg. F.

B. Application: Mix, apply, and finish spray-on insulation per manufacturer's specifications and instructions for a monolithic blanket of uniform texture. Thickness shall be as indicated.

C. Mineral fire-proofing and safing: Following manufacturer's recommendations, install mineral fire-proofing and safing in all openings in floors and walls to seal completely, without voids, around pipe, conduit, duct, and other penetrations.

D. Cleanup: Remove from site all containers, wrappings, and scrap insulation materials. Leave floors broom clean.

3.6 INSTALLATION -GRANULAR INSULATION

A. Place granular insulation in walls per manufacturer's instructions. Verify holes and openings have been sealed to prevent loss of insulation.

B. Place after masonry materials have sufficiently dried and attained optimum moisture content, and after vertical cores have been grouted.

C. Place as masonry is erected.

D. Ensure spaces are completely free of mortar and debris to allow free flow of insulation.

E. Completely fill spaces. Place in lifts and rod to eliminate air pockets. Do not exceed 4 feet pouring height. Place prior to covering cores and bond beams or lintels.

F. Place temporary signs in rooms that face insulated walls warning workers to use caution to prevent loss of insulation if cutting into walls

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Finishing prepared surfaces which are to be coated in accordance with paint manufacturer's recommendations.

B. Paint all surfaces unless it is indicated they are not to be painted.

1.2 REFERENCES

A. SSPC-SP1: Solvent Cleaning.

B. SSPC-SP6: Commercial Grade Blast Cleaning.

1.3 SAMPLES

A. Before proceeding with paint application, prepare 8 inches x 10 inches sample(s) of all paint systems on identical substrate materials on which the system will be applied.

B. Identify each sample as to surface preparation, paint system, color, product name and number, and manufacturer.

C. Colors to be selected by ENGINEER prior to commencement of work.

D. Submit manufacturer's coating product data sheet for each coating type to be applied, prior to initiating surface preparation.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to job site in original, unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material.
2. Federal specification number, applicable.
3. Manufacturer's stock number and date of manufacture.
4. Manufacturer's name.
5. Contents by volume, for major pigment and vehicle constituents.
6. Thinning instructions.
7. Application instruction.
8. Color name and number.

B. Provide adequate storage facilities. Store paint materials at minimum ambient temperature of 45 deg. F. in well ventilated area or as recommended by the manufacturer.

C. Take precautionary measures to prevent fire hazards and spontaneous combustion of paint material. Provide temporary fire extinguishers.

1.5 JOB CONDITIONS

A. Abrasive blast cleaning shall not be performed if humidity is greater than 85 percent, and if surface temperature is less than 5 deg. F. above the dew point of ambient air.

B. Do not apply finishes when temperature exceeds manufacturer's maximum and minimum temperature allowable, nor in dust, smoke laden atmosphere, damp or humid weather.

C. Provide adequate continuous ventilation.

D. Adequately protect other surfaces from paint and damage. Repair damage.

E. Furnish sufficient drop cloths, shields and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

F. Place cotton waste, cloths and material which may constitute a fire hazard in closed metal containers and remove daily from site.

G. Remove electrical plates, surface hardware, fittings and fasteners, prior to painting operations. Carefully store, clean and replace on completion of work in each area. Do not use solvent to clean hardware that has permanent lacquer finish.

H. Post "Wet Paint" signs in freshly painted areas to reduce the potential for damage to the surfaces or damage to people passing the area.

1.6 OPERATING PARTS AND LABELS

A. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting. Unless otherwise indicated, protect by drop clothes or maskings.

B. Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

PART 2 PRODUCTS

2.1 MATERIALS

A. Varnish, Stain, Enamel, Lacquer and Fillers: Type and brand as indicated.

B. Paint Accessory Materials: Linseed oil, shellac, turpentine and other materials not specifically indicated.

C. Paints: Ready-mix except field catalyzed coatings.

D. Do not provide paints containing lead unless indicated otherwise.

PART 3 EXECUTION

3.1 INSPECTION

A. ENGINEER shall examine surfaces prior to surface preparation and prior to application of each succeeding coating. Correct any condition that may potentially affect proper surface cleaning or coating application.

B. Correct defects and deficiencies in surfaces which may adversely affect work of this section before applying any paint.

3.2 PREPARATION OF SURFACES

A. General: Perform preparation and cleaning procedures per paint manufacturer's instruction and as herein specified, for each particular substrate condition. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly painted surfaces.

B. Mildew: Remove mildew by scrubbing with approved chemical solution such as tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry completely.

C. Aluminum Surfaces: Remove surface contamination from aluminum surfaces by steam, high pressure water or solvent washing. Coat surfaces with wash primer.

D. Asphalt or Bituminous Surfaces: Remove dirt, oil, grease and sand to provide adhesion key. Apply compatible sealer or primer.

E. Cloth Surfaces: Remove dirt, grease and oil before applying paint system.

F. Copper Surfaces: Remove contamination from copper surfaces by steam, high pressure water or solvent washing. Coat surfaces with wash primer.

G. Copper Surfaces -Oxidized: Remove contamination from copper surfaces required to be oxidized. Apply oxidizing solution. Rub on repeatedly for correct effect. Once attained, rinse surface well with clear water, allow to dry, and paint.

H. Wallboard: Remove contamination from gypsum wallboard surfaces and prime to show defects, if any. Remove surface dust and dirt with clean water and sand with medium grit sandpaper. Fill hairline cracks, small holes and imperfections on plaster surfaces with patching plaster. Smooth off to match adjacent surfaces. Wash and neutralize high alkali surfaces where they occur.

I. Galvanized Surfaces: Remove surface contamination and oils from galvanized surfaces with solvent. Apply coat of wash primer.

J. Concrete, Concrete Block:

1. New Concrete: Do not start surface preparation until concrete has cured 30 days. Remove contamination, sandblast or acid etch with 100 percent water soluble acid and rinse new concrete surfaces with clear water. Allow to thoroughly dry.
2. Remove dirt, loose mortar, scale, powder and other foreign matter from concrete and concrete block surfaces which are to be painted or to receive a clear seal. Remove oil

and grease with a solution of tri-sodium phosphate, rinse well and allow to thoroughly dry.

3. Remove stains from concrete and concrete block surfaces caused by weathering of corroding metals with a solution of sodium metasilicate after being thoroughly wetted with water. Allow to thoroughly dry.
4. Test for moisture before painting.

K. Steel Surfaces:

1. Remove grease, dirt and dust from steel and iron surfaces by solvent cleaning (SSPC-SP1). Remove rust and mill scale by wire brushing, sandblasting (SSPC-SP6) or other satisfactory method indicated. Ensure steel surfaces are satisfactory before paint finishing.
2. Sand and scrape shop primed steel surfaces to remove all loose primer and rust. Feather out edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces including shop primed steels.

L. Wood:

1. Wipe off dust and grit from miscellaneous wood items and millwork prior to priming. Sand wood to required smoothness. Spot coat knots, pitch streaks and sappy sections with sealer. Fill nail holes and cracks after primer has dried and sand between coats. Back prime interior and exterior woodwork.
2. Remove dust, grit and foreign matter from exterior wood siding which is to receive paint finish. Seal knots, pitch streak and sappy sections. Fill nail holes with filler after prime coat has been applied.
3. Prior to finishing glue-laminated beams, wash down surfaces with solvent and remove grease and dirt.

3.3 PREPARATION OF MATERIAL

A. Mix and thin paint materials per manufacturer's product data sheets.

B. Store materials not in actual use in tightly sealed containers free from foreign particles.

C. Discard paints which have formed a film in the container or exceeded the manufacturer's recommended pot life.

D. Multiple component coatings shall be prepared using all the contents of the container for each component. Partial batches will not be permitted.

3.4 APPLICATION

A. Apply each coat at proper consistency and per the manufacturer's recommendations.

B. Make each coat of paint slightly darker than preceding coat unless otherwise approved.

C. Sand lightly between coats as required to achieve specified finish.

D. Do not apply finishes on surfaces that are damp or wet.

E. Ensure that edges, corners, welds, and other protrusions receive a dry film thickness equivalent to the flat surfaces.

F. Where clear finishes are required on wood ensure tint fillers match wood. Work fillers well into the grain before set. Wipe excess from the surface.

G. Backprime exterior woodwork which is to receive paint finish, with exterior primer paint.

H. Backprime interior woodwork, which is to receive paint or enamel finish, with enamel undercoat paint.

I. Backprime interior and exterior woodwork, which is to receive stain or varnish finish, with gloss varnish reduced 25 percent with mineral spirits.

J. Prime top and bottom edges of wood and metal doors with enamel undercoat when they are to be painted.

K. Prime top and bottom edges of wood doors with gloss varnish when they are to receive a stain or clear finish.

3.5 MECHANICAL AND ELECTRICAL EQUIPMENT

A. Coordinate with mechanical and electrical sections with respect to painting and finishing requirements, color coding, identification banding of equipment, ducting, piping and conduit.

B. Remove grills, covers and access panels for mechanical and electrical systems from location and paint separately.

C. Finish paint primed equipment to color selected.

D. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars and supports, except where items are plated or covered with a prefinished coating.

E. Replace identification markings on mechanical or electrical equipment when painted over or spattered.

F. Treat and paint interior surfaces of air ducts, convector and baseboard heating cabinets that are visible through grills and louvers with one coat of flat black paint, to limits of sight line. Paint dampers exposed immediately behind louvers, grills, convector and baseboard cabinets to match face panels.

G. Paint exposed conduit and electrical equipment occurring in finished areas. Color and texture to match adjacent surfaces.

H. Paint sides and edges of plywood backboard for electrical equipment before installing backboards and mounting equipment.

I. Color Coding:
   1. Natural Gas: Orange.
   2. Sanitary Sewer: Brown.

3. Storm Drain: Green.
4. Potable Water: Blue.
5. Telephone: Orange.
6. Electrical Power: Red.
7. Danger and Fire: Red.

J. Paint color band and identify flow arrows, naming, numbering, etc.

3.6 CLEANING

A. Section 01 74 13.

B. As work proceeds and upon completion, promptly remove paint where spilled, splashed or spattered.

C. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.

D. Upon completion of work leave premises neat and clean.

3.7 FIELD QUALITY ASSURANCE

A. Minimum Coating Thickness: Maintain minimum thickness recommended by manufacturer.

B. Appearance: Cloudiness, spotting, show through of subsurface, laps, brush marks and other surface imperfections will not be acceptable.

C. Rework: Areas not acceptable will be refinished to the required standards.

D. Holiday Testing: Metal surfaces shall be holiday tested for pinholes and missed areas in the coating. Recoat holiday areas.

E. Drying Time: Do not exceed drying time between coats.

3.8 EXTRA STOCK

A. Furnish not less than 1 gallon of each color.

B. Tightly seal and clearly label all containers.

END OF SECTION

SECTION 09 96 23
GRAFFITI RESISTANT COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of clear, breathable, multi-polymer, water-based, penetrating, non-sacrificial graffiti coating for concrete surfaces, masonry surfaces, metals, and natural stones.

B. Includes companion cleaner.

1.2 REFERENCES

A. ASTM D 1475: Standard Test Method for Density of Paint, Varnish, Lacquer, and Related Products.

B. ASTM D 1653: Standard Test Method for Water Vapor Permeability of Organic Coating Films.

C. ASTM D 2369: Standard Test Method for Volatile Content of Coatings.

D. ASTM D 3278: Standard Test Method for Flash Point of Liquids by Setaflash Closed-Cup Apparatus.

1.3 SUBMITTALS

A. Manufacturer's recommended installation procedures.

B. Performance criteria data sheet showing material compliance.

1.4 QUALITY ASSURANCE

A. Applicator: Minimum of 5 years experience in application of similar systems and products on projects of similar size and scope.

B. Manufacturer: Minimum 5 years experience in manufacturing the proposed graffiti resistant coating.

PART 2 PRODUCTS

2.1 MATERIALS

A. Multi-polymer, water-resistant, non-sacrificial formulation that does not alter appearance of substrate.
   1. Color: Clear.
   2. Water-Vapor Transmission, ASTM D 1653: 33 perms minimum.
   3. Flash Point, ASTM D 3278: 150 deg. F. maximum.

4. Freeze Point: Minus 50 deg. F. minimum.
5. Density, ASTM D 1475: 6 pound per gallon minimum.
6. Solids by Weight, ASTM D 2369: 6 percent minimum.
7. Volatile Organic Compounds (VOC): Comply with local, state and federal requirements.

2.2 CLEANER

A. Composition of solvent cleaner:

1. Flash Point, ASTM D 3278: 140 deg. F. minimum.
2. Freeze Point: 10 deg. F. minimum.
3. Density, ASTM D 1475: 9 pounds per gallon minimum.
4. Solids by Weight, ASTM D 2369: 25 percent minimum.
5. Volatile Organic Compounds (VOC): Comply with local, state, and federal requirements.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Do not use graffiti resistant coatings on surfaces that are to receive hardeners until after hardener application. Refer to Section 03 35 00.

B. Test and clean substrate per coating manufacturer's recommendations. Surfaces are to be free of sand, dust, dirt, oil, grease, chemical films, and other contaminats and loose materials.

C. Make sure concrete surfaces are cured a minimum of 7 days before beginning application.

D. If surface paint is flaking or cracked, completely remove loose paint before application.

3.2 APPLICATION

A. Do not apply coating over existing graffiti treatment other than prior coat of same coating material.

B. Apply coating continuously and uniformly.

C. Control environment for proper coating drying.

3.3 GRAFFITI REMOVAL

A. Use water in combination with graffiti cleaner.

END OF SECTION

SECTION 09 97 14

COATINGS FOR STEEL BRIDGES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Washing, scraping, brushing, and sand blasting bridge metal surfaces prior to finishing.

B. Applying finish on steel products or assemblies.

1.2 REFERENCES

A. AASHTO M 67: Standard Specification for Foliage Green Bridge Paint.

B. AASHTO M 68: Standard Specification for Black Paint for Bridges or Timber Structures.

C. AASHTO M 69: Standard Specification for Aluminum Paint.

D. AASHTO M 70: Standard Specification for White and Tinted Ready-Mixed Paint.

E. AASHTO M 72: Standard Specification for Red Lead Ready-Mixed Paint.

F. SSPC-SP1: Solvent Cleaning.

G. SSPC-SP6: Commercial Blast Cleaning.

H. SSPC-SP10: Near White Blast Cleaning.

1.3 WEATHER LIMITATIONS

A. Apply coating only when all of the following conditions are met:

1. Air temperature is above 50 deg. F.
2. Surface temperature of the material is between 40 deg. F. and 100 deg. F. and 5 deg. F. above dew point.
3. Surface to be painted is clean and dry.

B. Cover coat materials in damp or cold weather until dry or until weather conditions improve to permit open exposure.

PART 2 PRODUCTS

2.1 PAINT

A. Red lead paint conforming to AASHTO M 72 for all shop priming of steel items.

B. When finish coat of paint is specified to be aluminum, black or graphite paint, colored green, brown or dark gray, use a red lead paint as specified for the shop coat, tinted light brown as required, with lamp black in an amount not to exceed 1/4 pound per gallon for the first field coat.

C. When finish coat is white or gray, use a first field coat conforming to the specification for white and tinted ready-mixed paint (lead and zinc base), AASHTO M 70 in lieu of red lead paint.

D. Paint for finish coat as indicated and conforming to one of the following AASHTO specifications.

1. Foliage green bridge paint, M 67.
2. Black bridge paint, M 68.
3. Aluminum paint (paste-mixing vehicle), M 69.
4. White and tinted ready-mixed paint (lead and zinc base), M 70.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Unless indicated otherwise, thoroughly clean all metal surfaces to be painted according to SSPC-SP1 solvent cleaning. Unless cleaning is to be done by blast cleaning, neutralize all weld areas with a proper chemical before cleaning is started, and thoroughly rinse with water after cleaning.

B. For blast cleaning two methods are provided. Either of these methods may be used unless indicated otherwise.

1. SSPC-SP6.
2. SSPC-SP10.

3.2 PAINT APPLICATION

A. Do not shop prime areas where field welding is required, bolted connections are to be made, or on steel that is to be encased in concrete.

B. Paint may be applied with hand brushes or by spraying, except apply aluminum paint by spraying. By either method, apply coating of paint smoothly and uniformly so that no excess paint collects at any point. If work done by spraying is not satisfactory, hand brushing shall be required.

C. When brushes are used, manipulate paint under brush to produce smooth, uniform, even coating in close contact with the metal or with previously applied paint, and work into all corners and crevices.

D. When using spraying equipment apply paint in a fine, even spray without addition of any thinner. In cool weather, warm paint to reduce the viscosity for use.

E. Paint when applied with spray equipment shall be immediately followed by brushing when necessary to secure uniform coverage and to eliminate wrinkling, blistering and air holes.

F. If operations have damaged the paint or painting is unsatisfactory, prepare the surface as indicated above and repaint.

3.3 PROTECTION

A. Protect adjacent structures, pedestrians, vehicular, and other traffic upon, underneath, or near the area to be painted and all portions of the structure against damage or disfigurement by splatters, splashes, and over spraying of paint.

END OF SECTION

SECTION 09 97 15

COATINGS FOR STEEL WATER STORAGE TANK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Finishing exterior and interior of steel water storage tanks.
B. Refinishing existing steel tanks.

1.2 REFERENCES

A. AWWA D102: Standard for Painting Steel Water-Storage Tanks.
B. NSF Standard 61: Drinking Water System Components – Health Effects.

1.3 SUBMITTALS

A. Product Submittal: As a minimum include the following information.
   1. Mixing instructions.
   2. The quality and type of thinner recommended.
   3. Percent solids by volume for liquid materials.
   4. Spreading rate in square feet per gallon at 1 mil dry film thickness.
   5. Net weight per U.S. gallon.
   6. Recommended drying time between coats and before immersion.
   7. Pot life after mixing.
   8. Safety precautions.

B. Test Report: Indicate the following.
   1. The film thickness gage used.
   2. Locations where tests were made.
   3. Dry film thickness at each location
   4. Name of person making the test
   5. Name of CONTRACTOR personnel witnessing the test.
   6. Name of OWNER personnel witnessing the test.

1.4 WEATHER LIMITATIONS

A. Apply coatings only when all of the following conditions are met:
   1. Air temperature is above 50 deg. F.
   2. Steel surface temperature is between 40 deg. F. and 100 deg. F. and 5 deg. F. above dew point.
   3. Surface to be painted is clean and dry.

B. Cover painted materials in damp or cold weather until dry or until weather conditions improve to permit open exposure.

PART 2 PRODUCTS

2.1 CLEANING PRODUCTS

A. Solvent solution for cleaning oil, grease and dirt prior to surface preparation.

B. Abrasive sand or grit for blast cleaning to produce profile recommended by paint manufacturer.

2.2 EXTERIOR COATING PRODUCTS

A. General: The following exterior coating systems for steel tanks refer to AWWA D102. Unless indicated otherwise provide System No. 1.

B. Outside Paint System No. 1: Alkyd, alkyd, alkyd.

C. Outside Paint System No. 2: Vinyl, vinyl, vinyl.

D. Outside Paint System No. 3: Alkyd, alkyd, silicone-alkyd.

E. Outside Paint System No. 4: Alkyd, alkyd, alkyd, alkyd.

F. Outside Paint System No. 5: Zinc, chlorinated-rubber, chlorinated-rubber.

2.3 INTERIOR COATING PRODUCTS

A. General: Comply with NSF Standard 61. The following interior coating systems refer to AWWA D102. Unless indicated otherwise provide System No. 1.

B. Inside Paint System No. 1: Epoxy, epoxy, epoxy.

C. Inside Paint System No. 2: Zinc Chromate-vinyl butyral wash, vinyl, vinyl.

D. Inside Paint System No. 3: Chlorinated rubber, chlorinated rubber, chlorinated rubber.

E. Inside Paint System No. 4: Vinyl, vinyl resin, vinyl resin, vinyl resin.

F. Inside Paint System No. 5: Coal tar, coal tar.

G. Inside Paint System No. 6: Coal tar, coal tar, coal tar.

H. Inside Paint System No. 7: Zinc.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean all surfaces to be finished according to AWWA D102.

B. After blasting, remove all sand, dust and grit with vacuum cleaner, compressed air (clean and dry), or a clean brush.

C. Prime coat cleaned surfaces within 8 hours of preparation.

3.2 PRIME COAT APPLICATION

A. Apply prime coat using a method recommended by coating manufacturer. Allow to dry for manufacturer's recommended drying time before applying subsequent coats.

B. Apply a stripe coat of primer to all edges, angles, welds, and bolted connection on interior of tank by hand brushing.

C. Apply evenly so there are no runs or thin areas.

D. Repair all runs and sags prior to application of stripe or finish coats.

3.3 FINISH COAT APPLICATION

A. Dry Film Thickness: Refer to AWWA D102.

B. Apply finish coats using the method recommended by coating manufacturer and apply evenly to eliminate runs or thin areas.

C. Appearance: Cloudiness, spotting, show through of subsurface, laps, brush marks and other surface imperfections shall not be acceptable.

D. Rework areas not acceptable shall be refinished to the required standards.

E. Do not immerse coating until full cure of coating has been achieved and cure is approved by coating manufacturer.

3.4 TESTING

A. Wet and dry film thickness, each 100 square feet.

B. Holiday test metal surfaces for pin holes and missed areas in the coating. Recoat holiday areas.

END OF SECTION

SECTION 13 34 19

METAL BUILDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnish all structural design data, fabrication, and erection of a metal building, including all primary and secondary structural framing members, connection bolts, covering, skylights, access hatches, windows, doors, flashing, fasteners, closures, sealer, insulation, and other miscellaneous items.

1.2 DESIGN CODES

A. All structural steel members shall be designed for those sections of the following listed codes as considered to be applicable by the building manufacturer and as related to design requirements and allowable stress.

B. AAMA: Architectural Aluminum Manufacturers Association.

C. AISC: Specification for the Design, Fabrication and Erection of Structural Steel for Building.

D. MBMA: Recommended Design Practices Manual.

E. SDI: Steel Door Institute.

F. Publications:

1. Underwriters Laboratories (UL): Building Materials Directory.
2. State of Utah: Utah Energy Code.

1.3 REFERENCES

A. ANSI B18.6.4: Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch Series).

B. ASTM A 325: Standard Specification for High-Strength Bolts for Structural Steel Joints.

C. ASTM A 441: Standard Specification for High-Strength Low-Alloy Structure Magnesium Vanadium Steel.

D. ASTM A 446: Standard Specification for Sheet, Zinc Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality.

E. ASTM A 500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

F. ASTM A 525: Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

G. ASTM A 529: Standard Specification for Structural Steel with 42 ksi (290 MPa) Minimum Yield Point (1/2 In. (13-mm) Maximum Thickness).

H. ASTM A 570: Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.

I. ASTM A 572: Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.

J. ASTM C 167: Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations.

K. ASTM C 177: Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

L. ASTM D 1494: Standard Test Method for Diffuse Light Transmission Factor of Reinforced Plastic Panels.

M. ASTM D 3220: Standard Specification for Reinforced Thermoplastic Polyester Molding and Extrusion Materials.

N. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.

O. ASTM E 96: Standard Test Method for Water Vapor Transmission of Materials.

P. AWS D1.1: Structural Welding Code.

Q. FS FF-H-106: General Specification for Hardware, Builders': Locks and Door Trim.

R. SSPC-SP6: Commercial Blast Cleaning.

1.4 **DEFINITIONS**

A. Clear Span Buildings: A building of the single-gable, rigid frame type with clear span primary transverse rigid frames.

B. Modular Frame Buildings: A building of the single-gable, rigid frame type with the primary transverse frames supported by intermediate columns.

C. Shed Roof Buildings: A building of the single slope, rigid frame type with the primary transverse frames being clear span or supported by intermediate columns.

1.5 **BUILDING NOMENCLATURE**

A. Measure the building "Width" and "Length" in accordance with the manufacturer's method.

B. Measure the building "Eave Height" from the bottom of the base plate of the rigid frame columns to the intersection of lines representing the inside of the wall covering and the inside of the roof covering.

C. "Slope Roof" as indicated with a minimum of 1/8 inch of rise for each 12 inches of horizontal run or as indicated.

D. The "Bay Spacing" between intermediate frame center lines as indicated.

1.6 **WIND UPLIFT RATINGS**

A. Furnish, when required, a roof deck system having a UL wind uplift rating of Class 30, Class 60, or Class 90 per Guide No. TGKX in Underwriters' Laboratories, Inc. "Building Materials Directory".

1.7 **DESIGN REQUIREMENTS**

A. Apply roof live loads to the horizontal roof projection or as indicated and in accordance with local Laws and Regulations.

B. Apply a snow load on a horizontal projected area for determining maximum load conditions. Snow loads shall be in conformance with local Laws and Regulations.

C. Use the design wind pressure indicated, applied to the primary framing and to the wall components per MBMA's recommended design practices manual. Wind and seismic loading shall conform to local Laws and Regulations.

D. Use wind or seismic conditions to control design, whichever is largest.

E. Design Load Combination: Determine maximum load combinations as follows:

1. 30 psf LL and over: DL + LL, DL = WL, DL + 1/2 LL + WL or DL + 1/2 WL +LL
2. LL less than 30 psf: DL + LL and DL + WL Where LL = live load; DL = dead load; WL = wind load

1.8 **SUBMITTALS**

A. Erection Drawings: Submit complete erection drawings to ENGINEER showing anchor bolt settings, sidewall, endwall, and roof framing, transverse cross-sections, covering and flashing details, and accessory installation details to clearly indicate the proper assembly of all building parts.

B. Certificate: Signed by a licensed professional stating that the building design meets the requirements of this section and is in accordance with Accepted Engineering Practices.

PART 2 PRODUCTS

2.1 **MANUFACTURED UNITS**

A. Structural Framing:

1. Shop fabricate all framing members for bolted field assembly. Indicated on shop drawings all field cutting or drilling when required.
2. Primary structural framing includes the transverse rigid frame, wing unit rafter beams and columns, canopy beams, intermediate columns, end bearings frames, endwall columns, and wind bracing.
3. Secondary structural framing includes the purlins, girts, eave struts, flange bracing, sill support, clips, and other miscellaneous structural parts.

4. Use hot rolled steel sheet, plate, and strip in the fabrication of welded assemblies conforming to ASTM A 529, A 572, A 441, or A 570, Grade E with a 50 ksi yield as applicable. Use hot roll sheet and strip in the fabrication of cold-formed members conforming to ASTM A 570, Grade E except for the following:
   a. For thicknesses .050" to .097" use a minimum yield strength of 55,000 psi and a minimum tensile strength of 67,500 psi.
   b. For thicknesses .098" to .130" use a minimum yield strength of 55,000 psi and a minimum tensile strength of 65,000 psi.
   c. For thicknesses .131" to .229" use a minimum yield strength of 50,000 psi and a minimum tensile strength of 62,500 psi.
   d. Use smooth round bars for diagonal rod bracing conforming to the requirements of ASTM A 572, Grades 60 or 65.
5. Use structural tubing for columns and other structural uses conforming to ASTM A 500, Grade B (42,000 psi yield).
6. Manufacture cold-formed sections by precision roll or brake forming with all dimensions true, and free of fluting or buckling.
7. Weld all shop connections, AWS D1.1. Weld all flange to web connections using continuous submerged arc partial penetration fillet welds on one side of the web. Make all other welds by either the gas metal, submerged or shielded arc process. Make welds in flange plates full penetration.
8. Make all field connections per manufacturer's specifications.
9. Mark all framing members with an easily visible identifying mark, either stamped, penciled, or painted.

B. Wind Bracing: Use diagonal rod bracing in both roof and sidewall, wind columns, or manufacturer's standard method. Use double roof purlins interconnected by diaphragms between the rigid frames at all points of attachment of diagonal roof bracing. Fixed base corner columns or other suitable designed bracing may be used in lieu of sidewall rod bracing. Wind bracing in the roof or sidewall need not be furnished where it can be shown that the diaphragm strength of the roof or wall covering is adequate to resist the longitudinal wind forces.

C. Flange Bracing: Brace laterally the inside flange of all rigid frames so that the allowable compressive stress is adequate for any combination of loading.

D. Sill Support: Provide a continuous member to which the base of the wall covering may be attached.

E. Framed Openings: Design the structural framing members for all openings for the specified design loads.

F. Painting: Clean by rotary abrasive blasting to an SSPC-SP6 commercial blast grade all primary structural framing members which are not galvanized. Following cleaning, apply 1 shop coat of iron-oxide zinc-chromate primer.

2.2 ROOF AND WALL COVERING

A. General: Unless indicated otherwise, provide roof coverings to resist the design loads.

B. Panel Materials:

1. Insulate all wall and roof covering units to provide a maximum "U" factor as specified by the Utah Energy Code unless indicated otherwise. Use rigid urethane polystyrene, cellular glass or fiberglass for insulation, all with a suitable vapor retarder.
2. Provide roof and wall panel units consisting of galvanized steel facings and conforming to ASTM A 446, G-90 coating class and the required grade and yield stress as required by the design load. Use galvanized coated steel of commercial quality with a nominal coating weight of 1.25 ounces per square foot. Aluminum-zinc alloy coating of the same quality and 0.5 ounces per square foot is also acceptable.

C. Fasteners:

1. Self-tapping sheet metal screws conforming to ANSI B18.6.4 with Type "A" threads. Where required for weather tightness use screws equipped with metal and neoprene washers. Use screws and washers that are carbon steel plated with 0.0003 inch thick cadmium. Coat all exposed fasteners and washers after plating with zinc phosphate and with one prime coat and two finish coats of baked silicone polyester. Match the color of the finish with the wall and roof panels. Type ASTM A 325 stainless steel fasteners plated with 0.00015 inch thick cadmium and aluminum washers may be substituted for the above.
2. Use standard wall fasteners that are nylon headed, cadmium plated, carbon steel, Type "AB" screws. Color-match wall panels and nylon screw heads.
3. Use structural blind rivets that are pull type fasteners having an aluminum body and an aluminum mandrel. Install to securely clinch the joined surfaces together.

D. Sealant and Closures:

1. Use a sealant for sidelaps, endlaps, and flashings that is a gray pressure-sensitive tape blended from butyl and EPDM rubbers, with not less than 50 percent butyl and suitable inert fillers and pigments. Use only sealants that are non-asphaltic, non-shrinking, non-drying, and non-toxic with superior adhesion to metals, plastics, and painted surfaces at temperatures from -10 deg. F. to +140 deg. F. and will not flow at 200 deg. F. For standing seam roof panels use the manufacturer's standard sealant.
2. Seal side joints of tongue and groove units with a non-skinning liquid butyl sealant, applied in the female joint of the interior face.
3. Use standard closures that are closed cell foam EPDM closures matching the panel profile and installed along the eave, rake, and at accessories to be weather-tight.

E. Flashing, Closures, and Trims:

1. Furnish all flashing and trim at the rake, corners, and eaves, at framed openings, to provide weather-tightness and a finished appearance.
2. Use only galvanized steel for flashing, metal closures, trim, and other miscellaneous uses, conforming to ASTM A 525, coating Class G-90, 26 gage or heavier.
3. Provide a formed panel matching the slope and profile of adjoining roof panels along the building ridge on (1:12) buildings.

F. Color Finish:

1. Unless indicated otherwise color coat exposed surface of all galvanized steel roof and

wall panels, flashing, trim, gutters, downspouts, ventilators, louvers, and other exterior galvanized steel surfaces. Use a color coating system utilizing a silicone polyester (colors) or polyester (white).

2. Unless indicated otherwise color coat all interior wall coverings and the interior face of units with a polyester finish.
3. Finish the interior side of all panels with a 0.5 mil, stone white polyester coating.

2.3 ACCESSORIES

A. Metal Swing Doors:

1. Use only door leaves that are 1-3/4 inches thick, full flush, fabricated from 20 gage, galvanized, mill bonderized steel with a core consisting of either one piece, full size, impregnated Kraft paper honeycomb with a minimum crush strength of 45 psi, or foamed-in-place polyurethane. Hang each door leaf using three 4-1/2 inches x 4-1/2 inches galvanized steel interlocking template butt hinges.
2. Use only door frames that are constructed from 16 gage galvanized steel of a rabbeted design with field applied, continuous weather stripping.
3. Use thresholds of extruded aluminum and provide a positive weatherseal.
4. Equip doors with cylindrical lock sets conforming to FS FF-H-106, Series 160, Type A, Series 161, Type A; or Security Lock Type A. When not specified use a Security Lock Type A with 2 sets of keys.
5. Use door leaves and frames that are made with embossed steel faces, bonderized, and prime painted. Apply a finish coat of enamel to all doors and frames.

B. Aluminum Horizontal Slide Windows:

1. Extruded aluminum alloy sections meeting the requirements of AAMA.
2. Install clear flat drawn window glass as required to qualify for the high wind zone requirements of the AAMA. Embed glass in mastic and securely retained by extruded vinyl spines.
3. Use only screen cloth that is full or half length made of aluminum frames wired with aluminum cloth.
4. Use hardware that is made of corrosion resistant materials.
5. Use weather stripping that is of the finest quality woven pile together with vinyl extrusions.
6. Equip all windows with integral head and sill flashing with jamb fins specially designed to match the wall panel profile and ensure complete weather-tightness.
7. Install windows so only minor amounts of caulking or sealant are visible from exterior.

C. Skylight Panels:

1. Type I, structural (general purpose) fiber reinforced polyester skylight panels conforming to ASTM D 3220.
2. Use skylights that have a profile matching the type of panel and arc 1/16 inches t thick, weight 8 ounces per square foot with a minimum acrylic content of 15 percent. Use white skylights with a granitized surface finish and minimum ASTM D 1494 light transmission of 66 percent.

3. Use insulated skylights consisting of white plastic panels to which a 3 inches deep pan is factory bonded to create an insulating air space. The pan shall be clear acrylic and consist of 2 pans to give a nominal length skylight to fit 2 adjacent purlin spaces. Light transmission shall be a minimum of 66 percent.

D. Eave Gutters and Downspouts: Use only eave gutters that are formed to a true profile free of objectionable waviness and imperfections from 26 gage galvanized steel. Match the face of the gutter to the profile of the rake trim. Provide positive counters flashing. Fasten sections securely and seal at end laps. Support outside face of gutter with heavy gage galvanized steel supports.

E. Insulation:

1. Fiberglass blanketing insulation manufactured per ASTM C 167, and C 177. (k value is not to exceed 0.31 BTU/hr/sq.ft./inch thick/deg. F.)
2. Furnish all facings with 1 or 2 inch tabs without adhesive as required.
   a. Vinyl sheet facing: Nominal 0.004 inch thick with a permeability rating of 1. to 1.5 grains/hr./sq. ft. tested by ASTM E 96, Method A, workable at 5 deg. F. and above, and available in white; colors may change.
   b. Vinyl-Scrim-Foil: Linen textured with a permeability rating of less than 0.1 grains/hr./sq.ft. tested by ASTM E 96, workable at 30 deg. F. and above with a white finish.
   c. Foil-Scrim-Kraft: Foil-surfaced with a permeability rating of less than 0.1 grains/hr./sq.ft. tested by ASTM E 96, workable at -10 deg. F. and above with a regular aluminum finish. Kraft paper shall be free of any chemical treatments which could cause deterioration of metal panels under any environmental condition.
3. Use a composites insulation with a UL approved flame spread rating of 25 or less tested per ASTM E 84 (tunnel test) with rolled and stapled side joints.

F. Ventilators: Gravity type fabricated from galvanized steel and conforming to one of the following:

1. Continuous, furnished in 10'-0" lengths. Provide splice plates and end caps to make up the specified length. Continuous ventilators shall have dampers that provide an adjustable opening at the throat and are of the manually operated screw type or pull chain type: or
2. Circular with interior baffles and exterior wind band designed to provide maximum air flow. Optional dampers shall be a spring-loaded butterfly type operated by a fused pull chain.
3. Furnish all ventilators with birdscreens.

G. Louvers: Fabricated from galvanized steel overlapping blades providing maximum weather-tightness while allowing free air flow. Louvers shall be either fixed type with integral birdscreen, adjustable, operated by pull chain, or gravity type indicated.

H. Access Hatches: Provide steel access hatches on roof as indicated to allow accessibility for removing equipment. Fit hatches with approved locking devices located on the inside of building.

2.4 BUILDING ANCHORAGE

A. Design building anchor bolts and related anchorage to resist column reactions resulting from specified loads as applied in the specified loading combinations.

PART 3 EXECUTION

3.1 FRAMING ERECTION

A. Do no erection work on the building prior to review of shop drawings.

B. Erect framing, AISC and MBMA specifications.

C. Provide temporary bracing for erection and wind loads to maintain structure plumb and in alignment until completion of erection.

D. Set column base plates per manufacturer's specifications.

E. Do not field cut or alter structural members without approval.

F. After erection prime welds, abrasions, and surfaces not shop primed. Use a primer consistent with shop coat.

3.2 WALL AND ROOFING SYSTEMS

A. Install roof panel continuous from ridge to eave for buildings 60 feet wide or less. Where endlaps are required, lap a minimum of 3 inches at a roof purlin.

B. Install wall panels continuous from 1-3/4 inches below the column base to the roof line. Where the required length would exceed 32 feet, Splice at a girt. Square cut all panels at the roof line.

C. Before securing, seal all laps of roof panels with a continuous ribbon of tape sealer.

D. Secure roof and wall panels to intermediate framing members with sheet metal screws at a maximum spacing of 12 inches; 24 inches at endlaps roof panels. On standing seam roof panels attach with manufacturer's standard method.

E. Stitch sidelaps of roof panels through the high rib with sheet metal screws at a maximum 20 inches spacing.

F. Install insulated wall units continuous from 1-3/4 inches below the column base to roof line. Where panel length exceeds 24 feet splice at a girt. Flash the splice for complete weather-tightness.

G. Prior to beginning panel installation, align structural framing true, plumb, and square. Accurately locate all accessory openings.

H. Predrill panels and fasten to the sill support and to the eave or rake framing with sheet metal screws. Attach at intermediate framing with structural blind rivets or acceptable alternate.

I. Exercise care to ensure that panels are erected true and square and that the module is

accurately maintained. Adjust for squareness of module when indented side joint in the interior face does not deviate more than 1/8 inch from parallel.

J. Following complete erection of wall panels, place a 1 inch wide adhesive-backed accent tape at each interior joint.

3.3 TOLERANCES

A. Framing Members: 1/4 inch from level, 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

3.4 INSTALLATION OF ACCESSORIES

A. Install door frames, doors, overhead doors, windows and glass, and other accessories per manufacturer's instructions.

B. Seal wall and roof accessories watertight and weather-tight with sealant.

3.5 GUTTER AND DOWNSPOUT ERECTION

A. Rigidly support and secure components. Joint lengths with formed seals sealed watertight. Flash and seal gutters to downspouts.

B. Apply bituminous paint on surfaces in contact with cementitious materials.

C. Slope gutters minimum 1/8 inch per foot.

END OF SECTION

SECTION 22 05 00

MECHANICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General requirements for mechanical systems.

B. General requirements for submittals, labelling, and servicing mechanical systems.

C. Locating equipment and test run mechanical systems.

1.2 SUBMITTALS

A. General: Submittals must indicate proper arrangements to suit installation and maintenance requirements such as but not limited to motor location, access door openings, filter removal, piping connections.

Clearly mark equipment submittal sheets indicating equipment symbol and exact selection of proposed equipment.

B. Shop Drawings: Submit complete, bound, indexed, loose leaf binder large enough for all items, including:

1. Equipment schedule items.
2. Vibration elimination devices.
3. Valves.
4. Insulation.
5. Registers and grilles.
6. Automatic temperature controls.
7. Certificates of guarantee.

C. Pipe Tests: When requested, submit a report of tests performed by pipe manufacturer and the date each test was completed.

1.3 LABELING

A. Identify all critical items of equipment with permanently etched, laminated plastic labels indicating function or relationship of each piece of equipment to system involved. Secure all labels in place in a clearly visible location with appropriate self-tapping screws.

B. Mark pipe continuously to identify such information as nominal size, pressure rating, industry standards designation number, etc.

1.4 SERVICE

A. Provide emergency service for mechanical systems.

B. In the event of a system Failure, OWNER shall be able to telephone a single request for complete service call by using a number furnished under the contract. The service organization shall dispatch in the time specified by the ENGINEER a person to the site who shall be able to analyze the systems and locate the malfunction. If work should be required out of the normal trade definition, it shall be the responsibility of this service organization to contact the CONTRACTOR or any other specialty involved, and take the responsibility of completing the repairs and putting the system into operation.

C. Service shall be provided by a service business, established and experienced in this work. Complete information in regard to this service organization, showing the personnel, equipment, location, experience, etc., shall be submitted for review along with other items of the system.

D. This service shall be provided starting at the date of Substantial Completion, and for the duration of the CONTRACTOR's guarantee period.

PART 2 PRODUCTS

2.1 EQUIPMENT

A. Where 2 or more units of the same class of new equipment are required, provide units of single manufacturer.

B. Use standard products of the manufacturer unless indicated otherwise.

PART 3 EXECUTION

3.1 ROUGH IN REQUIREMENTS

A. Refer to architectural, structural, mechanical, civil and electrical Drawings.

B. Verify that equipment dimensions meet space requirements with sufficient clearances as may be required by equipment used and as indicated.

C. Check building and equipment dimensions for exact placement of sleeves, conduit and equipment.

D. Determine requirements and dimensions relating to manufacturer's Shop Drawings.

E. Make changes required due to lack of coordination at no additional cost to OWNER.

3.2 ACCESSIBILITY FOR MAINTENANCE

A. Coordinate location of equipment such as valves, dampers, fixtures, motors, fans, controls, etc. to allow accessibility for maintenance.

B. Ensure access for service or maintenance for proper operation and function.

C. To facilitate function, coordinate mechanical work of all other trades to avoid concealing equipment.

D. Refer any critical location or assembly conflicts to the ENGINEER.

3.3 **TEST RUN**

A. Perform preliminary operation of all mechanical systems in cooperation with all trades involved.

B. Arrange time of test run.

C. Make operating test by a team consisting of manufacturer's representative, CONTRACTOR's representative and ENGINEER.

D. Complete test run in 1 working day including possible different date identification and recheck of significant items under different working conditions.

END OF SECTION

SECTION 22 11 13

FACILITY WATER DISTRIBUTION PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of building water piping, gas piping, drain piping, and related work.

B. Installation of pipe hangers, sleeves, supports, brackets, and related items.

C. Testing of piping systems and correction of any problems found to exist.

1.2 REFERENCES

A. ASME B31.1: Power Piping.

1.3 PIPING SYSTEM LAYOUTS

A. Piping system Drawings are diagrammatic and are intended to show approximate location of equipment and piping. Verify dimensions, whether in figures or scaled, in the field. CONTRACTOR is responsible for the installation of complete and workable systems whether completely detailed on the plans or not.

B. Ascertain locations of apparatus, fixtures, equipment, and piping in the field, and layout work accordingly. ENGINEER reserves the right to make minor changes in location of piping and equipment up to the time of installation without additional cost to OWNER.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

A. Install work per applicable provisions of codes, rules, regulations, statutes, and ordinances of authorities having jurisdiction.

PART 2 PRODUCTS

2.1 PIPE

A. Use the size, type, and class of pipe for various uses as indicated.

1. Steel pipe lined and coated, Section 33 05 09.
2. Ductile iron pipe, Section 33 05 05.
3. Copper pipe, Section 33 05 03.
4. PVC pipe, Section 33 05 07.
5. ABS pipe, Section 33 05 01.

B. Do not substitute different pipe unless approved in writing prior to Substitution. Refer to Section 01 25 00.

2.2 PIPE HANGERS AND SUPPORTS

A. Properly support, suspend, or anchor all piping and fittings to prevent sagging, overstressing, or longitudinal movement of piping, and to prevent thrust or loads on or against other equipment.

B. Support horizontal piping on adjustable split steel ring or clevis hangers. The following schedule shows minimum spacing.

1. Steel and Copper:

a. 1-1/4" and smaller 6'-0" on center
b. 1-1/2" thru 3" 8'-0" on center
c. 4" and larger 12'-0" on center

2. PVC, CPVC, and ABS:

a. 1" and smaller 4'-0" on center
b. 1-1/4" thru 2" 5'-0" on center
c. 2-1/2" thru 4" 6'-0" on center
d. 5" and larger 8'-0" on center

C. Support insulated piping with pipe saddles and hangers that fit on outside of insulation. Do not compress or damage pipe insulation with hangers or supports.

D. Provide all rigid hangers with a means of vertical adjustment after erection.

E. Use copper or copper plated hangers for supporting uninsulated copper pipe.

F. Use one of the following means of supporting horizontal piping from a wall.

1. Steel J-Hook for pipe located close to wall, up to 3 inches pipe.
2. For hanger suspension with 750 lbs. maximum loading, use light welded steel bracket with hole for one rod, 3/4 inch diameter.
3. For pipe-roll stand support use welded-steel bracket.

G. For vertical piping supports for all pipe except copper:

1. Support vertical piping with wrought steel riser clamps. Make adequate provision for expansion, contraction, and lateral stability.
2. Use steel extension pipe clamps for vertical pipe supports. Refer to manufacturer's rated maximum loading for each size pipe. Bolt clamp securely to pipe rest, clamp end extension on building structure.
3. Where pipe sleeves extend above floor, place pipe clamps at ceiling below, support clamp end extension from inserts.

H. For uninsulated vertical copper tubing lines, furnish copper tube straps.

I. Use beam clamps that are of malleable iron for 3/8 inch hanger rods; forged steel beam clamp for hanger rod up to 1-1/2 inches.

2.3 INSERTS

A. Furnish and set inserts in concrete forms; provide reinforcing rods for pipe sizes over 3 inches or equivalent.

B. Furnish concrete inserts as follows: Black, malleable iron, universal type for threaded connections with lateral adjustment.

2.4 SHIELDS

A. Provide shields to protect insulation in all areas.

B. Provide approved galvanized form shields to protect insulation at areas of contact with hangers and supports.

C. Furnish low compressive insulation protector shields. Size per shield manufacturer's recommendations.

2.5 SLEEVES

A. Where pipes pass through floors, footings, foundations, walls, or ceilings, furnish and install pipe sleeves. Sleeves for concealed piping shall be of galvanized iron, and for exposed piping on I.P.S. black steel pipe installed so as to be completely covered by escutcheons. Extend sleeves through floors 1/2" above finish floor.

2.6 ESCUTCHEONS

A. Fit pipe passing through walls, floors, or ceilings with escutcheons with set screws.

B. Use prime painted escutcheons where surface is to receive a paint finish; otherwise, use escutcheons that are nickel or chromium plated.

C. Where piping is insulated, use escutcheon outside the insulation.

2.7 JOINTS

A. For screwed pipe make ends with sharp, clean tapered threads using pipe compound on male thread only. Do not use mill cut threads. Ream cut pipe to full inside diameter.

B. Welding may be done by either the arc or acetylene process conforming to the requirements of the ASME B31.1.

C. For solder joints use fittings specifically made for soldering. Clean all burrs and roughen pipe to clean, Solder complete around joint.

D. For grooved pipe jointing systems use mechanical pipe couplings and fittings.

E. For no-hub cast iron pipe use double screw joint neoprene coupler.

2.8 **UNIONS**

A. Furnish and install unions necessary for installation and necessary to permit removal of equipment.

B. For unions in steel pipe 1-1/2 inches and smaller use malleable iron ground joint unions with brass to iron seat, galvanized or black as required.

C. For larger unions in steel pipe use standard weight, cast iron flange unions with 1/16 inch thick gaskets, galvanized or black as required.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Prior to installation of piping, verify that it will not interfere with clearances required for the erection and finish of structural members, architectural members, electrical, sprinkler, or mechanical items.

B. Hang or support piping materials from roof Support System whenever possible.

C. Do not cut any structural members for installation of piping.

3.2 **INSERTS**

A. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.

B. Set inserts in position in advance of concrete work. Provide reinforcement rod in concrete for inserts carrying pipe over 4 inches in diameter.

C. Where concrete slabs form finished ceiling, finish inserts flush with slab surface.

D. Where inserts are omitted, drill through concrete slab from below and provide rod with recessed square steel plate and nut above slab.

3.3 **SLEEVES**

A. Set sleeves in position in advance of concrete work. Provide suitable reinforcing around sleeves.

B. Extend sleeves through potentially wet floors 1 inch above finished floor level. Caulk sleeves full depth and provide floor plate.

C. Where piping passes through floor, ceiling, or wall, close-off space between pipe and construction with noncombustible insulation. Provide tight-fitting metal caps on both sides and caulk.

3.4 **PIPE HANGERS AND SUPPORTS**

A. Support all piping and make adequate provisions for expansion, contraction, slope, and anchorage.

B. The use of pipe hooks, chains, or perforated metal for pipe support will not be permitted.

C. Suspend all piping in the building as indicated.

D. Install hangers to provide minimum 1/2 inch clear space between finished covering and adjacent work.

E. Place a hanger within 1 foot of each horizontal elbow.

F. Use hangers that are vertically adjustable 1-1/2 inch minimum after piping is erected.

G. Support horizontal soil pipe near each hub, with 5 feet maximum spacing between hangers.

H. Support vertical piping at every other floor. Support vertical soil pipe at each floor and at hub.

I. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

J. Where practical, support riser piping independently of connected horizontal piping.

3.5 **PIPING INSTALLATION**

A. Cut piping accurately for fabrication to measurements established at the construction site and work into place without springing or forcing.

B. Remove burrs and cutting slag from pipe by reaming or other approved cleaning methods.

C. Make changes in direction with proper fittings.

D. Arrange piping so as not to interfere with the removal of other equipment, ducts, or devices. Do not block doors, windows, or access openings. Provide unions in the piping at connections to all equipment. Unions must be accessible.

E. Make connections of dissimilar metals (such as copper and steel) with insulating couplings suitable for at least 175 psig working pressure at 250 deg. F.

F. Cap or plug open ends of pipes and equipment with PVC caps or expanding neoprene plugs to keep dirt and other foreign materials out of the system. Plugs of rags, wool, cotton, waste, or similar materials are not acceptable.

G. Install all piping systems so they can easily be drained. Provide hose bibs at low point of water lines.

H. Slope all soil and waste lines within the building at 1/4 inch per foot fall in the direction of flow unless indicated otherwise.

3.6 **PRIMING AND COATING**

A. Prime coat exposed steel hangers and supports and hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces.

B. Color Code; Section 09 91 00.

3.7 DISINFECTION AND TESTING

A. Disinfect culinary water piping, Section 33 13 00.

B. Test culinary water piping, Section 33 08 00.

C. Repair defects that develop under tests promptly and repeat tests. No caulking of screwed joints, cracks, or holes will be permitted. Replace pipe or fitting or both with new material when repairing leaks in screwed joints.

D. Repair leaks in copper tubing by melting out joint, thoroughly cleaning both tubing and fitting, and resoldering.

END OF SECTION

SECTION 22 11 23

WATER PUMP

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Base mounted, in-line vertical, in-line circular, sewerage, and positive displacement pumps and materials.

1.2 SUBMITTALS

A. Prior to installation: Drawings, detailed specifications, dimensions, make, style, speed, size, type, horsepower, full load amps, head-capacity curves, efficiency curves, net positive suction head (NPSH) curves, specific materials used, design features and weights.

B. After operation of system: Pump test start up certificate from pump manufacturer.

PART 2 PRODUCTS

2.1 FABRICATION -GENERAL

A. Statically and dynamically balance rotating parts.

B. Except for submerged pumps or unless otherwise directed, tap pumps at the suction and discharge for pressure gages.

C. Construction: Permit complete servicing without breaking piping or motor connections.

D. Speed: 1750 rpm.

E. Connections: Flanged and bolted.

2.2 BASE MOUNTED PUMP

A. Type: Centrifugal, single or multi stage, direct connected.

B. Casing: Cast iron, split volute, single or double suction, rated for greater of 150 psi or 1.25 times actual working discharge pressure, renewable bronze wearing rings, flanged suction and discharge.

C. Impeller: Bronze, fully enclosed, keyed to shaft.

D. Shaft: High grade alloy steel with copper, bronze, or stainless steel shaft sleeves.

E. Bearings: Oil lubricated roller or ball bearings with oil reservoirs. Provide oil seal and integral dirt and water seal at each end of reservoir.

F. Drive: Flexible coupling with coupling guard.

G. Seals: Packing gland with minimum 4 rings teflon impregnated packing and gland lantern rings.

H. Baseplate: High grade, heat treated cast iron or reinforced heavy steel with integral drain rim grout base.

2.3 VERTICAL IN-LINE PUMP

A. Type: Centrifugal, single stage, close coupled in-line, back pullout design, suitable for horizontal or vertical operation.

B. Casing: Cast iron, rated for greater of 125 psi or 1.5 times actual discharge working pressure, suction and discharge gage port, air vent, wear rings, seal flush connection, drain plug, flanged suction and discharge.

C. Impeller: Bronze, fully enclosed, keyed to shaft and secured with locknut.

D. Shaft: Stainless steel or carbon steel with bronze or stainless steel sleeve through seal chamber.

E. Seals: Packing gland with minimum 4 rings teflon impregnated packing and gland lantern rings.

2.4 IN-LINE CIRCULATOR

A. Casing: Bronze cast iron rated for 125 psi working pressure.

B. Impeller: Bronze.

C. Shaft: Alloy steel with integral thrust collar and 2 oil lubricated bronze sleeve bearings.

D. Seal: Carbon rotating against a stationary ceramic seat.

2.5 SEWAGE PUMP (NONSUBMERSIBLE)

A. Type: Vertical centrifugal, direct connected, simplex or duplex.

B. Casing: Cast iron volute with radial clearance around impeller.

C. Impeller: Bronze or cast iron, nonclogging, semi-open, keyed to the stainless steel shaft.

D. Support: Cast iron pedestal registered and dowelled with inspection openings on cast iron sub-coverplate, bolted to steel coverplate with gas tight gaskets.

E. Bearings: Forced grease lubricated bronze sleeve every 6 feet and force grease lubricated ball thrust above.

F. Packing boxes extra deep and grooved with heavy-duty packing arrangement with bronze lantern ring for water seal attachment.

G. Drive: Flexible coupling.

H. Controls Duplex: Alternator to alternate operation of pump on average load, cut-in second pump on rising level or pump Failure, separate high level alarm.

2.6 SUBMERSIBLE PUMP

A. Section 22 13 33.

2.7 POSITIVE DISPLACEMENT PUMP

A. Type: Single stage, rotary gear.

B. Pumps: Cast iron casing hardened shaft with stainless steel sleeves and mechanical seal, self-lubricating bronze bearings, inlet and outlet connections, and integral bypass type adjustable relief valve.

C. Drive: Flexible coupling with coupling guard.

D. Base: Cast iron common mounting for pump and motor with drop rim and drain tapping.

PART 3 EXECUTION

3.1 INSTALLATION

A. Secure pumps to floor or base as indicated and per the manufacturer's recommendations.

B. Provide drains for bases and stuffing boxes piped to and discharging into floor drains.

C. Provide air cock and drain connection on horizontal pump casings.

D. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump so no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and over.

3.2 PUMP TESTING AND START-UP

A. Test the pump for flow, speed, vibration, and amperage draw. Factory representative shall certify that the installation is correct and the pumps are functioning properly.

END OF SECTION

SECTION 22 13 33

SUBMERSIBLE PUMP

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submersible pump with controls and components.

B. Coordinate installation with work of separate trades.

1.2 DESIGN REQUIREMENTS

A. Statically and dynamically balance rotating parts.

B. Pumps to operate under continuous submergence at a minimum depth of 35 feet without loss of watertight integrity.

C. Capable of handling storm water, sanitary sewerage, and wastewater.

D. Pump to operate at 1750 rpm unless indicated otherwise.

E. Design to permit complete servicing without breaking piping or motor connections.

F. Motor temperature rise to conform to latest NEMA standards for submersible pumps.

1.3 SUBMITTALS

A. Substitutions: Section 01 25 00.

B. Shop Drawings: Section 01 33 00 for pumps, electrical connections and controls.

C. Pump Curves: Certified pump performance characteristics with pump and system operating point plotted. Include net positive suction head (NPSH) curve.

D. Motor and Cable Insulation Test: For moisture content or insulation defects.

E. Pump manufacturer's certificate that installation is correct and the pump(s) function properly relative to flow, speed, vibration and amperage draw.

1.4 HANDLING AND STORAGE

A. Protect against damage and dirt during shipping and storage.

PART 2 PRODUCTS

2.1 MAJOR PUMP COMPONENTS

A. Gray case iron, Class 30 casing, with smooth surfaces devoid of blow holes and other irregularities.

B. Stainless steel exposed bolts and nuts, Section 05 05 23.

C. Waterproof exterior. Manufacturer select exterior spray with PVC epoxy primer chloric rubber paint finish.

2.2 DISCHARGE CONNECTION ELBOW

A. Installed in the wet well.

B. Make connection of pump to discharge connection elbow automatic when pump is lowered into place in a simple downward motion.

C. Provide sliding guide bracket and guide bar(s) as part of the discharge connection elbow.

D. Guarantee sealing of the discharge interface.

2.3 MATING SURFACES

A. Seal all mating surfaces. Do not use secondary sealing compounds, gaskets, grease, or other devices.

2.4 CABLE ENTRY

A. Watertight and submersible seal for cable entry into pump.

B. Isolate cable entry junction chamber and motor from each other so foreign material entering through the pump top (if any) shall not have access to the motor.

C. Do not use epoxies, silicones, or other secondary sealing systems.

2.5 PUMP MOTOR

A. Squirrel-cage, induction, shell type design, housed in an air-filled, watertight chamber, NEMA design B type with stator winding and stator leads insulated against moisture and temperatures less than 311 deg. F.

B. Design for continuous duty, capable of sustaining a minimum of 10 starts per hour.

C. Capable of continuous operation at totally, partially or non-submerged conditions.

2.6 JUNCTION CHAMBER

A. Junction chamber to contain the terminal board.

B. Connection Between Cable and Stator Leads: Perfectly leak-proof.

2.7 COOLING SYSTEM

A. Provide an adequately designed cooling system for the pumps.

B. Provide provision for external cooling and flushing.

2.8 THERMAL SENSORS

A. Use thermal sensors to monitor stator temperatures that are wired to the control panel.

2.9 PUMP SHAFT SEAL

A. Carbon steel shaft completely isolated from the pumped liquid by a mechanical rotating shaft seal system. Seals require neither maintenance nor adjustment, which can be easily inspected and replaced.

B. Do not use a pressure differential consisting of a single or double spring action between upper and lower sealing units to offset external pressure and to effect shaft sealing.

C. Use oil as seal lubricant. Provide drain and inspection plug, with positive anti-leak seal that is easily accessible from the outside.

2.10 SHAFT BEARINGS

A. Permanently lubricated bearings capable of 5 years continuous operation.

B. Use bearings capable of operating for short periods of time with the discharge valve closed.

2.11 IMPELLER

A. Dynamically balanced, double shrouded, nonclogging design having a long thrulet without acute turns capable of handling solids, fibrous materials, heavy sludge and other similar materials.

B. Fit the impeller and the shaft by sliding and using a key to lock.

2.12 VOLUTE

A. Designed with smooth fluid passages large enough at all points to pass any size solid which can pass through the impeller.

B. Install a wear ring system to provide efficient sealing between the volute and impeller.

2.13 PUMP MOTOR CABLE

A. Use pump motor cable suitable for submersible pump application. Conform cable sizing to NEC specifications for pump motors.

B. Seal pump cable end with a high quality protective covering to make it impervious to moisture or water seepage prior to electrical installation.

C. Provide 1 foot extra length of cable for each 50 feet of depth.

D. Provide 10 feet of extra cable beyond surface plate.

E. Provide corrosion resistant shield where cable passes pump volute.

2.14 **ACCESS FRAME, GUIDES AND DOOR**

A. Provide access frame to the discharge connection elbows complete with hinges and flush locking mechanism, upper guide holder and level sensor(s) cable holder. Provide frame with sliding nut rails to attach the accessories required. Lower guide bar holder(s) shall be integral with the discharge connection elbow.

B. Provide guide bars of the size necessary to lift and lower the pump(s) without bending, binding, or vibration. Do not support any portion of the weight of the pump of the guide bars.

C. Provide surface plate with adequate rigidity to support the system, but with sufficient openings to allow free access to cable, vent and water.

D. Access doors of skid proof design.

E. All components galvanized or zinc coated, Section 05 05 10.

2.15 **CONDUIT SYSTEMS**

A. Section 26 05 33.

B. Do not use flexible conduit.

2.16 **CONTROL PANEL**

A. Solid state logic circuitry operational in temperature range of -40 deg. F. and +120 deg. F. and waterproof, designed for outdoor use, lockable and containing line voltage pump power circuit and lower voltage pilot control circuit or approved equivalent. The pilot control circuit takes power from the same terminal board. Perform the following functions:

1. Start and stop pumps at required water levels.
2. Alternate the sequence of starting via manual or automatic selection.
3. Start progressively more pumps if water level in sump continues to rise.
4. Instant disconnect from power source in the event of major electrical fault.

B. Equip the panel with all protective devices for motors as disconnects, relays, hand-auto-off switches designed for three phase 480/277 volt power system to control the pumps via the operation of the liquid sensors.

C. On/off pump running lights in the control panel for each pump.

D. Adjustable thermostat heater.

2.17 **STRAINER**

A. Strainer with net inlet area 3 times (if indicated) the net inlet area of impeller.

2.18 **TIMERS**

A. Provide timers such that the operating time of each pump can be continuously

monitored. Fit each timer with a reset capability to restart timing cycle.

PART 3 EXECUTION

3.1 INSTALLATION

A. Check impeller, motor rating, and electrical connections for compliance with manufacturer's recommendations.

B. Secure pumps as indicated and per the manufacturer's recommendations.

3.2 PUMP TESTING AND START-UP -FIELD

A. Prior to submergence, run the pump dry to establish correct rotation and mechanical integrity.

B. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are nonoverloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

C. Run the pump for a minimum of 30 minutes submerged, under 6 feet of water minimum. Retest motor and cable insulation.

D. Qualified millwright to check, align, and certify base mounted pumps prior to start-up.

E. Testing: Run a complete operating test of the pumps and associated equipment after installed in the field.

1. Dry Test: Turn on the power to all equipment. With the pump station dry, activate the number 1 pump liquid level sensor. Then activate the number 2 pump and the number 3 pump liquid level sensors. Check the "pumps running" lights on the control panel to see that they are operating properly. Deactivate all sensors. Pump systems should turn off and the number 1 pump should switch to become the lag pump with the number 2 pump becoming the lead pump. Repeat the above process to verify that the pumps have transferred the lead.
2. Wet Test: Provide a source of water adequate for this test. Conduct this test identically to the Dry Test. All equipment must pass these tests. Repair or replace any equipment failing to operate properly at no additional cost to OWNER.

F. Start-up: Instruct OWNER's personnel, Section 01 78 23.

END OF SECTION

SECTION 26 05 00

ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General requirements for electrical systems.

B. Requirements for submittals, quality assurance, product handling and coordination.

1.2 REFERENCES

A. NFPA 70: National Electrical Code.

1.3 ELECTRICAL SYSTEM LAYOUTS

A. Drawings are diagrammatic, intended to indicate general scope and locations of work to be installed.

B. Furnish as if called for in detail by the Contract Documents all items of labor and material or equipment incidental to or necessary for the complete installation and proper operation the electrical work.

1.4 SUBMITTALS

A. Section 01 33 00.

B. Electrical installation certificate from electrical inspection authority having jurisdiction.

C. Wiring Layout: Prior to installation of the electrical work, submit a complete wiring layout, showing arrangement of all circuits, conduits, and control equipment, size of conduit, conductors, wiring diagrams and connections of all equipment necessary for full understanding and record of the installation.

1.5 QUALITY ASSURANCE

A. Section 01 43 00

B. Workmanship to be neat with good appearance, NFPA 70.

1.6 SUBSTITUTIONS

A. Section 01 25 00.

B. Resolve any conflict arising from use of substituted equipment.

C. Pay all costs required to make equipment comply with intent of Contract Documents. All approvals shall be obtained in writing.

1.7 **COORDINATION**

A. Section 01 31 13.

B. Plan all work to proceed with a minimum of interference with other trades.

C. Inform affected trades of all openings for electrical work.

D. Furnish all special frames and sleeves as indicated in other sections.

1.8 **PRODUCT HANDLING**

A. Section 01 65 00.

B. Deliver all materials to the job bearing manufacturer's name and trade name and UL label in every case where a standard has been established for that particular material.

C. Store product in original containers, protect from elements, and make readily accessible for Inspection until ready for installation.

1.9 **PROJECT CONDITIONS**

A. Notify ENGINEER if a discrepancy occurs between the equipment supplied and the intent or function of the equipment, catalog numbers, discontinued products, Drawings, Specifications, etc.

B. Failure to report any conflict does not relieve CONTRACTOR from meeting the intent of the Contract Documents nor shall it change the contract cost.

C. Perform all required digging, cutting, incidental work, and make required repairs.

D. Do not cut into any structural element without written approval.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 26 05 13

CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of wires or cables required for power distribution, service, feeders, and branch circuits.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. NFPA 70: National Electrical Code.

B. UL: Underwriters' Laboratories, Inc.

1.3 SUBMITTALS

A. Field Test Data: Submit megohmmeter test data for circuits under 600 volts.

PART 2 PRODUCTS

2.1 MATERIALS

A. Building Conductors: Copper, 600 Volt insulation, THW.

B. Branch Circuit Conductors and All Conductors #3 AWG and Smaller: Copper conductor, with TW, THHN, or THWN insulation #10 AWG and smaller, and THW larger than #10 AWG, where ambient temperature conditions exceed 140 deg. F.

1. Size all conductors; NFPA 70.
2. Minimum size to be #12 AWG.
3. Stranded conductors for #8 AWG and larger.
4. For outlets to fixtures, and in fixture channels (in dry areas); THHN insulated conductor.
5. In damp locations, under slabs, on exterior provide THWN.

C. Fire Alarm System Conductors: Cross-linked thermosetting polyethylene (RW90 X-link) type insulating.

D. Provide permanent plastic name-tag indicating load feed.

E. Use type XHHW conductors for water pumping and regulator stations.

F. Cable Supports: OZ cable supports for vertical risers, type as required by application.

2.2 COLOR AND CODING OF CONDUCTORS

A. 120/208 volt.

1. A Phase -Black
2. B Phase -Red
3. C Phase -Blue
4. Neutral -White
5. Ground -Green

PART 3 EXECUTION

3.1 INSTALLATION

A. Make conductor length for parallel feeders identical.

B. Lace or clip groups of feeder conductors at distribution center, pull-boxes, and wireway. Neatly arrange wiring within cabinets, junction boxes, fixtures, etc.

C. Provide copper grounding conductors and straps.

D. Install wire and cable in code conforming raceway.

E. Use non-detrimental wire pulling lubricant for pulling No. 4 AWG and larger wire.

F. Install wire in conduit runs after concrete and masonry work is complete and after moisture is swabbed from conduits.

G. Color code conductors to designate neutral conductor and phase.

H. Furnish necessary reels, reel jacks, and other pulling aids required to prevent damage to wires and cable.

I. Splicing:

1. Install wires and cables continuous without splices from sources of supply to distribution equipment and from source of supply to motor, lighting, or power outlet.
2. Do not use pull boxes for making splices.
3. Do not install splices in conduits.

J. Install all wiring; NFPA 70.

K. Use of cable with more conductors then specified; CONTRACTOR's option. When done, tape off and labeled extra conductors as spares.

3.2 CONDUCTOR CONNECTIONS

A. Use approved pressure type solderless connectors and lugs for service entrance, feeder, equipment connections and terminal posts.

B. Use connectors of a type compatible to conductors, locations, and load.

C. Make neutral connection and taps individually in order to prevent the possibility of an "open-neutral".

D. Make branch circuit connections with UL approved solderless connectors. Do not depend solely upon a single insulating material to secure connection as well as to insulate it.

E. After first either silverplating the bars or applying suitable non-oxidizing agents, bolt buss bar connections with adequate nonferrous bolts, washers, and lockwashers.

F. Insulate joints and taps with patented or molded plastic insulators. Use tapes compatible with conductor jackets, temperature, and other conditions.

3.3 SPECIAL WIRING

A. Special Systems: Furnish and install equipment, materials, labor, services, and accessories required for completion of any special systems of an electrical nature, but not classified otherwise herein, that may be indicated. Applicable portions of NFPA 70 also apply.

3.4 HAZARDOUS AREAS

A. Comply with NFPA 70 when installing wiring, fixtures, and equipment in locations classified as "Hazardous Locations".

3.5 AFTER INSTALLATION TEST FOR CABLE 600 VOLTS AND BELOW

A. Prior to energization, test cable and wire for continuity of circuit and for short circuits. Megger all circuit of 100 amp and greater rating.

B. Correct malfunctions.

C. Submit record of megahmmeter readings to ENGINEER.

3.6 IDENTIFICATION OF FEEDERS

A. Affix a marker stamped or embossed on each cable at each entry to and exit for each manhole, pullhole, pullbox, cable tray switchgear and switch, identifying circuit; i.e. "MCCI", "PANEL L" "NO 1" etc.

B. Identification letters to be 1/8 inch size minimum.

C. Markers to be rigid, noncorrosive, attached to feeder cables with feeder identification.

D. Nylon straps to be used to tie the markers.

END OF SECTION

SECTION 26 05 33

RACEWAY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flexible or rigid conduits, couplings, supports, and nonmetallic ducts.

B. Related work includes but is not limited to,

1. Trench backfill, Section 33 05 20 .
2. Landscape restoration, Section 32 92 00 or Section 32 93 13.
3. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ANSI C80.1: Rigid Steel Conduit -Zinc-Coated.

B. ANSI C80.3: Electrical Metallic Tubing -Zinc-Coated.

C. FS W-F-406: Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible.

D. FS WW-C-566: Conduit, Metal, Flexible.

E. NEMA TC6: PVC and ABS Plastic Utilities Duct for Underground Installation.

F. NEMA TC9: Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation.

G. NFPA 70: National Electric Code.

H. UL: Underwriters' Laboratories, Inc.

PART 2 PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) as indicated; with minimum trade size of 3/4 inch.

B. Rigid Metal Conduit (RMC): ANSI C80.1.

C. Intermediate Metal Conduit (IMC): ANSI C80.1.

D. Rigid and Intermediate Steel Conduit Fittings: Provide fully threaded malleable steel couplings; raintight and concrete tight where required by application. Provide double locknuts and metal bushings at conduit termination, use OZ type B bushings on conduits 1-1/4 inch and larger.

E. Electrical Metallic Tubing (EMT): ANSI C80.3.

F. EMT Fittings: Provide insulated throat non-indenter type malleable steel fittings; concrete tight where required by application. Install OZ type B bushings on conduits 1-1/4 inches and larger.

G. Flexible Metal Conduit (FMC): FS WW-C-566, Zinc-coated steel.

H. Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 1, Style A.

I. Liquid Tight Flexible Metal Conduit: Provide liquid-tight, flexible metal conduit; constructed of single strip, flexible continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coated with liquid-tight jacket of flexible polyvinyl chloride (PVC).

J. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G.

K. Expansion Fittings: OZ Type AX, or equivalent to suit application.

2.2 NON-METALLIC CONDUIT AND DUCTS

A. General: Minimum trade size: 3/4 inch.

B. Underground PVC Plastic Utilities Duct: NEMA TC6, Type I for encased burial in concrete, Type II for direct burial.

C. Duct Fittings: NEMA TC9, match to duct type and material.

2.3 CONDUIT, TUBING, AND DUCT ACCESSORIES

A. Provide conduit, tubing and duct accessories of types and sizes, and materials, complying with manufacturer's published product information, which mate and match conduit and tubing. Provide manufactured spacers in all duct bank runs.

2.4 LOCKNUTS, BUSHINGS, CONNECTORS, COUPLINGS, AND SUPPORTS

A. General: Provide malleable bushings, except that plastic bushings may be used in lieu of phenolic-lined malleable bushings where "insulating bushings" are required.

B. Provide "double-locknut" system (2 locknuts) throughout, each being tightened wrench tight as to effectively bond outlet box or cabinet to conduit.

C. Sealing Bushing: OZ Type FSK, WSK, or CSMI as required by application. Provide OZ type CSB internal sealing bushings.

D. Provide insulated-through type ground bushing of the malleable type.

E. Provide connectors or couplings that are proper for the conduit they are used with. Make watertight when required.

F. Provide cadmium plated or galvanized fittings.

G. Provide fittings with die-cut threads unless approved otherwise.

H. EMT connectors used with #4 and larger cable shall have throat liners of suitable plastic insulation.

2.5 INTERIOR OUTLET BOXES

A. Section 26 05 34.

2.6 SCHEDULE OF LOCATIONS

A. Galvanized steel conduit in concrete.
B. Electrical metallic tubing in other locations.
C. For underground conduit use rigid, threaded, galvanized steel conduit, or solvent welded PVC conduit.
D. Make connections to motors and equipment with PVC jacketed flexible conduit and liquid tight connectors. Provide 1/2 inch minimum size for motor connections.
E. Provide flexible conduit for fixture and control wiring with sufficient length of flexible conduit to avoid transmission of vibration.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate utility locations; Section 01 31 13.
B. Excavate; Section 31 23 16.

3.2 INSTALLATION

A. Install conduit concealed in all areas, excluding mechanical and electrical rooms, connections to motors, and connections to surface cabinets.
B. For exposed runs attach surface-mounted conduit with clamps.
C. Coordinate installation of conduit in masonry work.
D. Unless indicated otherwise, do not install conduit larger than 2-1/2 inches in concrete slabs. Provide a minimum concrete cover around conduits of 2 inches.
E. Install conduit free from dents and bruises. Plug ends to prevent entry of dirt and moisture.
F. Clean out conduit before installation of conductor.
G. Alter conduit routing to avoid structural obstructions, minimizing crossovers.
H. Fill end of conduit with fiberglass where conduits leave heated area and enters unheated area.
I. Provide flashing and pitchpockets, making watertight joints where conduits pass through roof or waterproofing membranes.
J. Install UL approved expansion fittings complete with grounding jumpers where conduits cross building expansion joints. Provide bends or offsets in conduit adjacent to building expansion joints where conduit is installed above suspended buildings.
K. Route all exposed conduits parallel or perpendicular to building lines.
L. Make interconnections between difference types of raceways with manufactured fittings approved by UL.

M. Size raceways; NFPA 70 tables. Do not reduce from any sized indicated.

N. Do not exceed sizes permitted in slabs or walls.

O. Do not exceed number of bends allowed in conduit by NFPA 70.

P. Make joints wrench tight or otherwise with minimum resistance to the flow of fault currents.

Q. Use furred spaces and chases to an advantage in concealing conduits.

R. Make field bends only where needed and then carefully to minimize wire pulling tensions and for best appearance in exposed runs.

S. Test conduit runs with lignum vitale ball (mandrel) of 85 percent of conduit diameter.

T. Cut conduit with hacksaw or other approved pipe cutting tool and ream ends to clean out all burrs before connecting.

U. Keep conduits at least 6 inches away from steam or hot water pipes, breaching, and boilers, but in no case permit conductors to reach higher than rated temperatures. Avoid traps in runs and slope conduit to drain.

V. Fasten raceways securely in place. Firmly fasten conduit within 3 feet of each outlet, junction box, cabinet, or fitting. Support metallic conduit, rigid (heavy wall) and EMT at least every 10 feet. Support rigid nonmetallic conduit in strict accordance with NFPA 70. Use raceway fasteners designed for the purpose.

3.3 SPECIAL CONDUIT FITTINGS

A. Use special conduit fittings as required or indicated. Use UL approved fittings suitable for location and usage made.

B. At expansion joints use special fittings if cast in concrete slabs.

C. Building Expansion Joints: Where surface conduits, raceways, panels, or light fixtures, span building expansion joints, make satisfactory arrangements to provide the movement provided for in building structure plus or minus nominal joint width.

3.4 PULL BOXES, WIREWAYS, AND GUTTERS

A. Furnish as indicated, plus any such items required to assemble conduits and other raceways. Provide Section 26 05 34 pull boxes as dictated by wire pulling requirements. Unless indicated otherwise face into secondary or unfinished rooms.

B. Construction: Code gage galvanized sheet steel and sized strictly in conformance with NFPA 70 requirements.

C. Finish: Free of burrs, sharp edges, unreamed holes, and sharp-pointed screw or bolts. Paint both inside and out.

D. Coating: When mounted direct to concrete or masonry walls that are below grade or where there will be sweating or other moisture present on wall surface, coat backs of boxes with a heavy coat of black asphalt paint before mounting.

E. Protection: Adequate provisions for preventing damage to conductors either during pulling in or from weights and tensions when in place.
F. Weatherproof, rain-tight, or special type when indicated or when required by NFPA 70.

3.5 ANCHORS, FASTENERS, AND MISCELLANEOUS SUPPORTS

A. Use compatible anchors in roof or ceiling slabs of concrete from which a load is suspended and anchors used to fasten heavy equipment without lead in their construction.
B. Make exposed conduit fastenings with one-piece, malleable conduit clamps. Two hole, galvanized sheet metal pipe straps may be used on all concealed installations.
C. Use companion bases or backs with conduit clamps when conduit is exposed to weather or continuous moisture.
D. Use ring type hangers on individual runs of conduit 3 inches and larger if suspended, complete with threaded rods. Use adjustable turnbuckles when specified or otherwise as an option.
E. Support multiple runs of suspended conduits from trapeze style hangers suspended with rigid threaded steel rods and with suitable conduit clamps or straps of the same make as cross channels used.
F. Mount multiple runs of conduit on ceiling or wall surfaces.
G. Do not hang or support electrical equipment and materials from roof decks.

3.6 COLOR CODING, EXPOSED CONDUIT

A. Provide color bands 1 inch wide for conduits up to 2 inches in diameter and one-half the conduit diameter for large conduits applied at panel and pull-box locations within each room and 500 feet on centers within an area.
B. Color Banding:
    1. 120/208 Volt: gray
    2. 347/600 Volt: sand
    3. Fire Alarm: red
    4. Telephone: blue
    5. Intercommunication and Sound: yellow
    6. Clocks: green
    7. Television: rust
    8. Low Voltage Switching: black
C. Nonmetallic Pressure Piping Label: When applicable, engraved plastic laminate, label permanently affixed to main electrical meter panel reading "THIS STRUCTURE HAS A NONMETALLIC PRESSURE PIPING SERVICE".

END OF SECTION

SECTION 26 05 34

ELECTRICAL BOXES AND FITTINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Types of electrical boxes and electrical fitting work.

1.2 REFERENCES

A. NEMA OS 1: Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

B. NEMA OS 2: Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

C. NFPA 70: National Electric Code.

D. UL: Underwriters' Laboratories, Inc.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 70 as applicable for installation of electrical boxes and fittings.

B. Comply with NEMA OS 1 and NEMA OS 2 as applicable for outlet boxes, device boxes, covers and box supports.

C. Provide electrical boxes and fittings which have been UL-listed and labeled.

PART 2 PRODUCTS

2.1 INTERIOR OUTLET BOXES

A. One piece, galvanized flat rolled sheet steel, cast iron or cast aluminum outlet wiring boxes, of types shapes and sizes, including box depths, to suit each respective location and installation. If of aluminum, essentially "copper free". Do not use on conduits of dissimilar metals, except with written permission.

B. Construct with stamped knockouts in back and sides, and with threaded screw holes with corrosion-resistant screws for securing box and covers and wiring devices.

C. Minimum depth 1-1/4 inches or 2-1/8 inch depth for boxes with 3 or more conduit entries.

D. Use in combination with factory or field bends when indicated or advised. Complete outlet bodies with mounting brackets, hangers, Extension Rings, fixture studs, cable clamps, metal straps, gaskets, cover, hubs, reducers, and other accessories.

2.2 WEATHERPROOF OUTLET BOX

A. Corrosion-resistant cast-metal of types, shapes and sizes (including depth) required.

B. Threaded conduit ends, cast-metal face plates with spring hinged waterproof caps suitably configured for each application, with face plate gaskets and corrosion-resistant fasteners.

2.3 JUNCTION AND PULL BOXES

A. Building Structure Type: Code-gage sheet steel with screw-on covers; of types, shapes and sizes to suit each respective location and installation; with welded seams and equipped with galvanized steel Section 05 05 23 nuts, bolts, screws and washers.

B. Buried Type: Plastic body and cover, or pre-cast concrete with screw-on cast iron covers; of types, shapes and sizes to suit each respective location and installation; equipped with stainless steel nuts, bolts, screws and washers, Section 05 05 23.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate installation of electrical boxes and fittings with wire/cable and raceway installation work.

B. Provide knockout closures to cap unused knockout holes where blanks have been removed.

3.2 INSTALLATION

A. Install where indicated, complying with manufacturer's written instruction, applicable requirements of NFPA 70 and NEMA's "Standard of Installation", and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Install coverplates for all boxes; weatherproof outlets for interior and exterior locations exposed to weather or moisture.

C. Install boxes and fittings to ensure ready accessibility of electrical wiring. Install recessed boxes with face of box or ring flush with adjacent surface.

D. Fasten boxes rigidly to substrates or structural surfaces to which attached, or solidly embed boxes in concrete or masonry. Use bar hangers for stud construction. Use of nails for securing boxes is prohibited. Set boxes on opposite sides of common wall with minimum 10 inches of conduit between them.

END OF SECTION

SECTION 26 09 26

PANELBOARD

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical distribution panelboards.

B. Connections between fixtures, equipment and panelboards.

1.2 REFERENCES

A. NEMA 1: Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

B. NEMA 250: Enclosures for Electrical Equipment (1000 Volt Maximum).

C. NFPA 70: National Electrical Code.

D. UL: Underwriters' Laboratories Inc.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's data including specifications, installation instructions and general recommendations, for each type of panelboard required.

B. Shop Drawings. Submit showing accurately scaled layouts of enclosures and required individual panelboard devices. Show circuit breakers, fusible switches, fuses, ground-fault circuit interrupters, and accessories.

1.4 QUALITY ASSURANCE

A. Construct panelboards to NEMA 1 and NEMA 250 Standards and provide UL labels.

B. Comply with NFPA 70 pertaining to installation of wiring and equipment in hazardous locations.

C. Make all grounding tight and secure throughout.

PART 2 PRODUCTS

2.1 PANELBOARD -GENERAL

A. Provide panelboards of the same make and key alike with a master key arrangement.

B. Use dead front panelboards with one-piece cabinets constructed from code gage steel. Cabinets shall have knockouts and minimum gutter space of 4 inches on all sides.

C. Provide branches with automatic circuit breakers, thermal-magnetic type, unless indicated otherwise. Multi-pole breakers shall automatically open all poles when an overload occurs in any pole. Branch circuit breakers used for switching duty shall be UL listed as SWD type. Ground fault circuit interrupter protection as required by NFPA 70 shall be provided by ground fault circuit interrupting breakers. Circuit breakers shall have positive trip indication as well as clear "off" and "on" indication.

D. Use factory assembled panelboards with amp rating units indicated. Provide spare units and blank spaces as indicated. Main circuit breaker or lugs only as indicated.

E. Affix large, permanent individual numbers to each breaker on panelboard face in a uniform position. Number starting at the top, with odd numbers used in sequence down left hand side and even numbers used in sequence down right hand side.

F. Use fronts manufactured with code gage steel, finished with rust inhibiting primer and baked enamel finish and manufacturer's standard color. Provide doors with flush tumbler type locks. Provide a circuit directory frame and card with a clear plastic covering inside the door.

G. Furnish locking clips for "off" position only, with "on" trip free travel and installed in all circuits so indicated.

H. Label panel with black phenolic or acceptable alternate engraved nameplate with 1/4 inch high lettering on the interior of each panelboard; including panel name and voltage. Provide red nameplate on emergency system panels.

I. For outside locations use a NEMA 4R cabinet.

2.2 PANELBOARD -480 VOLT

A. Voltage: 277/480 volts, 3 phase, 4 wire, S/N, equipped with automatic circuit breaker.

B. Circuit Breakers: Minimum interrupting capacity of 14,000 amps at 277 volts. Use breakers that are UL rated for use as switches.

C. Locking Clips: 5 minimum per panel.

2.3 PANELBOARD -208 VOLT

A. Voltage: 120/208 volts, 3 phase, 4 wire, S/N, equipped with automatic circuit breakers.

B. Circuit Breakers: Minimum interrupting capacity of 10,000 amps at 120 volts.

PART 3 EXECUTION

3.1 INSTALLATION

A. Provide mounting brackets, bus bar drillings and filler pieces for unused spaces.

B. Prepare and affix typewritten directory to inside cover of panelboard indicating loads controlled by each circuit.

C. Install per NFPA 70, NEMA, manufacturer's instructions and authorities having jurisdiction.

END OF SECTION

SECTION 26 13 13

CIRCUIT BREAKER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of motor circuit breaker and circuit disconnects.

1.2 REFERENCES

A. NEMA 250-85: Enclosures for Electrical Equipment (1000 Volts Maximum).

B. NEMA KS 1: Enclosed Switches.

C. NFPA 70: National Electrical Code.

D. UL: Underwriters' Laboratories, Inc.

1.3 SUBMITTAL

A. Product Data: Submit manufacturer's data including specifications, installation and general recommendations, for each type of motor and circuit disconnect switch required.

B. Shop Drawings: Submit dimensioned drawings of electrical motor and circuit disconnect switches which have a rating of 100 amperes and larger.

1.4 QUALITY ASSURANCE

A. Conform to:

1. NFPA 70.
2. Local and state codes and to authority having jurisdiction.

B. Provide switches that are UL listed and labeled. Comply with NEMA Standards Publication No. KS 1 and NFPA 70.

PART 2 PRODUCTS

2.1 GENERAL

A. Motor and circuit disconnects shall have a UL label.

B. Single Phase Disconnect Switches: 2 pole switch.

2.2 GENERAL DUTY SWITCHES

A. Sheet steel enclosed switches, fusible or nonfusible as indicated of types, sizes and electrical characteristics indicated.

B. Rated 240 volts, 60 hertz.

C. Spring assisted, quick-make, quick-break mechanisms.

D. Provide single phase or three phase with solid neutral as required by application.

E. Equip with padlock handle in OFF position.

F. Provide NEMA 1 or NEMA 3R enclosures as required by application.

G. Provide fusible switches with Class R rejection fuse clip kits.

2.3 MAINTENANCE STOCK, FUSES

A. Provide as required of classes, types, and ratings for electrical requirements for service indicated.

B. Furnish additional fuses amounting to 1 unit for every 10 installed units, but not less than 5 units of each, for both power and circuit fuses.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install motor and circuit disconnect within sight of controller position.

B. Coordinate motor and circuit disconnect installation work with electrical race way and cable work.

END OF SECTION

SECTION 26 29 13

MOTOR CONTROLLER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of motor starters for electric motor driven equipment.

B. Types of motor starters include:

1. AC fraction horsepower manual starters.
2. AC line voltage manual starters.
3. AC non-reversing magnetic starters.
4. AC combination non-reversing magnetic starters.

1.2 REFERENCES

A. NEMA 250-85: Enclosures for Electrical Equipment (1000 Volts Maximum).

B. NFPA 70: National Electric Code.

C. UL 508: Electrical Industrial Control Equipment.

1.3 SUBMITTALS

A. Product Data: Manufacturer's data on motor starters.

B. Shop Drawings: Submit dimensioned drawings of motor starters showing accurately scaled equipment layouts.

C. Motor Voltage/Current Report: After installation is complete including water and air balancing, measure voltage (L-L and L-N) and full load current of each phase of each motor. Submit report showing field readings of voltage, amperage, and thermal heater size installed for each motor.

1.4 QUALITY ASSURANCE

A. Comply with NEMA, UL 508, and NFPA 70 Standards as applicable to wiring methods, construction and installation of motor starters.

B. Provide units which have been UL-listed and labeled.

PART 2 PRODUCTS

2.1 MOTOR STARTER -GENERAL

A. Provide motor starters and ancillary components; of types, sizes, ratings and electrical characteristics indicated.

B. Materials, design and construction; manufacturer's option unless indicated.
C. Thermal Overload Units: Sized to actual running full load current, not to motor plate current. Size heaters for mechanical equipment after air and water balancing have been completed.

2.2 AC FRACTIONAL HP MANUAL STARTER

A. Single-phase, 1 and 2 pole, 300 volt AC maximum unless indicated.

B. Equip with 1 piece thermal overload relay with field adjustment capability of plus or minus 10 percent of nominal overload heater rating; for protection of AC motors of 1 HP and less. (For manually controlled motors in excess of 1 HP, refer to Line Voltage Manual Starter specified herein.)

C. Motor Protection Switches: Quick-make, quick-break trip free toggle mechanism, green pilot lights, with lock-off toggle operated handle. Mount surface units in NEMA 1 enclosures, unless indicated. Provide NEMA 3R enclosure in exterior or damp location. Provide flush mounted units with coverplate to match wiring device coverplates.

2.3 AC LINE VOLTAGE MANUAL STARTER

A. 2 or 3 pole, 600 volt AC maximum unless indicated.

B. Equip with pushbutton operator, low voltage protection feature and green pilot light.

C. Motor Protection Switches: Trip free mechanism such that contacts will open under load and remain open until thermal element has cooled, and unit is reset. Mount surface units in NEMA 1 enclosure unless indicated.
In exterior or damp location provide NEMA 3R enclosure. Provide flush mounted units with coverplate to match wiring device coverplates.

2.4 AC NON-REVERSING MAGNETIC STARTER

A. 2 or 3 pole, 600 volts maximum, with thermal overload position in all phases and inherent under voltage release.

B. Molded case automatic air circuit breakers.

C. Contactor with 3 overload relays.

D. 120 volt holding coil.

E. Pilot light in cover, green resistor type.

F. Reset button, and Hand-Off-Automatic switch in cover, field convertible to Off/Auto or Start/Stop push button.

G. 2 sets of normally open, auxiliary contacts in addition to standard auxiliary holding contact supplied with each contactor.

H. 120 volt control transformer of sufficient capacity to handle operating coil and

associated controls.

I. Surface mounted starters in NEMA Type 1 enclosure unless indicated. In exterior or damp locations provide NEMA 3R enclosure.

2.5 AC COMBINATION NON-REVERSING MAGNETIC STARTER

A. Molded case automatic air circuit breakers with rotary operating handle and lock off facility.

B. Restrict opening of switch enclosure by the use of a defeater screw unless switch is in the "off" position.

C. Contacts with 3 overload delays.

D. 120 volt holding coils.

E. Pilot light in cover, green resistor type.

F. Reset button, and Hand-Off-Automatic switch in cover, field convertible to Off-Auto or Start-Stop push button.

G. 2 sets of normally open, auxiliary contacts in addition to standard auxiliary holding contact supplied with each contactor.

H. 120 volt control transformer of sufficient capacity to handle operating coil and associated controls.

2.6 MAINTENANCE STOCK, FUSES

A. Provide as required of classes, types, and ratings for electrical requirements for service indicated.

B. Furnish additional fuses amounting to 1 unit for every 10 installed units, but not less than 5 units of each, for both power and circuit fuses.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install NEMA size motor protection switches. For units not using NEMA rating, use equivalent NEMA size.

B. In finished areas mount motor protection switches flush and install suitable cover-plates.

C. Install heaters correlated with full load current of motor provided.

D. Install fuses in fusible circuit breaker, if any. Mount chart inside each starter indicating heater type, size, and ampere rating.

END OF SECTION

SECTION 26 56 19

ROADWAY LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for installing roadway lighting system.
B. Testing, painting, restoration and salvage.
C. Related work includes but is not limited to,
   1. Landscape restoration, Section 32 92 00 or Section 32 93 13.
   2. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ASTM B 3: Standard Specification for Soft or Annealed Copper Wire.
B. ASTM B 8: Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
C. ASTM D 2301: Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape.
D. IES: Illuminating Engineering Society.
E. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).
F. NFPA 70: National Electric Code.
G. SSPC PS 1.4: Three-Coat Oil-Alkyd (Lead-and-Chromate-Free) Painting System for Galvanized or Non-Galvanized Steel (with Zinc Dust-Zinc Oxide Linseed Oil Primer).
H. UL: Underwriters' Laboratories, Inc.

1.3 SUBMITTALS

A. Shop Drawings and Product Data: Complete, bound, indexed, large enough for all items included. When requested, supplement the following list by such other data as may be required, including detailed scale drawings and wiring diagrams of any special equipment and of any proposed deviation from the Contract Documents.
   1. Performance data for luminaires, including lighting contours on the roadway surface and average maintained level of light in foot-candles.
   2. Shop drawings for luminaires showing pertinent physical characteristics, type of light source, and wattage.
   3. Shop drawings of ornamental poles.
   4. Luminaire supports.
   5. Pole bases.

6. Wiring schematic.
7. Fixture mounting height.
8. Pedestal.
9. Drawing showing location of poles, pedestal and underground power conduit.

B. Warranties and instruction sheets.
C. Electrical system design, stamped by a licenced Electrical Engineer.
D. Testing results.

1.4 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

A. Notify ENGINEER prior to performing any work on existing systems.

B. Allow 20 feet minimum overhead clearance across thoroughfares and 12 feet minimum clearance above sidewalk areas. Do not run temporary conductor on top of the ground or across any sidewalk area unless protected in an electrical raceway and barricaded.

C. Maintain existing electrical systems or approved temporary replacements, in effective operation for the benefit of the traveling public during the progress of the Work, except when shutdown is permitted to allow for alteration or removal of the systems. Do not interfere with the regular lighting schedule.

PART 2 PRODUCTS

2.1 EXISTING MATERIALS

A. Where existing systems are to be modified, incorporate existing material in revised system, Salvage or abandon as indicated.

2.2 CONDUCTORS

A. Materials: Solid or stranded copper of size indicated conforming to ASTM B 3 and ASTM B 8. Insulation; RHH-RHW-USE grade cross link polyethylene compound.

B. Splicing: Compatible with cable insulation and water seal for underground use. Comply with UL code.

C. Conduit: As indicated. Section 26 05 33.

D. Color and coding of 120/240 volt, Section 26 05 13.

2.3 POLES AND LUMINAIRE SUPPORTS

A. Provide poles and luminaire supports conforming to the height, type, configuration, and base detail indicated.

2.4 JUNCTION BOXES

A. Buried type; Section 26 05 34 and as follows.

1. Precast reinforced concrete in paved surfaces.
2. Plastic in landscaped surfaces.
3. Minimum size 14" x 20".
4. UL Listed.

B. Cover Stencil: "Street Lighting". Where box contains street lighting voltage greater than 600 volts, stencil "High Voltage".

2.5 INSULATING TAPE

A. Type 1 vinyl chloride, ASTM D 2301.

2.6 LUMINAIRE

A. Luminaire: Die cast aluminum housing complete with reflector, refractor, lamp socket, slipfitter, replaceable air filter, ballast components or as indicated.

1. Lamp wattage, voltage, and IES distribution type as indicated.
2. Not less than 10 degrees of adjustment above a horizontal position, and not less than 5 degrees of adjustment from a vertical position.
3. Lower housing door assembly removable with quick disconnect plugs to permit field maintenance or upgrading to other lamp types.
4. Glare shields when indicated.

B. Mercury Constant Wattage Regulated Ballasts: Prewired ballast with minimum primary power factor of 90 percent with normal secondary load with sufficient open circuit voltage to start lamps at minus 20 deg.
F. Ballast shall provide regulation within 5 percent variation in lamp watts with a 10 percent variation in primary voltage.

C. High Pressure Sodium Lamps: 250 or 400 watts as indicated.

D. Bonding and Grounding: Copper wire strap No. 6 AWG minimum.

E. Paint: None.

2.7 CONTROL EQUIPMENT

A. Photo-electric control sensitive between 1 and 5 foot candles, minimum.

B. Failure of any electrical component will energize the lighting circuit.

C. Control Relay Contacts Rating: Switch on at 3,000 watts minimum.

D.Remote Control Relays: Normally open.

E. Relays: Either mechanical armature type or mercury tube type, single or double pole, or as indicated.

1. Mechanical armature type: An operating coil (120 volts), a laminated core, a laminated armature, terminals and silver alloy contacts.

2. Mercury tube type: An operating coil, hermetically sealed mercury tubes and terminals. Contacts shall be made either mercury to mercury or between mercury and alloy resistant to arcing and mercury amalgamation.

F. Enclosure: NEMA 250 Type 4 with dead front panel, keyed padlock

G. Paint: Waterproof paint.

2.8 POLYSULFIDE BASE, SINGLE COMPONENT SEALANT

A. Chemical curing; capable of being continuously immersed in water, withstand movement up to 20 percent of joint width, and satisfactorily applied throughout a temperature range to 40 to 80 deg. F., Shore A hardness of minimum 15 and maximum 50; nonstaining and non-bleeding; color as selected by ENGINEER.

2.9 CONCRETE AND GROUT

A. Cast-in-place concrete: Class 3000, Section 03 30 04.

B. Grout: Cement, Section 03 61 00.

2.10 PEDESTAL

A. Milbank CP3B "ML" Series commercial Pedestal or equivalent.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate utility locations; Section 01 31 13.

B. Excavate; Section 31 23 16 and backfill; Section 33 05 20.

C. Do not disturb roadway surface, sidewalk, curb, gutter, or other obstructions without approval.

D. Do not block or restrict pedestrian traffic, vehicle traffic, drainage or utilities.

E. Barricade all Excavations in traveled ways.

F. Compact excavated Trench material; Section 33 05 20 to the requirements of the adjacent areas.

G. After backfilling Excavations, maintain smooth and well-drained surfaces until permanent repairs are effected.

H. Legally dispose of all excess or waste material.

3.2 POLE FOUNDATION

A. Construct foundation per details indicated and Section 34 41 13.

B. Locations:

1. 18 inches clear from pull box.
2. Not in pedestrian access way.
3. Unless specified otherwise:
a. 5 feet from new tree.
b. 10 feet from existing tree, driveway, or hydrant.
c. Center of park strip or 24 inches clear from top back of curb on wide park strips.

3.3 CONDUIT INSTALLATION

A. Use rigid steel conduit in areas subject to vehicular load, on the surface of structures, inside of structures and foundations, between structures, and the adjacent pull boxes located next to structures.

B. Place conduit as follows.

Location	Depth of Burial, inches
In front of curb faces	36 to 60
Back of the back of curb	24 to 36
Railroad tracks	36 to 60
Primary power cables	40 minimum

C. Use sizes of conduit indicated or use larger sizes for any run at no additional cost to OWNER. No expanding or reducing fittings will be permitted.

D. Make field cuts square and true so that the ends will come together for full circumference. Paint threads on all rigid steel conduit with rust preventive paint before couplings are made. Repair damaged coating on galvanized steel conduit.

E. Cap all conduit ends with standard pipe caps until wiring is installed. When caps are removed from metallic conduit, provide threaded ends and approved conduit bushings.

F. Clean all existing underground conduit to be incorporated into new system with a mandrel and blow out with compressed air. Where existing rigid steel conduit systems are to be modified or extended, install rigid steel conduit.

G. Make changes in direction by bending the conduit to a radius which will meet code or, preferable, by the use of standard bends or elbows.

H. Install a No. 12 AWG pull wire or equivalent strength cord in all conduits which are to receive future conductors. Leave at least 2 feet of pull wire extending beyond each end of the conduit run and secure.

I. Center conduit ends within the bolt circle of traffic signal poles or pedestals.

J. Pack conduit ends with sealant after conductors are installed.

K. Cap all conduit terminated without a pull box and identify its location by monumenting.

3.4 CONDUCTOR INSTALLATION

A. Install wiring per the appropriate articles of NFPA 70. Neatly arrange wiring within cabinets, junction boxes, etc.

B. Splice only at junction boxes, transformer leads, in pole bases, or at control equipment.

Splice conductors as per manufacturer's recommendations and codes. Provide a fused connector between the line and the ballast, accessible at the hand holes located in the poles.

C. Provide conduit to separate low-voltage conductors from high-voltage conductors in the same raceway (i.e. poles).

D. Splice insulation shall consist of layers of vinyl chloride, electrical insulating tape applied to a thickness equal to and well lapped over the original insulation to provide uninterrupted underwater operation.

E. Leave 2 feet of slack at each pole. Leave 18 inches of slack above top of pull box grade.

F. Mark termination of each conductor. Where circuit and phase are clearly indicated by conductor insulation, bands need not be used, otherwise use bands.

3.5 GROUNDING INSTALLATION

A. Effectively ground metallic cable sheaths, metal conduit, nonmetallic conduit grounding wire, ballast and transformer cases, service equipment, anchor bolts, metal poles, and pedestals, and make mechanically and electrically secure to form a continuous system. Use a copper wire strap for bonding and grounding jumpers of the same cross-sectional area as No. 6 AWG for all lighting systems.

B. Ground one side of the secondary circuit of series-multiple and step-down transformers. Ground metal conduit, service equipment, and neutral conductor at service point as required by NEC and electricity company with grounding conductor No. 6 AWG or larger.

C. In all nonmetallic (PVC) type conduit, provide a No. 8 AWG bare copper wire continuously and ground at each junction box.

D. At each multiple service point, unless otherwise indicated, furnish a ground electrode. Use copper coated ground electrodes of steel or iron in one piece lengths at least 3/4 inch in diameter. Do not use electrodes of nonferrous materials less than 1/2 inch in diameter.

E. Bond metal poles by means of a No. 8 AWG bonding wire attached from a grounding bushing to a foundation bolt or to a 3/16 inch or larger brass or bronze bolt installed in the lower portion of the pole.

F. On wood poles, ground all equipment mounted less than 8 feet above the ground surface.

G. Ground metallic conduit or bonding conductor system at intervals less than 500 feet to one of the following:

1. 1 inch galvanized pipe driven 8 feet deep.
2. 1/2 inch copper rod driven 8 feet deep.
3. Metal water main with the approval of the water company. Clean water main thoroughly prior to connection.

H. Use galvanized grounding bushings and bonding jumpers for bonding of metallic conduit in a concrete pull box. Use lock nuts for bonding of metallic conduit in steel pull

boxes, one inside and one outside of the box.

I. Pull Boxes: Install 3/4 inch x 10 feet copper clad ground rods at each pull box, 6 inches above bottom. Ground all metal parts, neutral and ground wire with #6 B.C. Use exothermic weld or hammerlock connection.

3.6 JUNCTION AND PULL BOX INSTALLATION

A. Install at the locations indicated, and at additional points when conduit runs are more than 200 feet. Without additional compensation cost to OWNER and at CONTRACTOR's convenience add such additional boxes as may be desired to facilitate the work.

B. Rest bottom of pull box firmly on a 12 inches thick bed of 1 inch crushed rock extending a minimum of 6 inches beyond the outside edge of box.

C. Establish grade of top of boxes as for foundations.

D. Place long side of box parallel to curb unless indicated.

E. Use box extensions if ballasts or transformers are installed in box.

F. Do not install boxes in Driveway aprons.

3.7 LUMINAIRES AND BALLASTS INSTALLATION

A. Immediately prior to installation, clean all light control surfaces, refractors, and reflectors to provide the maximum lumen output possible. Clean per the luminaire manufacturer's recommendations.

B. Mount at the height indicated.

C. Adjust luminaires uniformly to give the optimum light distribution.

3.8 PAINTING

A. Apply coatings, Section 09 91 00.

B. Recoat all painted equipment when relocated.

C. Use 2 coats of paint on relocated and new work.

3.9 FIELD QUALITY CONTROL

A. Conduct the following tests in the presence of the City Inspector on all lighting circuits and record the date and time of test.

1. Test for continuity of each circuit.
2. Test for grounds in each circuit.
3. Megger test at 500 volts DC on each completed lighting circuit. The insulation resistance to ground shall be not less than 10 megohms.
4. Test voltage and current on each circuit.

B. Functional Test:

1. Perform a functional test in which it is demonstrated that each and every part of the system functions as specified or intended.
2. A functional test for each new or modified electrical system will consist of not less than 5 days of continuous, satisfactory operation. If unsatisfactory performance of the system develops, correct the condition and repeat the test until the 5 day continuous satisfactory operation is obtained.
3. Do not start functional tests or turn-ons on Friday, or on the day preceding a legal holiday.
4. Shutdowns caused by factors beyond CONTRACTOR's control will not constitute discontinuity of the functional test.

C. Replace or correct any material revealed by these tests to be faulty.

D. Provide equipment, personnel, cable connections, and electrical energy for testing. Certify that each circuit has been completely tested and testing procedures are satisfied.

3.10 SALVAGE

A. Terminate all conduit abandoned in place at least 5 inches below finished grade.

B. Exercise care in removing equipment to be reused or salvaged so that it will remain in the condition existing prior to its removal.

3.11 RESTORATION

A. Replace damaged equipment, concrete work or other fixtures disturbed or damaged by the installation.

B. Restore or replace roadway pavement cuts, Section 33 05 25.

C. Restore or replace disturbed planting's in landscaped areas.

END OF SECTION

SECTION 31 05 10

BOUNDARY MARKERS AND SURVEY MONUMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for installing boundary markers and survey monuments.

1.2 PERFORMANCE REQUIREMENTS

A. Identify the land surveyor who set the marker plates and reference marks.

B. For vertical control datum use Mean Sea Level datum adjusted by United States Coast and Geodetic Survey for the location of survey.

C. Vertical Accuracy: 3rd order.

D. Make all individual tape measurements to the nearest 0.01 of a foot, with tape corrections for temperature, sag, suspension, etc. noted on all field notes requiring such measurements.

E. Horizontal Accuracy:

1. 1:10,000 minimum for urban areas.
2. 1:20,000 minimum for metropolitan areas.

1.3 SUBMITTALS

A. Survey notes and drawings showing:

1. All monuments found, set, reset, or replaced, describing their kind, size, and location and giving other data relating thereto.
2. Lines of survey, concrete structures containing reference marks, types of marks installed, distances and angles from monument referenced.
3. Witness monuments, basis of bearings, bearings, length of lines to monuments or corners witnessed and scale of drawing.
4. Errors of closure and method of adjustment.
5. Memorandum of oaths and certificates.
6. Narrative describing purpose of survey.
7. Any other data necessary for the interpretation of the various items and locations of the points, lines, and areas shown.

B. Copies of plats filed with the County Recorder.

1.4 QUALITY ASSURANCE

A. Use a land surveyor who complies with Utah licensing law and who is acceptable to

the OWNER to supervise the setting or resetting of monuments and boundary markers.

B. Make surveys in conformance with the accepted practice of land surveying and comply with all pertinent Laws and Regulations of land survey regulatory agencies and authority having jurisdiction.

PART 2 PRODUCTS

2.1 MONUMENT

A. Monument Post: Minimum 3 feet long, precast or cast-in-place concrete. Make exposed surface of finished monument posts uniform, even texture, and free of holes, cracks, and chipped edges.

B. Marker Plate: Brass or bronze or as indicated.

2.2 FRAME AND COVER

A. Asphalt coated, heavy duty, cast iron, Section 05 56 00.

2.3 LOT LINE WITNESS MARKER

A. Brass surveyor's tag or brass nail set in a lead filled hole in concrete.

2.4 REBAR CORNER MARKER

A. No. 5 rebar, at least 18 inches long with the top fitted with a nonferrous survey cap and stamped with land surveyor's registration number.

2.5 PIPE CORNER MARKERS

A. 1 inch internal diameter galvanized steel pipe at least 18 inches long, or 2 inches internal diameter galvanized steel pipe at least 36 inches long.

B. Fit pipe with concrete or mortar plug, tagged with surveyor's license number.

C. Fix tag in concrete or mortar plug with a 1 inch minimum long bent brass brad.

2.6 FIELD NOTE PAPER

A. 20 pound bond paper minimum with format of documents acceptable to OWNER.

2.7 CONCRETE

A. Cast-in-place: Class 4000 minimum, Section 03 30 04 or

B. Precast: Class 5000 minimum, Section 03 40 00.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify utility locations, Section 01 31 13.

B. Excavation, Section 31 23 16.

3.2 HORIZONTAL CONTROL

A. Set base horizontal ground control upon a minimum of 2 United States Coast and Geodetic Survey triangulation stations or equivalent, and tie to the Lambert Conformal Conic Projection for Establishment of the State Plane Coordinate System with Local Datum Adjustment within the Project area.

3.3 BEARING BASE

A. Refer all directional measurements to one "bearing base". Actual measurements may be equated to bearings and linear measurements shown on any record (i.e., plats, official maps, descriptions, or approved field notes of lines resurveyed that are shown on such records used in the survey).

3.4 TIE TO EXISTING MONUMENTS

A. Tie into a monument which has State Plane Coordinates if the monument is within 1/2 mile of the proposed survey site or at a selected location.

3.5 CORNER MARKERS

A. Site Boundary: Install pipe corner markers.

B. Lot Boundary: Install rebar corner markers for lot corners. Do not use rebar where pipe corner markers are installed as a boundary marker and a corner marker.

3.6 LOT LINE WITNESS MARKER

A. Witness all lot lines by installing 1/2 inch surveyor tags in sidewalk. If sidewalk does not exist, install tags in curb or mass concrete.

3.7 MONUMENTS

A. Locate monument post so reference point falls within 1 inch diameter circle in the center of marker plate. Install marker plate in survey monument post before the concrete has acquired its initial set.

B. Compact backfill soil; Section 33 05 05 to a Modified Proctor Density of 95 percent or greater.

C. Set top of frames and covers 1/4 inch lower than Pavement surface. Recess marker

plate a minimum of 4 inches below cover.

D. Install monument so frame and cover does not contact monument or marker plate.

3.8 DAMAGED MONUMENTS

A. Replace survey control monuments which are disturbed or destroyed by CONTRACTOR.

B. If OWNER allows replacement of project survey control monuments which are lost or destroyed, use a licensed land surveyor to re-establish control monuments based upon original survey control.

3.9 REFERENCE MARKS

A. Section 01 17 24.

END OF SECTION

SECTION 31 05 13

COMMON FILL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Common fill materials.

1.2 REFERENCES

A. ASTM C 136: Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ASTM D 1883: Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.

C. ASTM D 2487: Standard Test Method for Classification of Soils for Engineering Purposes.

D. ASTM D 2844: Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils.

E. ASTM D 3282: Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

F. ASTM D 3740: Standard Recommended Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

1.3 SUBMITTALS

A. Prior to delivering material to site, identify.

1. Name of Supplier and source, And.
2. Gradation of common fill material.

B. If a change in source of material is required, submit name of Supplier, source and gradation analysis of material prior to delivery to site.

1.4 QUALITY ASSURANCE

A. Use a laboratory that follows and complies with Section 01 45 00 and ASTM D 3740.

B. Reject common fill products that do not meet requirements of this section.

C. Remove any product found defective after installation and install acceptable product at no additional cost to OWNER.

1.5 ACCEPTANCE

A. General:

1. Acceptance is by Lot. One Lot is one day's production.
2. Dispute resolution; Section 01 35 10.

B. Roadway Backfill: Sub-lot size is 5,000 tons.

PART 2 PRODUCTS

2.1 BORROW

A. Classifications A-1-a through A-4, ASTM D 3282.

2.2 GRANULAR BORROW

A. Classifications A-1-a, A-1-b, A-2-4, or A-3, ASTM D 3282.

B. Material meets design CBR-value (ASTM D 1883) or R value (ASTM D 2844) for suitability of source, not for project control testing.

2.3 GRANULAR BACKFILL BORROW

A. Classification A-1, ASTM D 3282.

B. Well graded.

C. Particle size; 2 inch maximum.

D. Material meets design CBR-value (ASTM D 1883) or R value (ASTM D 2844) for suitability of source, not for project control testing.

2.4 RECYCLED FILL

A. Material: Pulverized portland cement concrete, pulverized asphalt pavement or combination, either mixed with or not mixed with a new aggregate.

B. Gradation: Meet the requirements of this Section based upon use; e.g. borrow, granular borrow, granular backfill borrow, etc.

2.5 NATIVE

A. When allowed by ENGINEER, material obtained from Excavations may be used as fill, provided organic material, rubbish, debris, and other objectionable materials are removed and CONTRACTOR has submitted the appropriate Proctor data (see Section 33 05 05).

2.6 CLAY

A. Classification CL, CL-ML, or ML, ASTM D 2487.

B. Free of organic matter, frozen material, debris, rocks, and deleterious materials.

C. Homogeneous, relatively uniform.

2.7 **SAND**

A. Friable river or bank aggregate, free of loam and organic matter. Graded as follows:

Sieve	Percent Passing by Weight
3/8	100
100	1 - 10

2.8 **GRAVEL**

A. Material: Rock, stone, or other high quality mineral particle or combination.

B. Gradation: ASTM D 448 narrow band.

1. **Sewer Rock.**

Nominal Size	ASTM Size No.
3.5 to 1.5"	1
2.5 to 1.5"	2
2 to 1"	3
1.5 to 3/4"	4
1 to 1/2"	5

2. **Pea Gravel**.

Nominal Size	ASTM Size No.
3/4 to 3/8"	6
1/2 to No. 4	7
3/8 to No. 8	8
No. 4 to No. 16	9
No. 4 (screenings)	10

2.9 **TOPSOIL**

A. Chemical Characteristics:

1. Acidity/alkalinity range: pH 5.5 to 7.7
2. Soluble Salts: Less than 2.0 mmhos/cm.
3. Sodium Absorption Ratio (SAR): less than 3.0
4. Nitrogen (NO3N): 48 ppm minimum
5. Phosphorus (P): 11 ppm minimum
6. Potash (K): 130 ppm minimum

7. Iron (Fe): 5.0 ppm minimum

B. Physical Characteristics:
1. Fertile, loose, friable.

2. Containing more than 2 percent organic matter.

3. Free of weeds, subsoil, lumps or clods of hard earth, plants or their roots, sticks, toxic minerals, chemicals and stones greater than 1-1/2 inch diameter.

4. Composition

Material	Percent Passing
Sand	15 – 60
Silt	10 – 70
Clay	5 – 30

2.10 SOURCE QUALITY CONTROL

A. Verify gradation, ASTM C 136.

B. Select Samples on a random location and time basis.

C. If tests indicate materials do not meet specified requirements, change materials and retest at no additional cost to OWNER.

PART 3 EXECUTION

3.1 INSTALLATION

A. Trenches, Section 33 05 20.

B. Structures or landscaping, Section 31 23 23.

C. Pavements, Section 32 05 10.

END OF SECTION

SECTION 31 05 15

CEMENT TREATED FILL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Controlled low-strength material (CLSM) requirements.

1.2 REFERENCES

A. ASTM C 25: Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime.

B. ASTM C 33: Standard Specification for Concrete Aggregates.

C. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

D. ASTM C 51: Standard Definitions of Terms Relating to Lime and Limestone (As Used by the Industry).

E. ASTM C 110: Standard Test Methods for Physical Testing of Quicklime, Hydrated Lime, and Limestone.

E. ASTM C 150: Standard Specification for Portland Cement.

F. ASTM C 260: Standard Specification for Air-Entraining Admixtures for Concrete.

G. ASTM C 494: Standard Specification for Chemical Admixtures for Concrete.

H. ASTM C 595: Standard Specification for Blended Hydraulic Cement.

I. ASTM C 618: Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

J. ASTM D 4832: Standard Test Method for Preparation and Testing of Soil-Cement Slurry Test Cylinders.

1.3 SUBMITTALS

A. Material analysis.

B. Engineered design calculations.

1.4 ACCEPTANCE

A. General:

1. Acceptance is by Lot. One Lot is one day's production.

2. If non-complying fill material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation. Section 01 29 00.
3. Dispute resolution, Section 01 35 10.

B. Lime or Asphalt Cement Treated Backfill: Data sheet.

C. Cement Treated Flowable Fill:
1. Sub-lot Size:
   a. Trench backfill, 100 cubic yards.
   b. Roadway backfill, 250 cubic yards
2. Lot is acceptable if strength deviations are within pay factor 1.00 limits. At ENGINEER's discretion, a Lot with a sub-lot test deviation in Reject may stay in place at 50 percent cost.

Pay Factor	28-Day Compressive Strength, psi
1.00	less than 60
0.75	60 to 120
Reject	greater than 120

1.5 **SAFETY**

A. Protect persons and property from lime or quicklime handling operations.

PART 2 PRODUCTS

2.1 **CEMENT TREATED FLOWABLE FILL**

A. Cement:
1. Types I or II, ASTM C 150
2. Types IP or IS, ASTM C 595. M C 33.

C. Water: Non-detrimental.

D. Admixtures: As needed for strength and flowability.
1. Pozzolan (fly ash): ASTM C 618.
   a. Class C or Class F.
   b. Loss on ignition plus or minus 3 percent.
2. Air: 4 percent to 35 percent, ASTM C 173.

E. Mix Design: 60 psi maximum in 28 days per ASTM D 4832.

2.2 **LEAN CONCRETE**

A. Physical Characteristics:
1. Cement: ASTM C 150, Type II .
2. Slump: 1 to 4 inches.

3. Strength: 750 psi minimum in 7 days.

B. Aggregate: Section 03 30 04. Submit substitute gradations for acceptance prior to beginning construction. Do not substitute gradations without approval.

2.3 LIME TREATED FILL

A. Aggregate: Non-plastic crushed aggregate base, Section 32 11 23; or Common fill, Section 31 05 13.

B. Water: Non-detrimental.

C. Lime: Dry hydrated lime or quicklime, ASTM C 25, ASTM C 51, and ASTM C 110.

1. Minimum Chemical Composition:
   a. Hydrated Lime (Ca(OH)2); 85 percent of chemical.
   b. Quicklime (CaO); 90 percent of chemical.
2. Gradation: ASTM C 136.

Table 1 - Hydrated Lime and Quicklime
Percent Passing by Weight

Sieve	Hydrated Lime ($Ca(OH)_2$)	Quicklime (CaO)
No. 4	100	100
No. 30	95 - 100	-
No. 100	-	0 - 20
No. 200	75 - 100	-

NOTES
(a) Hydrated Lime: Washed Sample for 15 minutes plus or minus 1 minute, ASTM C 110.
(b) Quicklime: Dry sieving only.

2.4 ASPHALT TREATED FILL

A. Cement:
1. Medium-setting emulsified asphalt, Section 32 12 09, or
2. Medium-cure cutback asphalt Section 23 12 09.

B. Aggregate:
1. Non-plastic crushed aggregate base, Section 32 11 23.
2. Common fill, Section 31 05 13.
3. RAP, Section 32 01 16.

C. Water: Non-detrimental.

PART 3 EXECUTION

3.1 **FIELD QUALITY CONTROL**

A. Cement Treated Fill (Flowable Fill):

1. Mold 3 test cylinder, ASTM D 4832. Test cylinders at 28 days.

2. If a cylinder test shows improper sampling, molding, handling, curing, or testing, discard the cylinder. Use remaining cylinders to determine average strength.

END OF SECTION

SECTION 31 05 19

GEOTEXTILES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Geotextile fabrics.

1.2 REFERENCES

A. ASTM D 146: Standard Methods of Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing.

B. ASTM D 276: Standard Test Methods for Identification of Fibers in Textiles.

C. ASTM D 882: Standard Test Methods for Tensile Properties of Thin Plastic Sheeting.

D. ASTM D 3786: Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics -Diaphragm Bursting Strength Tester Method.

E. ASTM D 4354: Standard Practice for Sampling of Geotextiles for Testing.

F. ASTM D 4355: Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon -Arc Type Apparatus).

G. ASTM D 4491: Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

H. ASTM D 4533: Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

I. ASTM D 4632: Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method).

J. ASTM D 4751: Standard Test Method for Determining Apparent Opening Size for a Geotextile.

K. ASTM D 4759: Standard Practice for Determining Specification Conformance of Geosynthetics.

L. ASTM D 4833: Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

M. ASTM D 4873: Standard Guide for Identification, Storage, and Handling of Geotextiles.

N. ASTM E 96: Standard Test Methods for Water Vapor Transmission of Materials.

O. ASTM E 154: Standard Methods of Testing Materials for Use as Vapor Barriers Under Concrete Slabs and as Ground Cover in Crawl Spaces.

1.3 DEFINITIONS

A. MARV (acronym for minimum average roll value): A statistical value of a particular test

property embracing 95 percent confidence level of all possible values of that property. For a normally distributed set of data, it is approximately the mean value plus and minus two standard deviations.

1.4 SUBMITTALS

A. Submit prior to use:

1. Sample of geotextile.
2. Manufacture's certificate that each fabric complies with requirements of this section.

1.5 DELIVERY STORAGE AND HANDLING

A. Label fabric, ASTM D 4873.

B. Deliver geotextile dry, in a wrapping that protects it from the elements during shipping and storage. Keep fabric dry.

C. Protect geotextile from ultraviolet light and temperature greater than 140 deg. F. until application.

1.6 QUALITY ASSURANCE

A. Provide manufacturer's on-site technical supervision and assistance.

PART 2 PRODUCTS

2.1 GEOTEXTILE -GENERAL

A. Stated values are for non-critical, non-severe applications.

B. Fabric consists of synthetic fibers at least 85 percent by weight of polyolefins, polyesters or polyamides.

C. Resistant to chemical attack, rot and mildew.

D. No tears or defects that adversely alter fabric's physical properties.

E. All numerical values represent minimum average roll values in the weaker principal direction.

2.2 STABILIZATION-SEPARATION GEOTEXTILES

A. Woven or non-woven fabric. Meet the following properties and survivability ratings.

Table 1 – Stabilization-Separation Geotextile						
Property	ASTM	MARV				
		Moderate		High		
		Woven	Non-woven	Woven	Non-woven	
Grab Tensile Strength, lbs.	D 4632	180	115	270	180	
Grab Elongation, percent	D 4632	<50	>50	<50	>50	
Trapezoid Tear, lbs.	D 4533	70	40	100	75	
Puncture Resistance, lbs.	D 4833	70	40	100	60	
Apparent Opening Size, (AOS-US Sieve)	D 4751	≥30	≥60	≥30	≥60	
Construction Survivability						
Subgrade, CBR		1		1 – 2		> 2
Tire Pressure, psi		<50	>50	<50	>50	<50	>50
6 inches Cover	NR	NR	H	H	M	M
12 inches Cover	NR	NR	H	M	M	M
18 inches Cover	H	M	M	M	M	M
Where H = High; M = Medium; NR = Not Recommended						

2.3 **SILT FENCE GEOTEXTILE**

A. Use woven fabric. Meet standard or high performance properties.

Table 2 – Silt Fence Geotextile			
Property	ASTM	MARV	
		Standard	High
Grab Tensile Strength, lbs. (a)	D 4632	90	120
Grab Elongation, percent	D 4632	< 40	< 40
Flux, gal/min/ft2	D 4491	15	90
Apparent Opening Size, (AOS-US sieve)	D 4751	> 20	> 30
Ultraviolet Degradation, percent	D 4355	70	90
NOTES (a) Percent of tensile strength retained determined after weathering, ASTM D 4355 for 500 hours.			

B. High performance fence to have tape yarns in one principle direction only.

C. Add stabilizers or inhibitors to make the filaments resistant to sunlight or heat deterioration.

D. Finish edges to prevent outer yarn from pulling away from the fabric.

E. Sheets of fabric may be sewn or bonded together. Provide minimum width recommended by manufacturer.

F. No deviation from any requirement in Table 2 due to the presence of seams.

G. Manufactured with pockets for posts, hems with cord, or with posts pre-attached using staples or button head nails.

2.4 EROSION CONTROL GEOTEXTILES

A. Use woven or non-woven fabric.

Table 3 – Erosion Control Geotextile

Property	ASTM	MARV		
		Class A	Class B	Class C
Grab Tensile Strength, lbs. (a)	D 4632	300	200	100
Grab Elongation, percent	D 4632	>15	>50	>50
Puncture Resistance, lbs.	D 4833	100	60	30
Trapezoid Tear, lb.	D 4533	80	50	40
Flux, gal/min/ft^2	D 4491	25	25	25
Apparent Opening Size, (AOSUS sieve)	D 4751	>59	>59	>59
Ultraviolet Degradation, percent	D 4355	70	70	70
Permittivity, sec.$^{-1}$ (b)	D 4491	0.1	0.1	0.1

NOTES
(a) Percent of tensile strength retained determined after ultraviolet weathering, ASTM D 4355 for 500 hours.
(b) This number reflects typical not minimum values for this test method only. The k value of the geotextile shall be greater than the k value of the soil.

B. Class A erosion control applications are those where the geotextile is used under conditions where installation stresses are greatest (more severe than Class B, i.e., stone placement height should be no more than 5 feet and stone weights should not exceed 250 pounds.

C. Class B erosion control applications for geotextiles are used under conditions where

installation stresses are more severe than Class C, i.e., stone placement height should be less than 3 feet and stone weights should not exceed 250 pounds.

D. Class C erosion control applications are those where the geotextile is used in structures or under conditions where the geotextile is protected by a sand cushion or by "zero drop height" placement of stone.

2.5 ROADWAY PAVEMENT GEOTEXTILES

A. Sheet Fabric: Non-woven. Heat bonded only on one side to assist in preventing bleed through of tack coat and sticking of fibers to wheels of laydown equipment.

Table 4 – Roadway Paving Geotextile			
Property	**ASTM**	**MARV**	
		Standard	**Heavy Duty**
Grab Tensile Strength, lbs. (a)	D 4632	80	120
Grab Elongation, percent	D 4632	50	50
Asphalt Retention, gal/yd2		0.2	0.3
Melting Point, deg. F.	D 276	300	300
Ultraviolet Degradation	D 4355	70	70
Apparent Opening Size, (AOSUS sieve)	D 4751	60	60
NOTES (a) Percent of tensile strength retained determined after ultraviolet weathering, ASTM D 4355 for 500 hours.			

B. Crack Patch Fabric: Needle-punched non-woven coated with asphalt cement and a rubberized asphalt adhesive.

Table 5 – Crack Patching Geotextile		
Property	**ASTM**	**MARV**
Strip Tensile, lbs/in (a)	D 882	50
Puncture resistance, lb	E 154	200
Permeance, perms	E 69 Method B	0.10 (max)
Pliability (b)	D 146	No crack in fabric or rubberized asphalt
NOTES (a) Using 12 in/min test speed and 1" initial distance between grips. (b) Using 180 degree bend on 1/4" mandrel at –25 deg. F.		

2.6 DRAINAGE GEOTEXTILES

A. Use non-woven fabric.

Table 6 – Drainage Geotextile			
Property	**ASTM**	**MARV**	
		Class A	**Class B**
Grab Tensile Strength, lbs. (a)	D 4632	200	100
Grab Elongation, percent	D 4632	>50	>50
Puncture Strength, lbs.	D 4833	60	30
Trapezoid Tear, lbs.	D 4533	50	40
Flux, gal/min/ft2	D 4491	25	25

Apparent Opening Size,(AOS -US Sieve)	D 4751	>59	>59
Permittivity, sec. -1 (b)	D 4491	0.1	0.1

NOTES
(a) Percent of tensile strength retained determined after ultraviolet weathering, ASTM D 4355 for 500 hours.
(b) The k value of the geotextile shall be greater than the k value of the soil. This number reflects typical not minimum values for this test method only.

B. Class A drainage applications are for fabrics where installation stresses 399 are more severe than Class B, i.e. very coarse sharp angular aggregate is used, a heavy degree of compaction (greater than or equal to 95 percent Standard Proctor, Section 31 23 36) is specified or depth of Trench is greater than 10 feet deep.

C. Class B drainage applications are those where fabric is used with smooth graded surfaces having no sharp angular projections, no sharp angular aggregate, compaction requirements are light, (less than 95 percent Standard Proctor, Section 31 23 36), and Trenches are less than 10 feet deep.

2.7 WEED BARRIER GEOTEXTILE

A. Use non-woven fabric.

Table 7 – Weed Barrier Geotextile

Property	ASTM	MARV
		Standard
Grab Tensile Strength, lbs. (a)	D 4632	90
Grab Elongation, percent	D 4632	>50
Puncture Strength, lbs.	D 4833	25
Trapezoid Tear, lbs.	D 4533	30
Apparent Opening size (AOS -US Sieve)	D 4751	>49
Ultraviolet Degradation, percent	D 4355	70

NOTES
(a) Percent of tensile strength retained determined after ultraviolet weathering, ASTM D 4355 for 500 hours.

2.8 POSTS

A. Minimum length: 4 feet.

B. Steel: Round, U shaped, T shaped, or C shaped with a minimum weight of 1.3 pounds per foot, and have projections for fastening wire.

C. Wood as follows:

1. Soft wood posts at least 3 inches in diameter, or nominal 2 x 4 inches and straight to provide a fence without noticeable misalignment.
2. Hard wood post providing a minimum cross sectional area of 2.25 square inches.

D. Fasteners for Wooden Posts:

1. Wire staples No. 17 gage minimum with a crown at least 3/4 inches wide and legs at least 1/2 inch long. Nails 14 gage minimum, 1 inch long with 3/4 inch button heads.

2.9 SOURCE QUALITY CONTROL

A. Sampling practices, ASTM D 4354.

B. Conformance verification, ASTM D 4759.

PART 3 EXECUTION

3.1 STABILIZING POOR LOAD BEARING SOILS

A. Remove all organic material larger than 1 inch in diameter from the Subgrade and grade to elevations required for overlaying backfill.

B. Compact Subgrade to the extent allowed by the condition of the substrate.

C. Roll fabric onto Subgrade so Subgrade remains smooth. Do not drag.

D. Fold or overlap geotextile in direction of drainage.

E. Provide fabric overlap joints as follows.

Table 8 – Geotextile Overlap

Soil CBR Rating	Overlap Required	
	Unsewn, inches	Sewn, inches
Less than 1	–	4
1-2	36	4
2-3	30	3
3-5	24	–
Greater than 5	18	–

NOTES
(a) Sewn seams, both factory and field seams shall conform to 90 percent of the grab tensile strength requirements.

F. Place granular material on top of fabric and spread carefully to insure no puncture. Minimum backfill lift on fabric; 6 inches.

G. Cover fabric with 12 inches of sand before placing rock larger than 4 inches diameter on top of fabric.

H. Avoid sudden stops or turning motions by equipment operating on aggregate placed over the fabric.

I. Compact backfill soils over fabric; Section 33 05 05 to a Standard Proctor Density of 95 percent or greater.

J. Repair any puncture by covering with new fabric using the same overlap dimensions indicated in Table above.

3.2 SILT FENCE

A. Beginning work means acceptance of existing conditions.

B. The quantity of temporary silt fences may be increased, decreased, or eliminated entirely at CONTRACTOR's discretion at no additional cost to OWNER. Maintain the silt fence until the Work is accepted or until the fence and silt accumulations are removed.

C. Clear area of any debris and obstructions that may damage geotextile.

D. Place post in all low points.

E. Install posts a maximum of 8 feet apart with at least 18 inches in the ground. If not possible to achieve depth, secure posts to prevent overturning.

F. Attach filter fabric by wire, cord, pockets, staples, nails, or other effective means.

1. When using a wire support fence, provide at least 6 horizontal wires with a minimum of 12 gage wire. Space vertical wires 6 inches maximum. Secure geotextile to the up slope side of the post. Extend wire into the Trench a minimum of 2 inches and extend a maximum or 36 inches above the ground surface.

G. Install fabric so 6 to 8 inches of fabric is left at the bottom to be buried. Splice together only at support posts with any a minimum overlap of 18 inches. Extend buried portion 6 inches deep and the rest upstream of the fabric fence.

H. Sediment Removal: Remove sediment before deposit reaches 1/2 of the height of the silt fence, or extend height of silt fence. After removal of sediment, dress landscape.

I. Schedule of Locations: Typical locations include the toe of fill slopes, the downhill side of fill slopes, the downhill side of large cut areas, and at natural drainage areas. Limit geotextile materials to handle an area equivalent to 1,000 square feet per 10 feet of fence. Use caution should site slope be steeper than 1:1, and water flow rates exceed 1 cubic foot per second per 10 feet of fence face.

3.3 EROSION CONTROL

A. Install fabric in locations shown on the Drawings.

B. Unless otherwise specified, the geotextile shall be overlapped a minimum of 2 feet at all longitudinal and transverse joints, or the geotextile shall be sewn.

C. If overlapped, the geotextile shall be placed so that the upstream sheet overlaps the downstream sheet.

D. For placement on slopes, each strip shall overlap the next downhill strip.

E. The geotextile shall be anchored using key Trenches or aprons at the crest and toe of the slope.

F. Pins, usually 18 inches in length, may be helpful in securing the geotextile during installation.

G. Repair: Place patch over damaged area and extend 3 feet beyond the perimeter of the tear or damage.

3.4 ROADWAY PAVING FABRICS

A. Preparing Asphalt Concrete Surface:

1. Brush road surface clean of debris, dust and gravel. Remove all water from surface and allow to dry.
2. Patch holes and level any uneven areas with asphalt concrete.
3. Fill cracks between 1/8 inch to 1/2 inch with asphalt cement. Allow cement to cure prior to geotextile placement.
4. Clean cracks larger than 1/2 inch to a depth of 3 inches and fill with asphalt concrete. Where Pavement is severely cracked, rutted, deformed or distressed, secure approval for providing an asphalt concrete leveling course prior to geotextile placement.

B. Tacking Asphalt Surface for Pavement Fabric: Use tack asphalt recommended by fabric manufacturer. Apply tack as follows:

1. Dry Pavement surface; 0.20 to 0.30 gallons per square yard. Within street intersections, on steep grades and in zones where vehicle speed changes are commonplace, reduce the application rate to no less than 0.20 gallons per sq.yard.
2. Heavy duty fabrics; 0.30 to 0.40 gallons per square yard.
3. Provide a tack width equal to geotextile width plus 6 inches.
4. Apply tack only as far in advance of geotextile installation as is appropriate to insure a tacky surface at the time of geotextile placement.
5. Allow tack time to cure with no moisture remaining prior to placing the geotextile and overlay.
6. Clean excess tack material from the road surface.

C. Placement of Fabric:

1. Place paving fabric into the asphalt with a minimum amount of wrinkling or folding. Wrinkles or folds in excess of 1 inch shall be slit and laid flat.
2. Shingle-lap all transverse joints and slit folds or wrinkles in the direction of the paving operation.
3. Maximize geotextile contact with the Pavement surface by brooming or pneumatic rolling.
4. Additional hand-placed asphalt may be required at laps and repairs.

D. Protection and Repair:

1. Do not allow traffic except necessary construction equipment and emergency vehicles to drive on the fabric.
2. Turn paver and other vehicles gradually and keep turning to a minimum to avoid movement and damage to the geotextile. Do not permit abrupt starts and stops.
3. Remove and replace damaged geotextile with the same type of geotextile, and shingle-lap the overlaps in the direction of paving. Restrict overlaps to a maximum of 6 inches.

3.5 SUBSURFACE DRAINAGE

A. Excavate Trench to size and depth indicated.

B. Cut fabric to width required and place in Trench. Prevent damage to geotextile.

C. Overlap geotextile 12 inches or the full width of the Trench, whichever is less at the top

of the Trench.

D. Overlap successive pieces of geotextile a minimum of 12 inches in the direction of flow.

E. Place fill to hold fabric in place.

F. Repair any damage to geotextile by placing patches extending 3 feet in all directions beyond the damaged area.

3.6 WEED BARRIER

A. Preparation:

1. Remove sharp objects, large stones and undesirable vegetation.
2. If placing geotextile over existing bed, cut an "X" over each plant and push geotextile under plant base. If placing over new bed, roll geotextile over soil and cut an "X" for each plant hole. Fold excess geotextile under and cover with specified landscaping materials.

B. Surface Cover: Provide a minimum of 4 inches of cover on all areas on the geotextile unless otherwise specified by ENGINEER. If using large landscape rock, increase thickness of cover material over geotextile to 3 times the diameter of the largest rock material. Do not leave any portion of geotextile exposed to direct sunlight.

C. Repair: Repair immediately. Clear the damaged area plus an additional 3 feet and apply geotextile patch.

D. Maintenance: Maintain surfaces and supply additional landscape materials where necessary, including areas affected by erosion.

3.7 FIELD QUALITY CONTROL

A. Reject fabric at the time of installation, if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, handling or storage.

END OF SECTION

SECTION 31 05 21

GEOGRIDS/GEOCOMPOSITES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Geogrid and geocomposite material requirements.

1.2 REFERENCES

A. ASTM D 4354: Standard Practice for Sampling of Geotextiles for Testing.

B. ASTM D 4759: Standard Practice for Determining Specification Conformance of Geosynthetics.

C. ASTM D 4873: Standard Guide for Identification, Storage, and Handling of Geotextiles.

D. ASTM D 5321: Standard Practice for Determining the Coefficient of Soil and Geosynthetic by Direct Shear.

E. ASTM D 6213: Standard Tests to Evaluate the Chemical Resistance of Geogrids to Liquids.

F. ASTM D 6637: Standard Test Method for Determining Tensile Properties of Geogrid.

G. FHWA-SA-96-071: Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines.

1.3 DEFINITIONS

A. Geocomposite: Fabric composed of a geogrid and geotextile.

B. MARV: Defined in Section 31 05 19.

1.4 SUBMITTALS

A. Geogrid sample.

B. Geocomposite sample

C. Manufacturer's warranty.

D. Installer's warranty.

1.5 DELIVERY STORAGE AND HANDLING

A. Label, handle and store product, ASTM D 4873.

B. Deliver product dry, in a plastic wrapping that protects the entire roll.

C. Protect product from ultraviolet light and temperature greater than 160 deg. F. until application. Cover product within 14 days of deployment.

1.6 QUALITY ASSURANCE

A. Provide manufacturer's on-site technical supervision and assistance if required for manufacturer's warranty.

1.7 WARRANTY

A. Manufacturer: Warrant product for a period of 20 years on a prorated basis against manufacturing defects, workmanship, and deterioration due to exposure to the elements.

B. Installer: Warrant material and workmanship for 2 years.

PART 2 PRODUCTS

2.1 GEOGRID/GEOCOMPOSITES -GENERAL

A. Synthetic fiber net at least 85 percent by weight of polypropylene, polyethylene, polyester, polyvinyl alcohol, or polyamide.

B. Resistant to chemical attack, rot and mildew.

C. No tears or defects that will adversely alter properties of product.

2.2 ROADWAY PAVEMENT GEOCOMPOSITE

A. Placement is between asphalt layers. Product is geogrid glued to a lightweight non-woven bitumen coated geotextile.

Table 1 – Roadway Pavement Geocomposite		
Property	**ASTM**	**MARV**
Ultimate Tensile Strength, lb/ft	D 6637	3425 x 3425
Tensile Strength at 3 percent Strain, lb/ft	D 6637	825 x 825
Melting Point (geogrid), deg. F.	–	490
Softening Point (geotextile), deg. F.	–	220

2.3 ROADWAY AGGREGATE GEOGRID

A. Subbase geogrid is placed on the Subgrade below new fill or crushed aggregate base.

B. Base course geogrid is placed between fills or crushed aggregate bases.

Table 2 – Roadway Aggregate Geogrid			
Property	**ASTM**	**MARV**	
		Subbase	**Base Course**
Ultimate Tensile Strength, lbs/ft.	D 6637	900x1400	900 x 1400
Tensile Strength at 2 percent Strain, lbs/ft.	D 6637	–	300 x 445
Tensile Strength at 5 percent Strain,	D 6637	580 x 920	–

lbs/ft.			
Coefficient of Direct Shear	D 5321	1.0	1.0
Chemical Resistance range, pH	D 6213	2 – 12	2 – 12
Aperture Size range, inches	Measured	0.5 – 1.3	0.5 – 1.3
Open Area, percent	-	50 – 80	50 – 80

2.4 **EMBANKMENT GEOGRID**

A. Geogrid is used for earth slope and retaining wall reinforcement.

Table 3 – Embankment Geogrid

Property	ASTM	MARV		
		Type 1	Type 2	Type 3
Long Term Design Strength, lb/ft	(a)	700	1300	1900
Chemical resistance, pH	D 6213	2 – 12	2 – 12	2 – 12
Aperture Size inches	Measured	0.8 – 1.2	0.8 – 1.2	0.8 – 1.2
NOTES (a) FHWA-SA-96-071.				

2.5 **CLAMPS, TAPE, RUBBER PADS**

A. Recommended by manufacturer.

2.6 **SOURCE QUALITY CONTROL**

A. Sample geogrids and geocomposites using ASTM D 4354 standard practices.

B. Verify specification conformance, ASTM D 4759.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Instruct workers about protecting product of this section.

B. Repair damage to Subgrade surface prior to installation.

C. Round edges of Excavation and grade changes.

3.2 **GRANULAR BASE REINFORCEMENT**

A. Deploy each panel per manufacturer's recommendations.

B. Provide sufficient material to allow for expansion and contraction.

C. Do not fold. Do not tie overlaps.

D. Install panels so overlapping panel is upgrade of the underlying panel.

E. Provide geogrid overlap as follows.

Soil CBR Rating	Recommended Overlap
3 +	0.5 feet
2 - 3	1.0 feet
1 - 2	2.0 feet

F. Provide a minimum fill thickness of six inches prior to operating tracked vehicles over geogrid.

3.3 ASPHALT CONCRETE PAVEMENT REINFORCEMENT

A. Clean the surface of the asphalt concrete base course.

B. Seal cracks wider than 1/8 of an inch. Repair larger cracks, Potholes, depressions, and irregularities.

C. Spray on tack coat uniformly at 0.08 -0.10 gal/yd^2 and place geogrid on the tack coat.

D. Overlap in a shingle fashion in the direction of overlay placement. Overlap all roll edges and ends six inches.

E. Place 2 inches minimum asphalt concrete over the geogrid. Compact, Section 32 12 16.

3.4 SOIL REINFORCEMENT

A. Compact Embankment Subgrade.

B. Place Embankment geogrid at the locations and elevations shown on the Plans or controlled by the geogrid manufacturer. Place any specified free draining crushed aggregate base above the geogrid. Compact the fill to a standard proctor of 95 percent or greater.

3.5 PROTECTION

A. At least 6 inches of fill cover is required if tracked vehicles are operated over geogrid.

END OF SECTION

SECTION 31 11 00

SITE CLEARING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of trees, stumps, roots, and tree debris.
B. Clearing site of plant life, root systems and shrubs.
C. Removal of fences, fence posts, mail box posts, and miscellany.

1.2 REFERENCES

A. NAA: Pruning Standards for Shade Trees.
B. Utah Shade Tree Pruning Standards.

1.3 QUALITY ASSURANCE

A. Provide at least one person, who is familiar with NAA pruning standards for the type of tree involved, to be present during tree pruning operations.

1.4 SITE CONDITIONS

A. Repair or replace damaged trees and shrubs at no additional cost to OWNER.

1.5 PROTECTION

A. Protect roots and branches of trees to remain.
B. Construct temporary barricading at tree's approximated drip line. Place continuous barricades at least 3 feet high.
C. When setting posts, avoid damaging tree roots.
D. Do not permit heavy equipment or stockpiling of materials or debris within the barricaded area, or permit earth surface to be changed.
E. Provide water and fertilizer to maintain existing trees.

PART 2 PRODUCTS

2.1 STUMP TREATMENT SOLUTION

A. Formulated to kill existing vegetation.

PART 3 EXECUTION

3.1 EXAMINATION

A. The Drawings do not purport to show all trees and shrubs existing on site.
B. Verify with ENGINEER which plantings are to be removed or to remain.
C. Tree root inspection:
   1. Assist ENGINEER by removing and replacing existing surface improvements.
   2. Cost of removals and replacements will be paid for using existing payment prices, or if none, then by using Modification prices.

3.2 PREPARATION

A. Locate utilities. Preserve utilities that are to remain in service.
B. Review work procedures with ENGINEER.
C. Schedule work carefully with consideration for property owners and general public.
D. Before starting, arrange for the disconnection of all utility services that are to be removed or which interfere with work.

3.3 SITE CLEARING

A. Remove all vegetation to outside Excavation, fill slope lines, and limits of slope rounding.
B. Remove fences, posts, appurtenances, and miscellaneous objects.

3.4 TREE REMOVAL

A. Remove branches, limbs, and debris.
B. Remove stumps and roots to 18 inches below proposed grade.
C. For stumps larger than 6 inches caliper remove and treat as follows:
   1. Remove chips and debris from around remaining stump.
   2. Apply stump treatment solution in accordance with manufacturer's recommendations.
   3. Do not allow chemical solution to mist, drip, drift, or splash onto adjacent ground surfaces or desirable vegetation.
   4. Replace any existing vegetation damaged or killed through improper use of chemical at no additional cost to OWNER.

END OF SECTION

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation and disposal of excavated materials.

B. Protection of existing facilities, utilities, and structures affected by excavation.

1.2 DEFINITIONS

A. Extra Excavation: Upper limit of Excavation is proposed excavation limit. Lower and lateral limits are as authorized by ENGINEER.

B. Classified Excavation: The excavation of specified materials.

C. Incidental Excavation: Excavation done for CONTRACTOR's benefit, excavation error, dewatering of Excavation, slough, or over-break.

D. Unclassified Excavation: The excavation of all materials encountered regardless of the nature, size, or manner in which they are removed. Presence of isolated boulders or Rock fragments will not be sufficient cause to change classification of surrounding materials.

1.3 STORAGE AND HANDLING

A. Stockpile excavated material to cause a minimum of inconvenience to public and provide for emergency services as necessary.

B. Provide free access to all existing fire hydrants, water and gas valves, and meters.

C. Provide free flow of storm water in all gutters, conduits, and natural water courses.

D. Utilize traffic control signs, markers, and procedures in product storage and handling activities.

E. Promptly remove other material from site.

1.4 SITE CONDITIONS

A. Prior to excavation, photograph existing surfaces along which work may take place in order to determine, after construction is completed, whether any damage to existing improvements occurred prior to construction operations. Refer to construction photograph requirements, Section 01 78 39.

B. Perform Incidental Excavation at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 MATERIALS FOR OVER EXCAVATED AREAS

A. Common fill, Section 31 05 13.

B. Crushed aggregate base, Section 32 11 23.

C. Stabilization fill, crushed aggregate base or common fill with maximum rectilinear particle size of 2 inches.

D. Stabilization fabric, Section 31 05 19.

PART 3 EXECUTION

3.1 PREPARATION

A. Use white paint and mark the proposed Excavation.

B. Call the one-call center and wait the required amount of time. Color of one call center marks indicate the following.

1. White: Proposed Excavation
2. Pink: Temporary survey markings
3. Red: Electric power lines, cables, conduit and lighting cables
4. Yellow: Gas, oil, steam, Petroleum or gaseous materials
5. Orange: Communications, alarm, signal, cables or conduits.
6. Blue: Potable water.
7. Purple: Reclaimed Water, irrigation and slurry lines
8. Green: Sewer and storm drain lines

3.2 PROTECTION

A. Identify required lines, grades, contours, and benchmarks, Section 01 71 23.

B. Pothole, expose or otherwise locate utilities as necessary to give utility company at least 4 days notice to protect, preserve, or relocate a utility that interferes with or may be damaged by excavation work.

C. Where utilities or structures conflict with design grades, report conflict to the appropriate utility company and ENGINEER 14 days prior to the initiation of work within the conflict area.

D. For temporary controls, refer to Section 01 57 00.

E. Support and protect from damage any existing facility and structure that exists in, passes through, or passes under the site.

F. No Contract Time extension shall be granted and no additional compensation shall be made if CONTRACTOR fails to pothole and identify buried utilities or structures which conflict with the Work.

3.3 TOPSOIL

A. Excavate topsoil only to depth that will preserve topsoil quality.

B. Do not mix topsoil with subsoil during stockpiling or spreading.

3.4 LANDSCAPE SPRINKLER SYSTEMS

A. Protect existing landscape sprinkler systems.

B. When disturbance of existing sprinkler system is required, interrupt and repair system so operation of system is maintained.

3.5 SHORING

A. .Slope, shore, sheet, brace or otherwise support Excavations over 4 feet deep, Section 31 41 00.

B. When soil conditions are unstable, Excavations shallower than 4 feet deep must also be sloped, supported or shored.

3.6 DEWATERING

A. Keep Excavation free from surface and ground water.

B. If ground water table is in the intended construction operations, dewater Excavations.

C. If there are no olfactory or visual indications of contamination in the water, discharge according to requirements of Federal, State or local agency having jurisdiction.

D. If any evidence of contamination in the water, based on olfactory or visual indications, cease excavation work until potential risks are evaluated. During evaluation, handle water as a contaminated material.

E. Pay for damages and costs resulting from dewatering operations.

3.7 GENERAL EXCAVATION REQUIREMENTS

A. Excavate topsoil from areas to be relandscaped or regraded and other marked areas.

B. Excavate site to line and grade indicated.

C. Carefully excavate soils in vicinity of buried utility marks placed by the one-call center.

D. Where soil has been softened or eroded by flooding or hardened by drying during unfavorable weather, rework all damaged areas or replace with approved material at no additional cost to OWNER.

E. Notify ENGINEER of unexpected subsurface conditions.

F. Underpin adjacent structure, service utilities and pipe chases that may be damaged by Excavation work.

G. Protect Excavation walls as required. If conditions permit, slope Excavation Sides to maintain a safe and clean working area. Remove loose materials.

H. Where ENGINEER deems Subgrade material to be susceptible to frost heave or otherwise unsatisfactory, excavate additional depth.

3.8 ROADWAY EXCAVATION

A. In advance of setting line and grade stakes, clean Subgrade area of brush, weeds, vegetation, grass, and debris. Drain all depressions or ruts that contain water.

B. Backfill and compact over excavation, Section 33 05 05.

3.9 STRUCTURAL AND LANDSCAPE EXCAVATION

A. Provide Shoring, cribs, cofferdams, caissons, pumping, bailing, draining, sheathing, bracing, and related items.

B. For piling work, coordinate special requirements for piling. Protect Excavation walls.

C. If conditions permit, slope Excavation Sides as excavation progress. Maintain a safe and clean working area.

D. Support Excavations. Do not interfere with the bearing of adjacent foundations, pipelines, etc.

3.10 TRENCH EXCAVATION

A. Grade bottom of Trenches to provide uniform bearing surface.

B. If necessary, make bellholes and depressions required to complete joining of pipe or box.

C. Limit width of Trench excavations to the dimensions suitable for worker access per pipe manufacturer's recommendation. Provide enough space for compaction equipment. Notify ENGINEER if excavation operations exceed any indicated line and grade limits.

D. In public thoroughfares and regardless of Trench depth, limit length of open Trenches to 200 lineal feet day or night. Provide barricading, Section 01 55 26. Protect Trenches over night.

3.11 EXTRA EXCAVATION

A. If unstable material is encountered at the bottom or face of any Excavation, do not perform extra excavation without written consent.

B. Correct excavations beyond the specified lines and grades by filling and compacting the resulting voids with acceptable fill.

C. Volume of Excavation within any specified pay limit will be determined by the method of average-end-areas in the original position.

3.12 TOLERANCE

A. Grading: Top surface of Subgrade = plus or minus 1 inch.

END OF SECTION

SECTION 31 23 17

ROCK REMOVAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for Rock removal and the use of explosives to assist in Rock removal.

1.2 REFERENCES

A. NFPA 495: Code for the Manufacture, Transportation, Storage, and Use of Explosive Materials.

1.3 DEFINITIONS

A. Rock: Solid mineral material that cannot be removed with equipment reasonably expected to be used in the Work without cutting, drilling or blasting.

1.4 SUBMITTALS

A. Submit proposed method of blasting, delay pattern, explosive types, type of blasting mat cover, and intended Rock recovery method.

B. Submit photographs of existing site conditions and facilities in vicinity of Work prior to blasting. Refer to construction photographic requirements, Section 01 78 39.

1.5 QUALITY ASSURANCE

A. Seismic Survey Firm: Company specializing in seismic surveys with 2 years documented experience.

B. Explosive Firm: Company specializing in explosives for disintegration of Rock with 2 years documented experience.

PART 2 PRODUCTS

2.1 EXPLOSIVES

A. Type recommended by explosives firm following seismic survey and required by authorities having jurisdiction.

2.2 DELAY DEVICES

A. Type recommended by explosives firm.

2.3 BLASTING MAT MATERIALS

A. Type recommended by explosives firm.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify site conditions and note irregularities affecting work of this section.

B. Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.

C. Verify utility locations, Section 01 31 13.

D. Beginning work of this section constitutes acceptance of existing conditions.

E. Comply with NFPA 495.

3.2 STORAGE OF BLASTING MATERIALS

A. Securely store all explosives in compliance with Laws and Regulations.

B. Mark all storage places clearly.

C. Where no local Laws or Regulations apply, provide storage not closer than 1,000 feet from any road, building, camping area or place of human occupancy.

3.3 ROCK REMOVAL -NONEXPLOSIVE METHOD

A. Cut away Rock at Excavation bottom to form level bearing.

B. Remove shaled layers to provide sound and unshattered base for foundations.

C. Remove and legally dispose of excess excavated material and debris off-site unless indicated otherwise.

D. Correct unauthorized Rock removal at no additional cost to OWNER.

3.4 ROCK REMOVAL -EXPLOSIVE METHOD

A. Provide a qualified explosives expert to act as an advisor and consultant during drilling and blasting operations.

B. Advise owners of adjacent buildings or structures and utility companies in writing prior to setting up seismographs. Describe blasting and seismic operations.

C. Obtain and pay for a seismic survey prior to Rock excavation to determine maximum charges that can be used at different locations in area of Excavation without damaging

adjacent properties and utilities.

D. Provide seismograph monitoring during progress of blasting operations.

E. Disintegrate and remove Rock from excavation operations.

END OF SECTION

SECTION 31 23 23

BACKFILLING FOR STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural backfill materials.
B. Structural backfilling requirements.

1.2 SUBMITTALS

A. Submit maximum laboratory dry density and optimum laboratory moisture content for:
   1. Subgrade material, and
   2. Each type of fill to be used.
B. Upon ENGINEER's request, submit a written quality control Inspections and testing report describing source and field quality control activities performed by CONTRACTOR and its Supplier.

1.3 QUALITY ASSURANCE

A. Do not change material sources, or aggregate without ENGINEER's knowledge.
B. Reject backfill material that does not comply with requirements specified in this section.

1.4 STORAGE

A. Safely stockpile backfill materials.
B. Separate differing materials, prevent mixing, and maintain optimum moisture content of backfill materials.
C. Avoid displacement of and injury to Work while compacting or operating equipment.
D. Movement of construction machinery over Work at any stage of construction is solely at CONTRACTOR's risk.

1.5 SITE CONDITIONS

A. Do not place, spread, or roll any backfill material over material that is damaged by water. Remove and replace damaged material at no additional cost to OWNER.
B. Control traffic and erosion. Keep area free of trash and debris. Repair settled, eroded, and rutted areas.
C. Reshape and compact damaged structural section to required density.

1.6 ACCEPTANCE

A. General:

1. Native material may be wasted if there is no additional cost to substitute material acceptable to ENGINEER.
2. For material acceptance refer to.
   a. Common fill, Section 31 05 13.
   b. Crushed aggregate base, Section 32 11 23.
   c. Cement treated fill, Section 31 05 15.

B. Structure Backfilling: One test per Lot.

Table 1 – Lot Size for Structural Backfilling Operations

Structure Type	Test Criteria	Lot Size
Strip Footings	Standard (a)	Subgrade: 200 lineal feet
	Modified (a)	Crushed aggregate base: 200 lineal feet per lift.
Structure Footing excluding strip footings	Standard (a)	Subgrade: 225 square feet.
	Modified (a)	Crushed aggregate base: Each 225 square feet per lift
Embankments	Standard (a)	Fill: 625 square feet per lift
Miscellaneous small structures (e.g. Manholes, drainage boxes, etc.)	Standard (a)	Subgrade: Each footprint area Fill: Each lift
	Modified (a)	Crushed aggregate base: Each lift
NOTES (a) Proctor density, Section 33 05 05 (b) Lift thickness before compaction is 8 inches.		

1.7 WARRANTY

A. Restore incidentals damaged by settlement at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 BACKFILL MATERIALS

A. Common fill, Section 31 05 13.

B. Crushed aggregate base, Section 32 11 23.

C. Cement treated fill, Section 31 05 15.

2.2 ACCESSORIES

A. Water:

1. Make arrangements for sources of water during construction and make arrangements for delivery of water to site.
2. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify:

1. Stockpiled fill meets gradation requirements.
2. Foundation walls are braced to support surcharge forces imposed by backfilling operations, areas to be backfilled are free of debris, snow, ice or water.
3. Ground surface is not frozen.

B. If subgrade is not readily compactable secure written authorization for extra excavation and backfill, Section 31 23 16.

C. Identify required line, levels, contours, and datum.

D. Stake and flag locations of underground utilities.

E. Upon discovery of unknown utility or concealed conditions, notify ENGINEER.

3.2 PROTECTION

A. Protect existing trees, shrubs, lawns, existing structures, fences, roads, sidewalks, paving, curb and gutter and other features.

B. Protect above or below grade utilities. Contact utility companies to repair damage to utilities. Pay all cost of repairs.

C. Protect Subgrade from desiccation, flooding and freezing.

D. Do not fill adjacent to structures until Excavation is checked by ENGINEER.

E. Do not use compaction equipment adjacent to walls or retaining walls that may cause wall to become over-stressed or moved from alignment.

F. Do not disturb or damage foundation perimeter drainage, foundation, damp-proofing, foundation waterproofing and protective cover, or utilities in Trenches.

G. Restore any damaged structure to its original strength and condition.

3.3 LAYOUT

A. Maintain all benchmarks, control monuments and stakes, whether newly established by surveyor or previously existing. Protect from damage and dislocation.

B. If discrepancy is found between Contract Documents and site, ENGINEER shall make such minor adjustments in the Work as necessary to accomplish the intent of

Contract Documents without increasing the Cost of the Work to CONTRACTOR or OWNER.

3.4 FOUNDATIONS AND SLABS ON GRADE

A. Place backfill materials in lifts not exceeding 8 inches after compaction.

B. Do not backfill against walls until concrete has obtained 14 day strength. Backfill against foundation walls simultaneously on each side.

C. Fill unauthorized excavations with material acceptable to ENGINEER at no additional cost to OWNER.

D. Do not damage adjacent structures or service lines.

E. Where flowable fill is used, use fill that flows easily and vibration for compaction is not required.

3.5 MODIFIED BACKFILL LAYER METHOD

A. Refer to Section 33 05 20.

3.6 COMPACTION

A. Compact backfill; Section 33 05 05 to the following maximum dry densities.

1. Under Footings: 98 percent.
2. Interior Crawl Spaces: 90 percent.
3. Interior Slab-On-Grade: 98 percent.
4. Side of Foundation Walls and Retaining Walls:
   a. Exterior: 95 percent.
   b. Interior: 98 percent.
5. Miscellaneous Structures: 95 percent.

3.7 CLEANING

A. Remove stockpiles from the site. Grade site surface to prevent free standing surface water.

B. Leave borrow areas clean and neat.

END OF SECTION

SECTION 31 23 26

COMPACTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Compaction of granular fill materials.

1.2 REFERENCES

A. ASTM D 698: Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

B. ASTM D 1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

C. ASTM D 2216: Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.

D. ASTM D 2922: Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

E. ASTM D 3017: Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

F. ASTM D 3282: Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

G. ASTM D 3740: Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

1.3 DEFINITIONS

A. A-1 Soil: Defined in ASTM D 3282.

B. Modified Proctor Density: The maximum laboratory density, as defined in and determined by ASTM D 1557 using procedure A, B or C as applicable.

C. Relative Density (or Relative Compaction): The ratio of field dry density to the maximum laboratory density expressed as a percentage.

D. Standard Proctor Density: The maximum laboratory density, as defined in and determined by ASTM D 698 using procedure A, B or C as applicable.

1.4 QUALITY ASSURANCE

A. Use a laboratory that follows and complies with ASTM D 3740.

PART 2 PRODUCTS Not Used **PART 3 EXECUTION**

3.1 COMPACTION

A. Moisten or dewater backfill material to obtain optimum moisture for compaction.

B. Correct deficient compaction conditions. Replace or repair materials and damaged facilities.

C. When no density compactive effort is specified, compact the entire area to eliminate unstable zones.

3.2 FIELD QUALITY CONTROL

A. Testing: Perform control testing of materials. Perform additional testing at no additional cost to OWNER.

1. Because of changes in source of materials or proportions requested by CONTRACTOR.
2. Because of Failure of materials to meet specification requirements.
3. For other testing services needed or required by CONTRACTOR.

B. Report: For each material tested, record the following.

1. Vertical and horizontal location of the test.
2. Optimum laboratory moisture content.
3. Field moisture content.
4. Maximum laboratory dry density.
5. Field density.
6. Percent compaction results.
7. Certification of test results by testing agency.

C. Optimum Soil Density: Use ASTM D 2216 and the following industry standards.

1. For A-1 Soils: Use test method C of ASTM D 1557 (Modified Proctor)
2. For All Other Soils: Use test method C of ASTM D 698 (Standard Proctor).

D. Field Density:

1. Use ASTM D 3017 and test method C of ASTM D 2922 for shallow depth nuclear testing.
2. No density determinations are required on any material containing more than 65 percent material retained on the number 10 sieve or more than 60 percent material retained on the number 4 sieve. In lieu of reporting densities in such cases, report the sieve analysis to document the material type.

END OF SECTION

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Erosion control and slope protection facilities including blankets or mulches.

B. Construction of drainage facilities to protect work area.

1.2 SUBMITTALS

A. Submit prior to using:

1. Sample of blanket or geotextile materials.
2. Mulch formula.
3. Grass mixture listing.
4. Plant list.
5. Geotextile manufacturer's certification.

B. Application rate of fiber mulches recommended by tackifier manufacturer.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver seed in original containers with certified germination test results showing analysis of seed mixture, percentage of pure seed, year of production, and date of packaging. Damaged packages are not acceptable. Store seed free of moisture.

B. Deliver fertilizer in waterproof bags showing weight, chemical composition and name of manufacturer.

C. Deliver blanket in original wrapping showing name of manufacturer and product weight.

D. Deliver plant materials immediately prior to placement.

E. Replace plant when original root protection system (burlap bag wrap of earth ball, plastic container with special plant bedder, etc.) has been broken or displaced prior to planting.

PART 2 PRODUCTS

2.1 MATERIALS

A. Riprap: Rock, Section 31 37 00.

B. Blankets: Uniform open weave jute, wood fiber, biodegradable or photodegradable synthetic fiber matting.

C. Geotextiles: Refer to fabric in Section 31 05 19.

D. Erosion Control Vegetation Mats: Permanent three dimensional mats which allow for

revegetation where high water flows are expected.

E. Fiber Mulches: Straw, hay, wood or paper free from weeds or foreign matter detrimental to plant life.

F. Mulch Binder: Vegetable based gel tackifier with growth stimulant.

G. Topsoil and Fertilizer: Refer to Section 31 05 13 and Section 32 92 00.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove foreign materials, roots, rocks, and debris.

B. Grade to eliminate rough spots, and ponding areas.

C. Grade soil to drain perimeter water away from protected areas.

D. As applicable.

1. Temporary controls, Section 01 57 00.
2. Grass, Section 32 92 00.

3.2 SLOPE PROTECTION BLANKET

A. Cover seeded slopes where grade is greater than 3 horizontal to 1 vertical with blanket. Roll down over slopes carefully and loosely without stretching or pulling.

B. Lay blanket smoothly on prepared soil surface. Bury top end of each section in a narrow Trench. Leave 24 inches overlap from top roll over bottom roll. Leave 12 inches overlap over adjacent section.

C. Toe-in top end of each section in narrow Trench at least 12 inches deep. Toe-wrap fabric at bottom of slope.

D. Staple loosely the outside edges and overlaps.

E. In ditches, lay matting in upstream direction. Overlap and staple ends 6 inches with upstream section on top.

F. If natural drainage water traverses protected or controlled area; construct a channel or riprap according to Drawings and Section 31 37 00.

G. Lightly dress slopes with topsoil to ensure close contact between cover and soil.

H. Present alternative methods of protection for approval prior to starting any work.

3.3 GEOTEXTILE

A. Placement, Section 31 05 19.

3.4 MULCHES

A. Apply mulches at the rate indicated.

B. When installed with a tackifier, apply at the rate recommended by the tackifier Supplier.

3.5 **SURFACE COVER**

A. Grass, Section 32 92 00.

B. Ground cover, Section 32 93 13.

3.6 **MAINTENANCE**

A. Maintain surfaces and supply additional topsoil where necessary, including areas affected by erosion.

B. Protect and repair geotextiles, Section 31 05 19.

C. Keep surface of soil damp only as necessary for seed germination.

D. Apply water slowly so surface of soil will not puddle and crust.

E. Replant damaged grass areas showing root growth Failure, deterioration, bare or thin spots, and eroded areas.

F. Re-fertilize 60 days after planting.

G. Remove weeds that are over 3 inches high.

END OF SECTION

SECTION 31 31 19

VEGETATION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of soil treatment to remove weed and vegetation.

1.2 SUBMITTALS

A. Submit certificate identifying composition of non-selective control herbicide.

PART 2 PRODUCTS

2.1 HERBICIDE

A. Water soluble herbicide for non-selective control of annual and perennial weeds.

PART 3 EXECUTION

3.1 MIXING

A. Mix herbicide solution in strict accordance with manufacturers instructions and applicable Laws and Regulations.

3.2 APPLICATION

A. Execute all work in an orderly and careful manner with due consideration for surrounding plantings which are to remain.

B. Apply herbicide solution with a shield applicator. Do not allow solution to mist, drip, drift, or splash onto desirable vegetation.

C. Apply solution according to manufacturer's recommendations 7 days before preparation of surface to receive additional cover material. Do not add cover material until ENGINEER reviews spraying results.

D. Do not spray under windy or adverse weather conditions.

E. Replace portions of surrounding vegetation damaged or killed through this operation.

END OF SECTION

SECTION 31 36 00

GABIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gabion for slope or bank protection and erosion control in open channels.

1.2 REFERENCES

A. ASTM A 313: Standard Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Spring Wire.

B. ASTM A 641: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

C. ASTM A 764: Standard Specification for Steel Wire, Carbon, Drawn Galvanized and Galvanized at Size for Mechanical Springs.

1.3 SUBMITTALS

A. Manufacturer's product data showing gabion wire twist or welded pattern, components to be used, erection and component tolerances, overall layout, typical construction details, and construction procedures.

B. Design criteria recommended by manufacturer.

1.4 QUALITY ASSURANCE

A. Manufacturer of gabion structure to train and instruct construction personnel regarding installation of gabion.

B. Do not allow any gabion structure to deform during the backfill operation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Gabions: Uniform hexagonal wire mesh woven in 2 or 3-1/2 twist pattern with openings fabricated in such a manner as to be non--raveling and designed to provide the required flexibility and strength. The wire mesh shall have deformability sufficient to permit a minimum mesh elongation equivalent to 10 percent of the unstretched length of the mesh test section without reducing the gage or tensile strength of the individual wire strands to values less than those for similar wire, one gage smaller in diameter.

B. Wire: Class 3, ASTM A 641.
1. Wire Mesh Fabric: US gage 11 after galvanization.
2. Selvedges: US gage 9.
3. Binding and Connecting: US gage 13-1/2.
4. Tensile Strength: 60,000 -75,000 (psi).
5. Elongation: 12 percent maximum.

C. Polyvinyl Chloride Coated Galvanized Wire:
1. Wire Mesh Fabric: Same diameter as galvanized with an approximate overall diameter of 0.12785 inch (galvanized wire core plus PVC coating).
2. Selvedges: Same diameter as galvanized except, galvanized wire code to be US gage 10 (0.1338 inch with an approximate overall diameter of 0.15545 inch (galvanized wire core plus PVC coating).
3. Binding and Connecting: Same diameter as galvanized with an approximate overall diameter of 0.10825 inch (galvanized wire core plus PVC coating).

D. Fasteners: Resistant to a force of at least 900 pounds while still remaining in a locked and closed position.
1. Stainless steel, ASTM A 313 for PVC coated gabions.
2. Galvanized, ASTM A 764, Finish I, Class I, Type 3 with the same weight of coating as specified in ASTM A 641.

E. Stone: Hard, durable, graded from 4 inches to 8 inches diameter.

PART 3 EXECUTION

3.1 GABION ASSEMBLY

A. Assemble the base, lid, ends and sides into a single woven unit. If not woven then connect these members so that strength and flexibility at the connecting point is at least equal to that of the mesh.

B. Where the length of the gabion exceeds 1-1/2 times its horizontal width, divide the gabion with diaphragms, of the same mesh and gage as the body of the gabion, into equal cells whose length does not exceed the horizontal width. Secure diaphragms in position on the base section such that no field tying is required.

C. Tie all untied edges with binding wire. Loop wire tightly around every other mesh opening along the seams such that every other mesh opening along the seams are single and double loop alternating.

3.2 PLACEMENT

A. Place empty gabions into positions indicated. Tie each unit to the adjoining unit along the vertical reinforced edges and the top selvedges.

B. Tightly wire front and back of base of empty gabions to top of previously filled

gabions.

C. Stretch gabions to achieve better alignment and finish.

D. Position fasteners at 2 per foot of selvedge.

3.3 GABION FILLING

A. Backfilling Gabion Structures 24 inches High or Greater:

1. Backfill each unit in 12 inches thick lifts.
2. At the completion of the first backfill lift, tie one connecting wire in each direction to opposite face of each gabion cell. Loop and twist lock all connecting wires around 2 mesh openings.
3. At the completion of the second backfill lift, tie 2 connecting wires as above.
4. Continue above backfilling procedure until gabion structures are filled.
5. Tie gabion structure lid to the rest of the basket.

B. Backfilling Gabion Structures 18 inches High or Less:

1. Backfill each unit in lifts 1/2 the thickness of the gabion structure.
2. At the completion of the first backfill lift, tie 2 connecting wires in each direction. Complete the wire tying and backfill operation as above.

END OF SECTION

SECTION 31 37 00

RIPRAP OR ROCK LINING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Placement of loose riprap, hand-placed riprap, or grouted riprap.

1.2 REFERENCES

A. ASTM C 535: Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

1.3 SUBMITTALS

A. Submit prior to use in the Work product data showing riprap source, gradation, aggregate wear and placement technique.

PART 2 PRODUCTS

2.1 AGGREGATE

A. Durable, angular, hard stone free from seams and cracks.

B. Graded in size to produce a reasonably dense mass.

C. The greatest dimension of 25 percent of the stones shall be at least, equal to but not more than 1-1/2 times the thickness of riprap indicated.

D. The greatest dimension of 50 percent of the stone shall be at least 3/4, but not more than 1-1/2 times the thickness of riprap indicated.

E. Not more than 10 percent of the aggregate shall have a dimension less than 0.1 times the thickness of riprap.

F. At least 95 percent of the stones shall have a minimum of 2 fractured or clean angular faces.

2.2 ACCESSORIES

A. Portland cement grout, Section 03 61 00.

B. Geotextile fabric, Section 31 05 19.

2.3 SOURCE QUALITY CONTROL

A. Aggregate: Wear not greater than 40 percent when tested, ASTM C 535.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove all brush, trees, stumps, and other objectionable materials and dress area to a smooth surface. Make Excavation to provide a firm foundation and protect against undercutting. Secure approval prior to backfilling.

B. Install required geotextile in accordance with Section 31 05 19.

3.2 LOOSE-PLACED RIPRAP

A. Place stones to secure a Rock mass with the minimum thickness and height indicated. Manipulate Rock to secure a regular surface of graded size and mass stability.

3.3 HAND-PLACED RIPRAP

A. Place and bed the Rocks, one against the other, and key together. Fill irregularities between stones with suitable size spalls.

B. Place so that finished surface of riprap is even, tight, and true to line and grade. Extend riprap sufficiently below ground surface to secure a firm foundation.

3.4 GROUTED RIPRAP

A. Place riprap as indicated.

B. After wetting the stones, sweep sand or fine gravel into the interstices to fill to within 4 inches of the outer surface of the riprap.

C. Fill the remaining volume of the interstices flush with a well-mixed grout.

D. Keep grout wet by sprinkling or covering with wet material for at least 3 days. Protect grout from stream water or any other disturbance during this cure period.

E. Do not place grout in freezing weather.

END OF SECTION

SECTION 31 41 00

SHORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shoring for open Excavations requiring a Protective System.

B. Underpinning to stabilize adjacent structure.

1.2 UNIT PRICE -MEASUREMENT AND PAYMENT

A. In trenching, two Protective Systems are required if each Side of the Trench is to be shored. The use of a Trench Box shall be classified as one Protective System.

B. Payment covers the cost of the Protective System to a depth of 3 feet below the Excavation elevations indicated. Allowance for extra cost may be made, based upon the actual cost to the CONTRACTOR of constructing, extending or reconstructing any Protective System that may be necessary to carry the excavation to the required depth which is greater than 3 feet below the Excavation elevations indicated. The extra cost will be paid for by **Change Order**.

C. Excavation in Lieu of Protective System: When Protective Systems are indicated and with the written approval of the ENGINEER the actual installation of the Protective Systems are not made, the CONTRACTOR will be paid in full for the Protective System bid item, which includes all extra excavation, extra backfill, backfill compaction, or other incidental work performed by CONTRACTOR in lieu of constructing the Shoring or underpinning.

1.3 DEFINITIONS

A. Accepted Engineering Practices: Those requirements or practices that are compatible with standards required by a duly licensed or recognized authority.

B. Benching: A method of protecting persons and property against cave-ins by excavating the Sides of an Excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

C. Excavation: Any man-made cut, cavity, or depression in an earth surface, including Trenches, formed by earth removal and producing unsupported earth conditions (Sides). If installed forms or similar structures reduce the depth-to-width relationship, an excavation may become a Trench.

D. Failure: The permanent deformation or breakage of a structural member or connection; or the collapse of all or part of an Excavation.

E. Protective System: Any recognized method of protecting persons and property against cave-ins, the collapse of adjacent structures, or material that may fall or roll from an

Excavation Side or into an Excavation. Protective systems include Support Systems, Sloping and Benching systems and Shield systems.

F. Shield: A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect persons and property within the structure without preventing a cave-in. Shields may be permanent structures or may be designed to be portable and moved along as work progresses. Portable Shields used in Trenches are usually referred to as "trench boxes" or "trench shields".

G. Shoring: A structure that supports the Sides of an Excavation and thereby protects persons and property by preventing cave-ins.

H. Side: Vertical or inclined earth surface formed at the outer edges of an Excavation.

I. Sloping: A method of protecting persons and property against cave-ins by excavating to form Sides that are inclined away from the Excavation, the angle of incline being of such a degree for the conditions of exposure that a cave-in will not occur.

J. Support System: A structure that protects persons and property by providing support to an adjacent structure, underground installation, or the Sides of an Excavation.

K. Trench: A narrow Excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

L. Trench Box: See Shield.

M. Unfractured Rock: Rock that can be excavated with vertical Sides and remain intact while exposed. Fractured Rock is considered equivalent to unfractured Rock when the material on the Side or Sides of the Excavation is secured against cave-in or movement by Rock bolts, netting, or other means approved by a professional engineer.

1.4 DESIGN OF PROTECTIVE SYSTEMS

A. Design Support Systems, Shield systems, and the structural components of these systems, and Sloping and Benching systems to resist all loads that are intended to be imposed or transmitted to them.

B. Design system for any hydrostatic pressure in the Sides of an Excavation.

1.5 SUBMITTALS

A. Submit a Protective System plan when requested.

PART 2 PRODUCTS

2.1 MATERIALS

A. CONTRACTOR's choice.

PART 3 EXECUTION

3.1 PREPARATION

A. Make safe or remove trees, surface encumbrances which are hazardous to Shoring operations.

B. Provide adequate ventilation of Excavations.

C. Control dust and groundwater.

3.2 STABILITY OF ADJACENT STRUCTURES

A. Support adjoining buildings, walls, sidewalks, Pavements, or other structures endangered by excavation operations.

B. Excavation below level of base of footing of any structural foundation or wall shall not be permitted except as follows:

1. Underpinning or other Support Systems is provided to ensure stability of structure, or
2. Excavation is in Unfractured Rock, or
3. A professional engineer determines in writing that such work will in no way pose a hazard to persons and property or the integrity of the structure.

3.3 PROTECTION OF PERSONS AND PROPERTY

A. Protect from cave-ins. Install a Support System, by Sloping, by Benching, by use of a Shield system, or by use of a combination of these methods.

B. Scale to remove loose material. Use Rock bolting, wire mesh, installation of protective barricades, or provide equivalent protection.

C. Stairway, Ladder, Ramp: Comply with OSHA.

D. Protect against cave-ins from vibratory loads adjacent to excavation operations.

3.4 INSPECTIONS

A. Inspect Excavations daily for evidence of possible cave-ins, indications of Failure of Protective Systems, or other hazardous conditions.

B. Upon discovery of hazardous conditions, cease all work in the Excavations until additional precautions have been taken to ensure persons and property safety.

3.5 SHIELD SYSTEMS

A. Minimize the time the Sides of the Excavation remain unsupported.

B. Do not subject Shield systems to loads other than those considered for in their design.

C. Remove persons and property from Excavation when portable Shields are being relocated.

3.6 INSTALLATION AND REMOVAL OF SUPPORT SYSTEMS

A. Do not overload Support Systems.

B. Install additional members to carry the loads imposed upon the Support System when temporary removal of individual members is necessary.

C. When removing the Support System, release member by member slowly to avoid Failure of the remaining members or cave-ins.

D. Coordinate backfilling to minimize time an unsupported Excavation remains open.

END OF SECTION

SECTION 32 01 05

INFORMATION, REGULATORY, AND WARNING SIGNS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Information, regulatory, and warning signs but not street name signs or construction signs.

1.2 REFERENCES

A. MUTCD: Manual on Uniform Traffic Control Devices for Streets and Highways.

B. APA: American Plywood Association.

C. ASTM B 209: Standard Specification for Aluminum and Alumin-um-Alloy Sheet and Plate.

D. FS L-P 380: Plastic Molding Material Methacrylate.

E. FS L-S-300: Sheeting and Tape, Reflective: Nonexposed Lens.

F. PS 1: Construction and Industrial Plywood.

1.3 DEFINITIONS

A. For definition purposes, the various types of signs are identified by a combination of letter and number. The letter represents the type of sign panel construction and the number represents the type of lettering and symbols to be used as follows:

1. Panel Type:
   a. Panel Type A: Reflectorized sheeting on sheet aluminum.
   b. Panel Type B: Reflectorized sheeting on plywood.
2. Letter Type:
   a. Letter Type 1: Reflectorized demountable cutout letters, symbols, and borders with prismatic reflectors.
   b. Letter Type 2: Opaque legend and borders.
   c. Letter Type 3: Reflectorized permanently attached cutout letters, symbols, and borders or reflectorized screen processed letters, symbols, and borders.

1.4 SUBMITTALS

A. Submit shop drawings of support structures prior to fabrication.

B. Submit sample of each color of reflective sheeting including manufacturer's name and product number.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sheet Aluminum Sign Blank: 0.1 inch thick ASTM B 209 alloy 6061-T6.

B. Aluminum Extrusion Sign Blank: 0.1 inch thick ASTM B 209 alloy 6063-T5 and 6063-T6.

C. Softwood Plywood Sign Blank: PS 1 Group 1 with each panel bearing initials DFPA Grade -Trademark of the American Plywood Association; painted to ENGINEER's choice of color unless indicated.

D. Posts: Galvanized structural steel, U-shaped, T-shaped, C-shaped, box-shaped, or round tube, Section 05 12 00, with 3/8 inch diameter mounting holes.

E. Fabricated Supports: Galvanized steel, Sections 05 12 00 and 05 05 10.

F. Reflective Sheeting: Reflective per FS L-S-300 requirements with 2,200 hours minimum durability.

G. Nonreflective Sheeting: Nonchalking, weather resistant transparent plastic having a protected adhesive backing and a smooth flat outer surface with glass spheres embedded within.

H. Prismatic Reflectors: Methyl methacrylate lens meeting FS L-P-380 requirements with aluminum frame.

I. Bolts, Nuts, Accessories: Galvanized steel, Section 05 05 23.

J. Cast-in-place Concrete: Class 3000, Section 03 30 04.

2.2 COLORS AND FORMAT

A. Sign Colors and Format: Conform to MUTCD.

B. Provided colors of same reflectorized hue in daylight and night under artificial white illumination.

PART 3 EXECUTION

3.1 PREPARATION

A. Indentify utility location, Section 01 31 13.

B. Excavation, Section 31 23 16.

3.2 INSTALLATION

A. Do not remove a sign that is being replaced until the new sign is placed and uncovered.

B. Unless indicated otherwise use clearance and locations shown in MUTCD. Install

posts plumb and in proper alignment.

C. Establish proper elevation and orientation of all signs, structures, and determine proper sign post lengths as dictated by construction slopes.

D. Cover signs that require temporary covering with a porous cloth or fiber material folded over the sign edges and secured at the rear of the sign in such a manner that the sign is not damaged. Maintain covering until oremoval.

E. Construct sign post foundations with concrete conforming to indicated dimensions. Finish foundations flush with or below natural ground.

F. Construct overhead support structures where indicated. Support sign by mounting posts on anchor bolts placed in reinforced concrete foundations. Construct signs horizontal and perpendicular to roadway. The minimum allowable vertical clearance from the high point of Pavement is 16.5 feet.

3.3 WORKMANSHIP

A. Carefully fabricate and erect signs. Damage signs will be rejected.

B. Make all vertical joints and cuts flat and true.

C. Elevator bolts may be used or bolt holes relocated where conflict exists with sign border, legend, or copy.

D. Lay out and properly balance on the sign face all Type 1 legend and copy before fastening. Plug holes left by shifting of copy or legend with the same type screw used to fasten the legend.

E. Wash all sign faces prior to Final Inspection, Section 01 74 13.

END OF SECTION

SECTION 32 01 06

POST MOUNTED SIGNS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for street name sign and components.

1.2 REFERENCES

A. ASTM B 209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. FS L-S-300: Sheeting and Tape, Reflective: Nonexposed Lens.

PART 2 PRODUCTS

2.1 MATERIALS

A. Sheet Aluminum Sign Blanks: 0.1 inch thick ASTM B 209 alloy 6061-T6, of the height indicated with length required to spell the street name (18, 24, 30, 36, 42, 48 inches).

B. Nonmetallic Sign Blanks: Fiberglass reinforced composite bonded with a thermosetting polymer and the following properties.

1. Tensile strength (transverse), 5,000 psi minimum.
2. Tensile strength (longitudinal), 25,000 psi minimum.
3. Lengths as required to spell the street name (18, 24, 30, 36, 42, 48 inches).
4. Height as indicated.

C. Posts: Galvanized structural steel, U-shaped, T-shaped, C-shaped, box-shaped, or round tube per Sections 05 12 00 and 05 05 10 requirements, with 3/8 inch diameter mounting holes.

D. Reflective Sheeting: Reflective per FS L-S-300 requirements with 2,200 hour minimum durability.

E. Sign Lettering: White upper case and lower case letters, reverse silk screened on white with specified background color transparent ink.

F. Letter Composition: Spell out street name and give numerical coordinate on the right hand side; include neighborhood logo, if applicable, on the left hand side. Font as indicated.

G. Rail for Sign Blank: Tensile strength 40,000 psi minimum.

H. Bolts, Nuts, Accessories: Galvanized steel, Section 05 05 23.

I. Cast-in-place Concrete: Class 3000, Section 03 30 04.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify utility location, Section 01 31 13.

B. Excavation, Section 31 23 16.

3.2 INSTALLATION

A. Set posts 2 feet deep and anchored in concrete.

B. Provide 10 feet high clearance from the ground level to the bottom of sign.

C. Install posts plumb so closest edge of sign is 2 feet from vertical projection of the curb face at the point of curve (PC) of the intersection approach curb.

D. Restore all surfaces damaged during installation.

END OF SECTION

SECTION 32 01 07

RELOCATE POST MOUNTED SIGNS AND MAIL BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Relocate post mounted signs.

B. Relocate mail boxes to supports which are approved by USPS.

1.2 REFERENCES

A. USPS: United States Postal Service, mailbox requirements.

1.3 DEFINITIONS

A. Post Mounted Signs: Street name signs and traffic control signs such as regulatory signs, warning signs, guide signs, detour and closure signs.

PART 2 PRODUCTS

2.1 CONCRETE

A. Cast-in-place Concrete: Class 3000 minimum, Section 03 30 04.

2.2 MAIL BOX SUPPORTS

A. Wood: Salt treated fir, hemlock or pine for post, shelf and brace. Grade: No. 2 or better.

B. Metal: Galvanized or dark epoxy painted steel post, shelf and brace with no defects.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate utility location, Section 01 31 13.

B. Excavate, Section 31 23 16.

C. Reuse existing mail boxes, street signs and posts unless indicted otherwise.

3.2 EXISTING TRAFFIC CONTROL SIGNAGE

A. Maintain all existing street signs in full view of the intended traffic.

B. Coordinate relocations such that view of post mounted sign is maximize.

3.3 **SIGN RELOCATION**

A. Maintain existing signs until construction requires removal. Coordinate with ENGINEER 24 hours in advance of removal of any sign.

B. Relocate existing street signs as indicated or ordered by the ENGINEER.

C. Remove concrete from existing posts where posts are to be reused.

D. Protect new signs and posts until Project is accepted.

E. Reset post in concrete, 8 inches in diameter to the depth indicated or ordered by ENGINEER.

F. Completely fill and compact hole left by removing sign post. Match adjacent surface.

3.4 **MAIL BOX RELOCATION**

A. Completely remove all designated mail box posts and footings.

B. Furnish and install new posts, shelf, and brace.

C. Relocate existing mail boxes indicated or ordered by the ENGINEER.

D. Attach box firmly to shelf and post.

E. Repair any damage done to the mail box during moving or replace if irreparable to ENGINEER's and mail box owner's satisfaction.

F. Compact soil around post and provide firm support.

G. Provide support for temporary mail box as required during construction at no extra cost to OWNER, with temporary mail box located in accordance with United States Postal Service requirements.

H. Restore original location of box to condition equivalent to adjacent area.

3.5 **PAVEMENT MARKINGS**

A. Section 32 17 23.

END OF SECTION

SECTION 32 01 10

RELOCATE FENCES AND GATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Moving and resetting existing fences and gates to locations indicated or directed by ENGINEER.

PART 2 PRODUCTS

2.1 MATERIALS

A. Nails, Spikes and Staples: Galvanized steel for exterior, high humidity locations, and treated wood, Size and type to suit applications.

B. Chain Link Fences and Gates: Section 32 31 13.

C. Wire Fences and Gates: Section 32 31 16.

D. Cast-in-place Concrete: Class 3000 minimum, Section 03 30 04.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate locating utilities, Section 01 31 13.

B. Excavation, Section 31 23 16.

3.2 INSTALLATION

A. Completely remove all existing posts, footings, wires, gates, and other items used in fencing.

B. Remove concrete on posts. Reuse posts, wire, and gates from existing fence unless directed otherwise by ENGINEER.

C. Replace any fencing materials and gates that are damaged, lost, or broken during fence and gate relocations. Provide new materials as required which meets Specifications, for fence and gates of the same type.

D. Set relocated fences and gates straight and true.

E. Fill in old post holes unless they become part of new construction.

F. Reset posts in concrete, 8 inches in diameter to depth indicated or 2 feet minimum.

END OF SECTION

SECTION 32 01 13.50

FOG SEAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of a surface rejuvenator (hot liquid asphalt emulsion) over a pavement surface that has aged at least nine (9) months.

1.2 SUBMITTALS

A. Product data including manufacturer's literature and installation instructions.
B. Traffic control and notification plan.
C. Construction equipment list.

1.3 WEATHER

A. Apply sealer seal when air and roadbed temperatures in the shade are between 50 and 80 deg F. The temperature restrictions may be waived only upon written authorization from ENGINEER.
B. Do not apply sealer during rain, fog, dust, or other unsuitable weather.

PART 2 PRODUCTS

2.1 ASPHALT BINDER MATERIALS

A. Select from the following:
   1. Emulsified asphalt: grade SS-1h, Section 32 12 03.
   2. Cationic emulsified asphalt: grade CSS-1h, Section 32 12 03.
   3. Cationic emulsified asphalt: grade CQS-1h, Section 32 12 03.
   4. Cationic asphalt emulsion with gilsonite ore.
B. Rejuvenators:
   1. Asphalt and maltene oil with polymer mix.
   2. Maltene oil base.
   3. Latex: Two (2) parts latex to 100 parts asphalt emulsion.

2.2 MIX DESIGN

A. Emulsified asphalt and water dilution ratios.

1. Ratio of 1:1 for most applications.
2. Ratio of 2:1 for use on hills where runoff may be of concern or on existing very rough surface texture pavements.

2.3 SAND

A. Section 31 05 13.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Standard bituminous spreader with triple coverage spray bar.

3.2 PREPARATION

A. Plane off or grind off existing painted lines, grease or oil patches, and spillage and spillage of any material that has adhered to pavement.
B. Remove all dust, dirt, and debris.
C. Apply crack sealant, Section 32 01 17, if indicated.
D. Clean surface by water flush. Do not flush over cracks. Complete flush 24 hours prior to application of seal. Surface must be completely dry prior to application.

3.3 APPLICATION

A. Follow sealant manufacturer's recommendations in regard to fogging of substrate, priming of substrate, and dilution of sealer.
B. Application Rate: Use the following as a guide. If surface completely absorbs emulsion with ability to absorb more, increase application rate.

Table 1 – Application Rate

Dilution	Rate, Gal/sq.yd.	Temperature, deg F		
		Target	Minimum	Maximum
1:1	0.10 to 0.15	150	90	190
2:1	0.08 to 0.12			

C. Stop application if any spray bar nozzle is not working properly.
D. Blot areas with too much emulsion by spreading a light, uniform layer of sand.

3.4 **PROTECTION**

A. Protect all structures, including curb and gutter, sidewalks, guardrails, and guideposts from being spattered or marred. Remove any spattering, over-coating, or marring at no additional cost in the city.
B. Do not discharge bituminous material into borrow pits or gutters.
C. Prevent tracking of seal coats onto adjacent surfaces.

3.5 **OPENING TO TRAFFIC**

A. Keep traffic off surface until material is no longer tacky and will not track out. Material should set between 4 to 6 hours after application.
B. To allow traffic on surface prior to complete setting of the emulsion, CONTRACTOR may lightly sand surface at no additional expense to the OWNER.
C. CONTRACTOR is responsible for any claims for damage.

END OF SECTION

SECTION 32 01 13.52

MASTIC SEAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of an asphalt-aggregate *mastic* seal coat as a high-density roadway surface preservation treatment.

1.2 REFERENCES

A. **AASHTO Standards:**

T85 Specific Gravity and Absorption of Coarse Aggregate.
T308 Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method.
T327 Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

B. **ASTM Standards:**

C117 Material Finer Than 0.075mm Sieve in Aggregate.
C131 Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
C136 Sieve Analysis of Fine and Coarse Aggregates.
D5 Penetration of Bituminous Materials.
D244 Emulsified Asphalts.
D3628 Selection and Use of Emulsified Asphalts.
D3666 Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.
D6934 Residue by Evaporation of Emulsified Asphalt.
D6937 Determining Density of Emulsified Asphalt.
E1911 Measuring Paved Surface Frictional Properties Using the Dynamic Friction Tester.

C. **ISSA Standards:**

TB 100 Wet Track Abrasion of Slurry Surfaces, Modified.

1.3 SUBMITTALS

A. **Mix Design:** Provide the following. Allow ENGINEER 10 days to evaluate the submittal. Do not mix aggregate and emulsions designated for other public or private projects.
   1. Date of mix design. If older than 60 days from date of submission, recertify mix design.
   2. Proportions of aggregate, filler, water, polymer, and emulsion in the mix.
   3. Residual in-place bitumen content, in ***pounds per square yard***.
   4. Residual in-place aggregate or mineral solids content, in ***pounds per square yard***.
   5. Thickness target for each application coat, in ***in gallons per square yard***.
   6. Total minimum thickness, in ***gallons per square yard***.
   7. Results of a wear resistance or wet track abrasion test current within one (1) calendar year of the proposed mix design.

B. **Before Placement**: Submit 48 hours before delivery.
   1. Traffic control plan, Section 01 55 26
   2. List of construction equipment to be used.
   3. Certification from emulsion supplier stating emulsion meets requirements in this section.
   4. Names, certification levels, and years of experience of testing agency's field technicians that are assigned to the work. Verify laboratory complies with ASTM standards.
   5. Warranty.

C. **Reports**: If requested by ENGINEER, submit the following.
   1. List of five (5) projects that have successful product application on bituminous surfaces. Provide names of project contacts.
   2. Source and field quality control testing reports performed by CONTRACTOR and Suppliers.

1.4 QUALITY ASSURANCE

A. Foreman of CONTRACTOR's crew of Supplier's representative has completed at least three (3) projects of similar scope. If crew foreman docs not have such experience, Supplier must provide a full-time representative on site during application.
B. Use a laboratory that complies with ASTM D3666 and follows Section 01 45 00 requirements.
C. Verify mixture delivered to site contains the same emulsion specified in the mix design.
D. Do not change source of the asphalt emulsion or aggregate without supporting changes in the mix design.
E. Reject product or work that does not meet requirements.

1.5 **WEATHER**

A. Temperature:
   1. Apply seal coat when air and pavement surface temperatures in the shade are 55 deg F. and rising.
   2. Cease application if air or pavement surface temperatures are projected to fall below 40 deg F. within 48 hours.

B. Moisture and Wind:
   1. Do not apply seal coat to a wet surface (no visible standing water or high sheen), during rain, 24 hours prior to forecast rain, or in unsuitable windy weather.
   2. Cease work if weather or other conditions prolong opening pavement surface to traffic.

1.6 **NOTICE**

A. Follow Laws and Regulations concerning when and to whom notices are to be given at least three (3) days before applying surface treatment materials.

B. Indicate application time and when new surface can be used. If necessary, include a map showing closed-off areas.

C. Provide phone numbers of at least two (2) individuals who represent the CONTRACTOR who can be reached at any time during the work.

D. Warn of potential vehicle tow away and other construction issues affecting neighborhood.

E. Should work not occur on specified day, issue an updated notice advising when work will be performed.

1.7 **ACCEPTANCE**

A. **General:**
   1. Acceptance is by Lot.
   2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring complying material as part of its installation, Section 01 29 00.
   3. Dispute resolution, Section 01 35 10.
   4. Opening surface treatment to vehicular traffic does not constitute acceptance.
   5. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing; however, may be used by ENGINEER for acceptance if requirements of Section 01 35 10 are met.

B. **Asphalt Binder**:
   1. Lot size is total contracted product placement. Sub-lot size is one (1) day production.
   2. Of all sub-lot samples collected, randomly select one sub-lot and test it for physical properties in this section. The lot is acceptable if tests on this sub-lot sample meets requirements, continue testing other samples for a sample that complies.
   3. Pay Reduction: At ENGINEER's discretion, a lot with a deficient sub-lot test may be accepted if pay for the lot is reduced using on of the following applicable pay factors, or lot may be accepted at 50 percent pay if lot is in Reject.

Pay Factor	Number of Non-complying Tests
1.00	0
0.95	1
0.90	2
0.85	3
Reject	4

C. Placement:
   1. Mat appearance.
      a. No runoff onto concrete curbs, gutter pans, and shoulders.
      b. No streaking, drag marks, or squeegee marks.
      c. No light spots.
      d. No de-bonding
      e. Straight longitudinal edges with proper joints.
   2. Mat thickness, bitumen content and aggregate content.
      a. Lot size is one (1) day production. Sub-lot size is 0.5 lane mile.
      b. Collect and test five (5) equally spaced samples from the initial sub-lot. Upon review of the initial sub-lot test results and at ENGINEER's discretion, acceptance of subsequent sub-lots may be based upon one or less samples from each subsequent sub-lot.
      c. Pay Adjustment: Not Applicable. Correct mat placement deficiencies at no additional cost to OWNER.

1.8 **WARRANTY**

A. Both the CONTRACTOR and Supplier shall provide a two (2) year minimum written warranty when the existing pavement is in an appropriate condition (CONTRACTOR

and Supplier to determine condition). Warranty covers delaminating, peeling and premature surface wear.

1. Before placement, notify ENGINEER if pavement condition or application condition voids the warranty.
2. ENGINEER may allow or cancel product application at no cost to OWNER if warranty cannot be given.

B. Acceptable performance after two (2) year period is no delaminating, peeling, or inter-aggregate loss in surface wear. Mechanical disturbances by snow plow chatter, studded tires, etc. are excluded from warranty. Repair defective coverage at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 ASPHALT BINDER

A. Crack Pouring Asphalt: Rubberized asphalt or asphalt rubber hot pour, Section 32 01 17.

B. Tack Coat: SS-1 or CSS-1, Section 32 12 13.13. Use a tack coat that is compatible with seal coat application.

C. Emulsified Asphalt: Grades SS-1, SS-1H, CSS-1, or CSS-1h, selected in accordance with ASTM D 3628 and the following.

Table 1 – Asphalt Properties

	Standard	Min	Max
Tests on Emulsion			
Viscosity at 25 deg C, seconds	D 244	15	100
Particle Charge Test (a)		Positive	
Residue by distillation, percent		57	--
Tests on Residue from Evaporation			
Penetration at 25 deg C, 100 g, 5 seconds	D 5	15	150

NOTES
(a) In case of inconclusive particle charge, material having a pH value of 6.0 will be acceptable as a CSS type

2.2 AGGREGATE

A. Material: Clean and fee from organic matter or other detrimental substances. Light weight with the following properties.

Table 2 – Aggregate Properties			
	Standard	**Min**	**Max**
Water absorption, percent	T 85	--	10
Wear (hardness or toughness), percent	C 131	--	50
Micro-Deval, Percent (b)	T 327	--	20
NOTES (a) Test results are on aggregate received before blending into sealer. (b) Micro-Deval wear of aggregate retained on No. 60 Sieve.			

B. Gradation: Analyzed on a dry weight and percent passing basis.
   1. Material passing any sieve and retained on the next consecutive sieve is 45 percent maximum.
   2. Target Grading Curve must lie within the Master Grading Band.

Table 3 – Master Grading Band and Target Tolerance Limits			
Sieve	**Standard**	**Master Grading Band Limits Percent Passing**	**Target Tolerance**
No. 8	C 136	100	+/- 5
No. 16		80 – 100	+/- 5
No. 30		75 – 100	+/- 5
No. 60		50 – 85	+/- 5
No. 100		40 – 65	+/- 5
No. 200	C 117	25 – 65	+/- 5
NOTES (a) Test results are on aggregate received before blending into sealer. (b) Target tolerance is the allowable variation from the Target Grading Curves.			

2.3 **ADDITIVES**

A. Use water that is clean, non-detrimental, and free from salts and contaminant.
B. Polymers, clays, other additives as necessary to achieve mix design performance.

2.4 **MIX DESIGN**

A. Asphalt Binder: select type and grade of emulsified asphalt, ASTM D3628.
B. Set and Cure Time: Select to meet opening to traffic requirements.
C. Provide a mix containing a minimum of 18 percent aggregate by weight of the wet mixture meeting the following requirements.

Table 4 – Mix Properties				
		Standard	**Min**	**Max**
Tests on Mix				
Weight per gallon, pounds	(a)	D6937	Report	
Solids content by evaporation at 130 C, percent	(b)	D6934	48	--
Tests on Residue from Evaporation				
Asphalt binder content of cured mix, (130 deg C method), percent	(d)	T308	30	--
Mineral aggregate and fines content of cured mix (130 deg C method), percent	(d)	T308	50	--
Wet-track abrasion loss, (72-hour soak), g/m²		TB100	--	80
Asphalt content by ignition method, percent	(a)	T308	30	--
Dynamic friction test number, 20 km/h	(e)	E1911	>90 percent of base value	

NOTES

(a) Use the modified method to account for a fine emulsion mixture. Required for calibration of application equipment and for field control and acceptance.

(b) A 500-to-1000-gram representative sample of the mix shall be dried in a suitable oven until weight loss ceases. Solids content shall then be defined as the net residual weight divided by net original weight expressed in precent. Retain this residual dried mix for AASHTO T308 tests if required.

(c) Rotational viscosity acceptable range shall be provided by the Supplier. Test device, spindle type, size and rotational speed shall be included with the submitted certification test results.

(d) Due to the high binder content of the mix the sample size processed in the ignition oven may need to be adjusted to not exceed the binder content allowable for a particular model ignition oven.

(e) Establish base friction value using prepared laboratory compacted slab of any ENGINEER approved mix as surface to be tested. The Dynamic Friction Test (DFT) number ratio should indicate that after application of the mastic seal, the surface retains required minimum percentage DFT number of the original pavement surface. Based on a minimum of three (3) slabs with three (3) measurements per slab. Value for information only. Will not be used for project control.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Paver: Use a continuous flow mixing unit.
   1. Capable of applying at least 15,000 square yards of material per day.
   2. Equipped with full sweep agitation system to assure proper suspension of fine aggregates.
   3. Equipped with an operator control station that adjusts material spread rate in accordance with project calibration process.
   4. Equipped with a filtering system to catch particles that plug nozzles.
   5. Equipped with a retractable spray bar capable of applying mixture without drilling. The bar should be positioned to meet calibration requirements.

B. Storage Tanks:
   1. When delivering mix from the central mixing plant to a job site storage tank, use only storage tanks with a capacity to contain the entire transport load.
   2. Ensure that all site storage tanks have internal full sweep mixing mechanisms and mixing capability that can provide at any given point in the tank a homogeneous mix.

3.2 PREPARATION

A. **Paver Calibration**: on a test strip at least 300 feet long, determine the correct pump settings, spray bar height, and ground speed for the application equipment. Apply material with pump settings at 80 percent of maximum output (plus or minus 5 percent) and a ground speed of 300 to 400 feet per minute.
   1. Do not begin or continue application without ENGINEER's knowledge of the calibration process and equipment settings.
   2. Do not deviate from calibration settings without ENGINEER's knowledge.

B. **Surface Repair**: Method of payment to be determined by ENGINEER if any of the following repairs are required.
   1. Raising low areas to grade, lowering high areas to grad, hole patching, inlays.
   2. Providing tack coat on highly absorbent, polished, oxidized, or raveled asphalt surfaces or on brick or on Portland cement concrete surfaces.
   3. Crack filling and crack sealing, Section 32 01 17.
   4. Pushing or shoving pavement to be repaired as follows.
      a. Mill damaged area at least three (3) inches below required surface elevation. Section 32 01 16.71
      b. Install and compact PG64-22, DM-3/4, 50 blow bituminous concrete in lifts not less than three (3) inches after compaction. – See additional requirements in Section 33 05 25.

C. **Masking**: Mask-off Street Fixtures, end of streets, intersections.
D. **Traffic Control**:
    1. Implement traffic control plan requirements, Section 01 55 26. Provide safe passage for pedestrians and vehicles. Do not proceed without flaggers if work requires maintaining two-way vehicular traffic.
    2. Grind off existing pavement markings and lane stripes. If existing markings and stripes are to be reestablished, use reflective tabs to mark existing locations before applying seal coat. Unless specified otherwise, cost is included in the work of this section.
E. **Cleaning**:
    1. Remove loose material, mud spots, sand, dust, oil, vegetation and other objectionable material.
    2. Do not flush water or apply pressurized water over cracked pavement unless ENGINEER allows its' use and a sufficient time is allowed for drying.

3.3 PROTECTION

A. Trees, Plants, Ground Cover:
    1. Protect trees, plants and other ground cover from damage.
    2. Prune trees to allow equipment passage underneath, Section 32 01 93. Repair tree damage at no additional cost to OWNER.
B. Protect structures, curb, gutter, sidewalks, guard rails, guideposts, etc. from physical damage.

3.4 APPLICATION

A. General:
    1. Two separate application coats are required. The first application must be thoroughly set and free of any damp areas before the second application begins.
    2. Adjust application rates according to surface conditions, only after obtaining review by ENGINEER and the asphalt emulsion manufacturer.
B. Spreading:
    1. Keep material delivery at a constant rate even if forward speed of lay-down machine varies.
    2. Do not reduce application rate along edges or around manhole covers.
    3. Apply both applications right to the edge of the pavement. Do not leave uncovered areas near curbs, Street Fixtures, or edges on either application.
    4. Make straight lines at all locations.
    5. Place product out to right-of-way line on side streets and intersections.
    6. Use hand squeegees to spread mix in areas that cannot be reached with distribution spray bar.

a. Provide complete and uniform coverage.
b. Avoid unsightly appearance from hand work.

C. Joints:
1. Make transverse joints straight-cut butt type, not over-lap type.
2. Place longitudinal joints on lane lines. Limit overlap to three (3) inches maximum.
3. Stop and correct paving operation if longitudinal or transverse joints have uncovered areas or unsightly appearance.

D. Lines:
1. Make straight lines along lip of gutters, shoulders, end of streets and in street intersections. No runoff on these areas will be permitted.
2. Vary edge lines no more than one (1) inch per 100 feet.

3.5 **TOLERANCES**

A. Each coat thickness = **at least 40 percent of the total thickness.**
B. Total thickness = **0.30 gallons per square yard minimum.**

3.6 **FIELD QUALITY CONTROL**

A. Emulsion density testing, ASTM D6937. If testing shows material non-compliance, remove installed product and halt operations until new material is delivered and is known to be in compliance.
B. Measure the total amounts of material installed, and verify it meets the application rate.

3.7 **AFTER APPLICATION**

A. Raise reflective tabs that were covered over by application.
B. Clean Street Fixtures.
C. Do not apply permanent pavement markings or striping material until layout and method of payment has been determined by ENGINEER and final application of surface treatment material has been in -place at least 10, days or as permitted by ENGINEER. Layout must be verified by ENGINEER prior to application.

3.8 **REPAIR**

A. Remove delaminated or non-compliant product found after installation and apply acceptable product.
B. Remove spatter, mar and overcoat from curb, gutter, sidewalk, guard rails, guideposts, etc.
C. Remove over coat from Street Fixtures.
D. Make edge and end lines straight. Provide a good appearance.
E. Leave no streaks, holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement.
F. Repair collateral damage caused by construction.

3.9 **OPENING TO TRAFFIC**

A. Cure time depends on type of asphalt, mixture characteristics and weather. Keep traffic off of treated surface until seal coat does not track out.

END OF SECTION

SECTION 32 01 13.61

SLURRY SEAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Stone and an asphalt binder slurry evenly mixed and spread as a seal coat for roadways and thoroughfares.

1.2 REFERENCES

A. **AASHTO Standards**:

R9 Acceptance Sampling Plans for Highway Construction.

B. **ASTM Standards**:

C88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
C117 Material Finer Than 0.075 mm Sieve in Aggregate.
C131 Resistance to Degradation of Small-Size coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
C136 Sieve Analysis of Fine and Coarse Aggregates.
D5 Penetration of Bituminous Materials.
D36 Softening Point of Bitumen (Ring-and-Ball Apparatus).
D242 Mineral Filler for Bituminous Paving Mixtures
D1664 Coating and Stripping of Bitumen-Aggregate Mixtures.
D2170 Kinematic Viscosity of Asphalts (Bitumens).
D2419 Sand Equivalent Value of Soils and Fine Aggregate.
D3319 Accelerated Polishing of Aggregates Using the British Wheel.
D3628 Selection and Use of Emulsified Asphalts.
D3740 Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
D3910 Design, Testing, and Construction of Slurry Seal.
D5821 Determining the percentage of Fractured Particles in Coarse Aggregate.
D6937 Density of Emulsified Asphalt.

1.3 SUBMITTALS

A. **Mix Design**: Provide the following. Allow ENGINEER 10 days to evaluate the submittal. Do not mix aggregate and emulsions designated for other public or private projects.
   1. Date of mix design. If older than 180 days from date of submission recertify mix design.
   2. Target Grading Curve for aggregate.

3. Percentage of emulsion, aggregate, water and additives in the mix.
4. Emulsion type and time target for opening up a thoroughfare to traffic.
5. Slurry application rate.
6. Aggregate physical properties (this section article 2.4). The information is for suitability of source and not for project control. A new report may be required if aggregate source is changed. Test results shall not be older than 455 days from the date of submissions.

B. **Before Placement**: Submit at least 48 hours before delivery.
1. Traffic control plan. Section 01 55 26.
2. List of the construction equipment to be used.
3. Certification from emulsion supplier stating emulsion meets requirements in this section.

C. **Reports**:
1. Provide daily reports to OWNER's representative including weight of material used, application rate, area covered. Indicate date, type, and project names.
2. Provide delivery tickets for each emulsion delivery. Include certification from manufacturer that emulsion meets specifications.
3. Submit oil quantities in CONTRACTOR's emulsion storage tankers prior to transfer, after transfer and at the end of each working day.

1.4 QUALITY ASSURANCE

A. Foreman of paving crew has completed at least three (3) projects of similar scope.
B. Use a laboratory that follows and complies with ASTM D3740 and Section 01 45 00 requirements.
C. Verify mixture delivered to site contains the same emulsion specified in the mix design.
D. Do not change source of asphalt emulsion or aggregate without supporting changes in the mix design.
E. Reject product that does not meet requirements.

1.5 WEATHER

A. Temperature:
1. Apply seal coat when air and pavement surface temperatures in the shade are 45 deg F and rising.
2. Cease application if air or pavement temperatures are below 55 deg F and falling or if the finished product will freeze before 24 hours.

B. Moisture and Wind:
1. Do not apply seal coat to a wet surface (no visible standing water or high sheen), during rain, if humidity prolongs curing, or in unsuitable windy weather.

2. Cease work if weather or other conditions prolong opening pavement surface to traffic.

1.6 **NOTICE**

A. Follow Laws and Regulations concerning when and to whom notices are to be given at least three (3) days before applying seal coat.
B. Indicate application time and when new surface can be used. If necessary, include a map showing closed-off areas.
C. Provide phone numbers of at least two (2) individuals who represent the CONTRACTOR who can be reached at any time during the work.
D. Warn of potential vehicle tow away and other construction issues affecting neighborhood.
E. Should work not occur on specified day, issue an updated notice advising when work will be performed.

1.7 **ACCEPTANCE**

A. **General**:
   1. Acceptance is by Lot.
   2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring complying material as part of its installation, Section 01 29 00.
   3. Dispute resolution, Section 01 35 10.
   4. Opening surface treatment to traffic does not constitute acceptance.
   5. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing: however, may be used by ENGINEER for acceptance if requirements of Section 01 35 10 are met.
B. **Asphalt Binder**:
   1. Lot size is total contracted product placement. Sub-lot size is one (1) day production.
   2. Of all sub-lot samples collected, randomly select one sub-lot and test it for the physical properties in this section. The lot is acceptable if tests on this sub-lot sample meets requirements. If the sample does not meet requirements, continue testing other samples for a sample that complies.
   3. Pay Reduction: At ENGINEER's discretion, a lot with a deficient sub-lot test may be accepted if pay for the lot is reduced using one of the following applicable pay factors, or lot may be accepted at 50 percent pay if lot is in Reject.

Pay Factor	Number of Non-complying Tests
1.00	0
0.95	1
0.90	2
0.85	3
Reject	4

C. **Aggregate**: Lot size is one (1) day's production with 300 tons sub-lots. Collect Samples randomly before mixing. Test gradation, ASTM C136. Test thickness. Lot will be acceptable if:
   1. Average gradation of each sieve for the Lot is within the Target Grading Band for the sieve.
   2. Number of Samples in the Lot with any sieve measurement outside of the Target Grading Band does not exceed two (2).
   3. Material on 200 sieve does not exceed allowable.
   4. Price Adjustment: Aggregate gradation defects may be accepted if 2.5 percent price reduction is applied against lot for each condition not met. Maximum price reduction for a lot is five (5) percent.

D. **Placement**:
   1. Mat Appearance:
      a. No runoff onto concrete curbs, gutter pans, and shoulders.
      b. No streaking, drag marks or squeegee marks.
      c. No light spots.
      d. No de-bonding.
      e. Straight longitudinal edges with proper joints.
   2. Price Adjustment: Not applicable. Correct deficiencies at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 ASPHALT BINDER

A. Crack Pouring Asphalt: Rubberized asphalt or asphalt rubber hot pour, Section 32 01 17.
B. Tack Coat: SS-1 or CSS-1, Section 32 12 13.13. Use a tack coat that is compatible with seal coat application.
C. Emulsified Asphalt: Unless specified elsewhere provide CQS-1h quick traffic type, ASTM D3628 with two (2) hours return to traffic quickset. Provide the following properties.

Table 1 – Physical Properties				
	Standard	Target	Min	Max
Tests on Emulsion				
Viscosity at 25 deg C, second	D244	32	15	90
Sieve test, percent		0.01	--	0.30
Settlement, 5 day, percent		3.5	--	5
Storage stability, 1 day, percent		0.6	--	1
Residue by distillation, percent		64.2	60	--
Tests on Residue from Evaportaion				
Penetration at 25° C, 0.1 mm	D5	51	40	90
Softening point, deg. C.	D36	60	57	--
Kinematic viscosity, cSt/sec	D2170	--	650	--
Saybolt furol viscosity at 77° F., seconds		--	--	50
Polymer solids based on mass of residual asphalt, percent.	--	3 to 6	3	--
NOTES (a) Polymer is a solid synthetic rubber or latex material. (b) Cement mixing test waived. (c) Polymer solids are to be milled or blended into the asphalt or emulsifier solution before the emulsification process.				

2.2 **AGGREGATE**

A. **Material**: Stone, slag, or other high-quality particle or combination clean and free from organic matter or other detrimental substances with the following properties.

Table 2 – Aggregate Properties				
		Standard	Min	Max
Angularity (fractured faces), percent		D5821	80	--
Wear (hardness or toughness), percent		C131	--	35
Soundness (weight loss in 5 cycles), percent		C88	--	10
Clay content (sand equivalent), percent	SS Type I	D2419	45	--
	SS Type II	D2419	55	--
	SS type III	D2419	60	--
Polishing, BPN		D3319	28	--
Water absorption, percent		--	--	1.25
NOTES				

(a) Angularity of aggregate retained on No. 4 sieve with at least one (1) mechanically fractured face or clean angular face. Provide 100 percent (maximum) for thoroughfares with a Road Class III (Section 32 12 05).
(b) Wear of aggregate retained on No. 12 sieve after 500 revolutions.
(c) Soundness for combined coarse and fine aggregate measured using five (5) cycles Na_2SO_4.
(d) Clay content before additives.

B. **Gradation**:
   1. Material passing any sieve and retained on the next consecutive sieve is 45 percent maximum.
   2. Target Grading Curve must lie within one (1) of the following Master Grading Bands. Field Samples shall not vary from the Target Grading Curve by more than the Target Tolerance.

Table 3 – Master Grading Band and Target Tolerance Limits

Sieve	Standard	Master Grading Band Limits Percent Passing			Target Tolerance
		SS Type I	SS Type II	SS Type III	
3/8 in.	C136	--	100	100	--
No. 4		100	90 – 100	70 – 90	+/- 5
No. 8		90 – 100	65 – 90	45 – 70	+/- 5
No. 16		65 – 90	45 – 70	28 – 50	+/- 5
No. 30		40 – 65	30 – 50	19 – 34	+/- 5
No. 50		25 – 42	18 – 30	12 – 28	+/- 4
No. 100		15 – 30	10 – 21	7 – 18	+/- 3
No. 200	C117	10 – 20	6 – 15	5 – 15	+/- 2

NOTES:
(a) Target tolerance is the allowable variation from the Target Grading Curve.
(b) Portion retained on the No. 4 sieve clean and fee of clay coatings.
(c) Portion passing No. 200 sieve includes mineral filler.

2.3 ADDITIVES

A. Use water that is clean, non-detrimental, and fee from slats and contaminant.
B. Mineral Filler: ASTM D242
C. Portland cement, hydrated lime, limestone dust, fly ash, or aluminum sulfate to regulate setting time and improve workability.
D. Limestone dust, fly ash, and rock dust to alter aggregate gradation.

2.4 MIX DESIGN

A. Asphalt Binder: Select type and grade of emulsified asphalt, ASTM D3628.
B. Proportioning: Use the consistency test of ASTM D3910 to determine optimum ratio of aggregate, filler, water, and emulsion.
C. Set and Cure Time: Select to meet opening to traffic requirements.
D. Stripping: More than 90 percent of bituminous-coated particles retain asphalt coating. ASTM D1664.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Paver: Use a continuous flow mixing unit:
   1. Capable of applying at least 15,000 square yards of material per day.
   2. Capable of accurately delivering a predetermined portion of aggregate, water, and asphalt emulsion to the mixing chamber.
   3. Prevent loss of slurry from the distributor by using a mechanical type squeegee distributor equipped with flexible material in contact with the pavement surface.
   4. Has a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the mix design application rate.

3.2 PREPARATION

A. **Meter Calibration**: On a test strip at least 500 feet long, determine the correct meter settings on the mixing equipment. The settings are to produce a product that complies with the following.
   1. Set time 30 minutes maximum. Initial set occurs when blotting the surface of the material yields only water (no emulsion).
   2. No distress when exposed to traffic two (2) hours after placement.
B. **Surface Repair**: Method of payment to be determined by ENGINEER if any of the following repairs are required.
   1. Raising low areas to grade, lowering high areas to grade, hole patching, inlays.
   2. Providing tack coat on highly absorbent, polished, oxidized, or raveled bituminous pavement or on brick or on Portland cement concrete surfaces.
   3. Crack filling and crack sealing, Section 32 01 17.
   4. Pushing or shoving pavement to be repaired as follows.
      a. Mill damaged area at least three (3) inches below required surface elevation. Section 32 01 16.71.

b. Install and compact PG64-22, DM-3/4, 50 blow bituminous concrete in lifts not less than three (3) inches after compaction. See additional requirements in Section 33 05 25.

C. **Masking**: Mask-off Street Fixtures, end of streets, intersections.

D. **Traffic Control**:
   1. Implement traffic control plan requirements, Section 01 55 26. Provide safe passage for pedestrians and vehicles. Do not proceed without flaggers if work requires maintaining two-way vehicular traffic.
   2. Grind off existing pavement markings and lane stripes. If existing markings and stripes are to be reestablished, use reflective tabs to mark existing locations before applying seal coat. Unless specified otherwise, cost is included in the work of this section.

E. **Cleaning**:
   1. Remove loose material that may cause drag marks.
   2. Remove mud spots, sand, dust, oil, vegetation, and other objectionable material.
   3. Do not flush water or apply pressurized water over cracked pavement unless ENGINEER allows its' use, and a sufficient time is allowed for drying.

3.3 PROTECTION

A. Trees, Plant, Ground Cover:
   1. Protect trees, plants, and other ground cover from damage.
   2. Prune trees to allow equipment passage underneath, Section 32 01 93. Repair tree damage to no additional cost to OWNER.

B. Protect structures, curb, gutter, sidewalks, guard rails, guideposts, etc. from physical damage.

3.4 APPLICATION

A. General:
   1. Machine meter settings must match mix design. Water and additives may be adjusted (per mix design) for better consistency or set time.
   2. Wait at least two (2) hours if an adjacent pass has broken and started to cure.
   3. The seal coat, when cured shall present a uniform, skid-resistant appearance with all cracks filled.
   4. Do not apply lane marking tape or paint for traffic control until layout and placement has been verified by ENGINEER.

B. In the Spreader Box:
   1. Do not exceed four (4) minutes total mixing time.

2. No additional water.
3. No lumping, balling or unmixed aggregate.
4. No segregation of the emulsion and aggregate fines from the coarse aggregate.
5. No breaking of emulsion.
6. No overloading. Carry a sufficient amount of slurry in all parts of the spreader box for complete coverage.

C. Spreading:
1. Dampen surface immediately before application of surface treatment (prevents premature breaking and improves bonding). All surfaces are to be uniformly damp with no fee water standing on the surface or in cracks.
2. Keep material delivery at a constant rate even if forward speed laydown machine varies.
3. Do not reduce application rate along edges or around manhole covers.
4. Apply seal coat right to the edge of the pavement. Do not leave uncovered areas near curbs, Street Fixtures, or edges.
5. Make straight lines at all locations.
6. Place seal coat out to right-of-way line on side streets and intersections.
7. Use hand squeegees to spread mix in areas that cannot be reached with distribution spray bar.
    a. Provide complete and uniform coverage.
    b. Avoid unsightly appearances from hand work.
8. If coarse aggregate settles to bottom of mix, remove slurry form pavement.

D. Joints:
1. Make transverse joints straight-cut butt type, not over-lap type.
2. Place longitudinal joints on lane lines. Limit overlap to three (3) inches maximum.
3. Tolerance for joint match is 1/4-inch difference in elevation when measured with a 10-foot-long straight edge over the joint.
4. Stop and correct paying operation if longitudinal or transverse joints have uncovered areas or unsightly appearance.

E. Lines
1. Make straight lines along lip of gutter, shoulders end of streets, and in street intersections. No runoff on these areas will be permitted.
2. Vary edge lines no more than one (1) inch per 100 feet.

3.5 **TOLERANCES**

A. Thickness: Measured in pounds per square yard. Standard application rate applies unless specified elsewhere.

Slurry	Standard	Heavy
SS Type I	8 to 12	10 to 13
SS Type II	12 to 16	15 to 18
SS Type III	15 to 18	22 to 25

3.6 **FIELD QUALITY CONTROL**

A. Emulsion density testing, ASTM D6937. If testing shows material non-compliance, remove installed product and halt operations until new material is delivered and is known to be in compliance.
B. If an ASTM C136 sieve analysis shows aggregate gradation non-compliance, either remove the material or blend in other aggregates to bring it into compliance. This may require a new mix design. Screening may be required at the stockpile to remove any defective material.
C. Measure the total amounts of material installed, and verify it meets the application rate. Make all emulsion deliveries in the presence of OWNER's representative.

3.7 **AFTER APPLICATION**

A. Raise reflective tabs that were covered over by application.
B. Clean Street Fixtures.
C. Leave no streaks caused by oversized aggregate particles or buildup on squeegees.
D. Leave no holes, bare spots, or cracks. The seal coat shall be uniform and skid-resistant when cured.
E. Do not apply permanent pavement markings or stripe material until layout and method of payment has been determined by ENGINEER and final application of seal coat has been in-place at least 10 days, or as permitted by ENGINEER. Layout must be verified by ENGINEER prior to application.

3.8 **REPAIR**

A. Remove delaminated or non-compliant product found after installation and apply acceptable product.
B. Remove spatter, mar and overcoat from curb, gutter, sidewalk, guard rails, guideposts, etc.

C. Remove overcoat from Street Fixtures.
D. Make edge and end lines straight. Provide good appearance.
E. Leave no streaks, holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement.
F. Repair collateral damage caused by construction.

3.9 **OPENING TO TRAFFIC**

A. Cure time depends on type of asphalt, mixture characteristics and weather. Keep traffic off of treated surface until seal coat does not track-out.

END OF SECTION

SECTION 32 01 13.64

CHIP SEAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Asphalt binder and cover aggregate evenly spread as a uniform, skid-resistant seal coat on roadways and thoroughfares.

B. Application of a slurry seal over a chip seal (cape seal) if specified.

1.2 REFERENCES

A. **ASTM Standards**:

C88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
C117 Material Finer Than 0.075 mm Sieve in Aggregate.
C131 Resistance to Degradation of Small-Size coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
C136 Sieve Analysis of Fine and Coarse Aggregates.
D5 Penetration of Bituminous Materials.
D36 Softening Point of Bitumen (Ring-and-Ball Apparatus).
D242 Mineral Filler for Bituminous Paving Mixtures
D1664 Coating and Stripping of Bitumen-Aggregate Mixtures.
D2170 Kinematic Viscosity of Asphalts (Bitumens).
D2419 Sand Equivalent Value of Soils and Fine Aggregate.
D3319 Accelerated Polishing of Aggregates Using the British Wheel.
D3628 Selection and Use of Emulsified Asphalts.
D3740 Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
D3910 Design, Testing, and Construction of Slurry Seal.
D4791 Flat or Elongated Particles in Coarse Aggregate.
D5821 Determining the percentage of Fractured Particles in Coarse Aggregate.

1.3 SUBMITTALS

A. **Mix Design**: Provide the following. Allow ENGINEER 10 days to evaluate the submittal. Do not mix aggregate and emulsions designated for other public or private projects.

1. Date of mix design. If older than 60 days from date of submission recertify mix design.
2. Type and grade of asphalt binder to be used (if not specified).
3. Target Grading Curve for aggregate.
4. Asphalt and aggregate compatibility.

5. Asphalt additives.
6. Asphalt and aggregate application rates.
7. Aggregate physical properties (this section article 2.3). The information is for suitability of source and not for project control. A new report may be required if aggregate source is changed. Test results shall not be older than 455 days from the date of submissions.

B. **Before Placement**: Submit at least 48 hours before delivery.
1. Traffic control plan. Section 01 55 26.
2. List of the construction equipment to be used.
3. Certification from emulsion supplier stating emulsion meets requirements in this section.

C. **After Installation**: Submit the asphalt bill of lading. Identify weight of asphalt, weight of emulsified asphalt (after water has been added).

D. **Reports**: If requested by ENGINEER, submit source and field quality control testing reports performed by CONTRACTOR and Suppliers.

1.4 QUALITY ASSURANCE

A. Foreman of paving crew has completed at least three (3) projects of similar scope.

B. Use a laboratory that follows and complies with ASTM D3740 and Section 01 45 00 requirements.

C. Do not change source of asphalt emulsion or aggregate without supporting changes in the mix design.

D. Reject product that does not meet requirements.

1.5 WEATHER

A. Temperature:
1. Apply seal coat when air and pavement surface temperatures in the shade are 70 deg F and rising.
2. Allow four (4) weeks of warm weather cure time. This generally limits performance of work from May 15 to August 31.
3. Do not apply seal coat if pavement surface is above 120 deg F.

B. Moisture and Wind: Do not apply seal coat during rain, if humidity prolongs curing, or in unsuitable windy weather.

1.6 NOTICE

A. Follow Laws and Regulations concerning when and to whom notices are to be given at least three (3) days before applying seal coat.

B. Indicate application time and when new surface can be used. If necessary, include a map showing closed-off areas.
C. Provide phone numbers of at least two (2) individuals who represent the CONTRACTOR who can be reached at any time during the work.
D. Warn of potential vehicle tow away and other construction issues affecting neighborhood.
E. Should work not occur on specified day, issue an updated notice advising when work will be performed.

1.7 **ACCEPTANCE**

A. **General**:
   1. Acceptance is by Lot.
   2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring complying material as part of its installation, Section 01 29 00.
   3. Dispute resolution, Section 01 35 10.
   4. Opening chip seal to traffic does not constitute acceptance.
   5. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing: however, may be used by ENGINEER for acceptance if requirements of Section 01 35 10 are met.

B. **Asphalt Binder**:
   1. Lot size is total contracted product placement. Sub-lot size is one (1) day production.
   2. Of all sub-lot samples collected, randomly select one sub-lot and test it for the physical properties in this section. The lot is acceptable if tests on this sub-lot sample meets requirements. If the sample does not meet requirements, continue testing other samples for a sample that complies.
   3. Pay Reduction: At ENGINEER's discretion, a lot with a deficient sub-lot test may be accepted if pay for the lot is reduced using one of the following applicable pay factors, or lot may be accepted at 50 percent pay if lot is in Reject.

Pay Factor	**Number of Non-complying Tests**
1.00	0
0.95	1
0.90	2
0.85	3
Reject	4

C. **Aggregate**: Verify suitability of aggregate source.
   1. Lot size is one (1) day's production with 300 tons sub-lots. Collect Samples randomly before mixing. Test gradation, ASTM C136. Test thickness. Lot will be acceptable if:
      a. Average gradation of each sieve for the Lot is within the Target Grading Band for the sieve.
      b. Number of Samples in the Lot with any sieve measurement outside of the Target Grading Band does not exceed two (2).
      c. Material on 200 sieve does not exceed allowable.
   2. Price Adjustment: Aggregate gradation defects may be accepted if 2.5 percent price reduction is applied against lot for each condition not met. Maximum price reduction for a lot is five (5) percent.

D. **Placement**:
   1. Asphalt Binder:
      a. No runoff onto concrete curbs, gutter pans, and shoulders, etc.
      b. No streaking, drilling, bare spots.
      c. No light spots.
      d. Uniform with no ridging.
   2. Aggregate:
      a. Asphalt See-through: Not more than 15 percent black (asphalt) can be seen through the newly laid and compacted rock chip after sweeping.
      b. Embedment: After rolling and evaporation, random sampling reveals large particles are embedded in the asphalt binder on their flat side to a depth of 50 percent to 70 percent.
   3. Price Adjustment: Not applicable. Correct deficiencies at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 BINDER

A. Crack Pouring Asphalt: Rubberized asphalt or asphalt rubber hot pour, Section 32 01 17.
B. Emulsified Asphalt: Cationic or anionic emulsion, Section 32 12 03. Use any of the following additives to match aggregate particle charge, weather conditions, and mix design:
   1. Anti-strip: To change or neutralize particle charges.
   2. Enhancer: To promote greater film thickness on the aggregate.
   3. High Float Agent: To improve temperature susceptibility of the asphalt and impart a gel structure to the asphalt.

4. Polymer: To reduce stripping, improve coating, decrease temperature susceptibility, and increase stability of the mix.
5. Rejuvenator: To adjust penetration of base asphalt or soften reclaimed asphalt.

2.2 COVER AGGREGATE

A. Material: 100 percent crushed stone, slag or other high-quality particle or combination. Clean and free from organic matter or other detrimental substances with the following properties.

Table 1 – Physical Properties

	Standard	Min	Max
Dry Unit weight (rodded), lb./ft³	C29	--	100
Wear (hardness or toughness), percent	C131		30
Angularity (2 fractured or angular faces), percent	D5821	60	
Soundness (weight loss), percent	C88	--	12
Polishing, BPN	D3319	30	--
Flats or elongates (1:3 ratio), percent	D4791	--	10
Friable particles, percent	C142	--	3

NOTES
(a) Wear of aggregate retained on No. 8 sieve.
(b) Soundness for combined coarse and fine aggregate measured using five (5) cycles Na_2SO_4.

B. Gradation: Analyzed on a dry weight and percent passing basis and graded as follows.

Table 2 – Master Grading Band

Sieve	Standard	Grade A	Grade B	Grade C
1/2 in.	C136	100	--	100
3/8 in.		85 – 100	--	70 – 90
No. 4		0 – 20	--	0 – 5
No. 8		0 – 5	85 – 100	0 – 3
No. 16		--	10 – 25	--
No. 50		--	0 – 5	--
No. 200	C117	0 – 1	0 – 2	0 – 2

NOTES:
(a) Portion retained on the No. 4 sieve clean and fee of clay coatings.
(b) Material passing any sieve and retained on the next consecutive sieve is 45 percent maximum.
(c) Portion passing No. 200 sieve includes mineral filler, ASTM C117.

2.4 **MIX DESIGN**

A. Select type and grade of emulsified asphalt, ASTM D3628.
B. Determine asphalt application rate based upon achieving an aggregate embedment of 50 to 70 percent.

Note: It is difficult to get adequate embedment of 3/8 inch aggregate with an asphalt application rate of 0.30 gallons per square yard.

PART 3 EXECUTION

3.1 **CONSTRUCTION EQUIPMENT**

A. Distributor Truck: Use triple overpass distributor bar setting. Apply asphalt binder uniformly (no drilling).
B. Aggregate Spreader: Variable width up to 20 feet in a single pas. Distribution varies no more than one (1) pound per yard.
C. Rollers: Rubber tire pneumatic with a gross load adjustable to apply 200 to 220 pounds per inch of rolling width.

3.2 **PREPARATION**

A. Equipment Calibration:
    1. Do not begin or continue application without ENGINEER's knowledge of the calibration process and equipment settings.
    2. Do not deviate from calibration settings without ENGINEER's knowledge.
B. Surface Repair: Method of payment to be determined by ENGINEER if any of the following repairs are required.
    1. Raising low areas to grade, lowering high areas to grade, hole patching, inlays.
    2. Providing tack coat on highly absorbent, polished, oxidized, or raveled bituminous pavement or on brick or on Portland cement concrete surfaces.
    3. Crack filling and crack sealing, Section 32 01 17.
    4. Pushing or shoving pavement to be repaired as follows.
        a. Mill damaged area at least three (3) inches below required surface elevation. Section 32 01 16.71.
        b. Install and compact PG64-22, DM-3/4, 50 blow bituminous concrete in lifts not less than three (3) inches after compaction. See additional requirements in Section 33 05 25.
C. Masking: Mask-off Street Fixtures, end of streets, intersections.

D. Traffic Control:
    1. Implement traffic control plan requirements, Section 01 55 26. Provide safe passage for pedestrians and vehicles. Do not proceed without flaggers if work requires maintaining two-way vehicular traffic.
    2. Grind off existing pavement markings and lane stripes. If existing markings and stripes are to be reestablished, use reflective tabs to mark existing locations before applying seal coat. Unless specified otherwise, cost is included in the work of this section.
E. Cleaning:
    1. Remove loose material that may cause drag marks.
    2. Remove mud spots, sand, dust, oil, vegetation, and other objectionable material.
    3. Do not flush water or apply pressurized water over cracked pavement unless ENGINEER allows its' use, and a sufficient time is allowed for drying.

3.3 **PROTECTION**

A. Trees, Plant, Ground Cover:
    1. Protect trees, plants, and other ground cover from damage.
    2. Prune trees to allow equipment passage underneath, Section 32 01 93. Repair tree damage to no additional cost to OWNER.
B. Protect structures, curb, gutter, sidewalks, guard rails, guideposts, etc. from physical damage.

3.4 **APPLICATION**

A. General: Wait at least seven (7) days before placing chip seal on new bituminous surfaces.
B. Asphalt Emulsion: Keep viscosity between 50 and 100 centistokes, ASTM D2170 during application.
    1. Make straight lines along lip of gutter and shoulders, end of streets and in street intersections. No runoff onto these areas will be permitted.
    2. Leave no holes, bare spots, or cracks.
    3. Vary edge lines no more than one (1) inch per 100 feet.
    4. Protect curb, gutter, and sidewalk from spatter, mar, or overcoat.
C. Chips: Apply aggregate within +1 or -2 pounds per square yard of mix design:
    1. For polymer and latex modified emulsions, apply chips immediately.
    2. For other emulsions, maintain a distance of not more than 100 feet between distributor and chip spreader.

3. Use a damp chip but not saturated. (Note. If water can be seen running out of the haul truck, the chips are too wet).
4. Spread larger aggregate first.
5. Hand broom cover material if necessary, to distribute the aggregate uniformly over Pavement surface.

D. Blotting: If bleeding occurs, apply a blend of 25 to 50 percent hydrated lime with sand (blotting material). Use sand to cool chips.

3.5 **ROLLING**

A. Use a rubber tire roller to seat aggregate. Apply at least two (2) complete rolling coverage.
B. Complete rolling before the bituminous material cools or hardens.
C. Keep traffic off at least four (4) hours or until moisture leaves remaining chips. Sweep surface before allowing uncontrolled traffic on chips.

3.6 **FOG SEAL**

A. If a fog seal is specified, see Section 32 01 13.50.
B. Apply within 24 hours of placing chips. Keep viscosity between 50 and 100 centistokes during application, ASTM D2170.

3.7 **CAP SEAL**

A. If a cape seal is specified, remove loose chips (by sweeping), fog the chip seal surface with water, and apply slurry seal, Section 32 01 13.61 within 48 hours of chip seal application.

3.8 **FIELD QUALITY CONTROL**

A. Emulsion density testing, ASTM D6937. If testing shows material non-compliance, halt operations, remove installed product and install new material known to be in compliance.
B. Measure the total amounts of material installed, and verify it meets the application rate.

3.9 **AFTER APPLICATION**

A. Raise reflective tabs that were covered over by application.
B. Clean Street Fixtures.

C. Do not apply permanent pavement markings or stripe material until layout and method of payment has been determined by ENGINEER and final application of seal coat has been in-place for at least 14 days, or as permitted otherwise by ENGINEER. Layout must be verified by ENGINEER prior to application.

3.10 **REPAIR**

A. Remove non-compliant product found after installation and apply acceptable product.
B. Remove spatter, mar and overcoat from curb, gutter, sidewalk, guardrails, guideposts, etc.
C. Remove overcoat from Street Fixtures.
D. Make edge and end lines straight. Provide a good appearance.
E. Leave no streaks, holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying Pavement.
F. Repair collateral damage caused by construction.

END OF SECTION

SECTION 32 01 13.68

MASTIC SEAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of an asphalt-aggregate *mastic* seal coat as a high-density roadway surface preservation treatment.

1.2 REFERENCES

A. **AASHTO Standards:**

T59 Emulsified Asphalts.
T111 Mineral Matter or Ash in Asphalt Materials.

B. **ANSI Standards:**

B74.8 Ball Mill Test for Friability of Abrasive Grain.

C. **ASTM Standards:**

C128 Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
C170 Compressive Strength of Dimension Stone.
C1326 Knoop Indentation Hardness of Advanced Ceramics.
D1644 Nonvolatile Content (Solids by weight).
D2172 Quantitative Extraction of Bitumen From Bituminous Paving Mixtures.
D2196 Rheological Properties of Non-Newtonian materials by Rotational (Brookfield type) Viscometer.
D2486 Determining Wear Resistance in Cycles
D2939 Emulsified Bitumens Used as Protective Coatings.
D3740 Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Related Coatings.
D3960 Determining Volatile Organic Compound Content of Paints and Related Coatings.
D6937 Density of Emulsified Asphalt.
E70 pH of Aqueous Solutions with the Glass Electrode

D. **ISSA Standards:**

TB 100 Wet Track Abrasion of Slurry Surfaces, Modified.

1.3 SUBMITTALS

A. **Mix Design:** Provide the following. Allow ENGINEER 10 days to evaluate the submittal.
   1. Date of mix design. If older than 60 days from date of submission, recertify mix design.
   2. Proportions of aggregate, filler, water, polymer, and emulsion in the mix.
   3. Residual in-place bitumen content, in ***pounds per square yard***.
   4. Residual in-place aggregate or mineral solids content, in ***pounds per square yard***.
   5. Thickness target for each application coat, in ***pounds per square yard***.
   6. Total minimum thickness, in ***pounds per square yard***.
   7. Results of a wear resistance test current within one (1) calendar year (this section article 2.3).

B. **Before Placement**: Submit 48 hours before delivery.
   1. Traffic control plan, Section 01 55 26
   2. List of construction equipment to be used.
   3. Certification from emulsion supplier stating emulsion meets requirements of this section.
   4. Names, certification levels, and years of experience of testing agency's field technicians that are assigned to the work. Verify laboratory complies with ASTM standards.
   5. Warranty.

C. **Reports**: If requested by ENGINEER, submit the following.
   1. List of five (5) projects that have successful product application on bituminous surfaces. Provide the names of whom to contact about each project.
   2. Source and field quality control testing reports performed by CONTRACTOR and Suppliers.

1.4 QUALITY ASSURANCE

A. Foreman of CONTRACTOR's crew of Supplier's representative has completed at least three (3) projects of similar scope. If crew foreman does not have such experience, Supplier must provide a full-time representative on site during application.

B. Use a laboratory that follows and complies with ASTM D3740 and Section 01 45 00 requirements.

C. Verify mixture delivered to site contains the same emulsion specified in the mix design.
D. Do not change source of the asphalt emulsion or aggregate without supporting changes in the mix design.
E. Reject product or work that does not meet requirements.

1.5 **WEATHER**

A. Temperature:
   1. Apply seal coat when air and pavement surface temperatures in the shade are 55 deg F. and rising.
   2. Cease application if air or pavement surface temperatures are likely to fall below 40 deg F. within 48 hours.
B. Moisture and Wind:
   1. Do not apply seal coat to a wet surface (no visible standing water or high sheen), during rain, 24 hours prior to forecast rain, or in unsuitable windy weather.
   2. Cease work if humidity or other conditions prolong curing, or if wind conditions are unsuitable.

1.6 **NOTICE**

A. Follow Laws and Regulations concerning when and to whom notices are to be given at least three (3) days before applying surface treatment materials.
B. Indicate application time and when new surface can be used. If necessary, include a map showing closed-off areas.
C. Provide phone numbers of at least two (2) individuals who represent the CONTRACTOR who can be reached at any time during the work.
D. Warn of potential vehicle tow away and other construction issues affecting neighborhood.
E. Should work not occur on specified day, issue an updated notice.

1.7 **ACCEPTANCE**

A. **General:**
   1. Acceptance is by Lot.
   2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring complying material as part of its installation, Section 01 29 00.
   3. Dispute resolution, Section 01 35 10.
   4. Opening surface treatment to vehicular traffic does not constitute acceptance.

5. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing; however, may be used by ENGINEER for acceptance if requirements of Section 01 35 10 are met.

B. **Asphalt Binder**:
   1. Lot size is total contracted product placement. Sub-lot size is one (1) day production.
   2. Of all sub-lot samples collected, randomly select one sub-lot and test it for physical properties in this section. The lot is acceptable if this single sub-lot test meets requirements. If the test does not meet requirements, continue testing other sub-lot samples for compliance.
   3. Pay Reduction: At ENGINEER's discretion, a lot with a deficient sub-lot test may be accepted if pay for the lot is reduced using on of the following applicable pay factors, or lot may be accepted at 50 percent pay if lot is in Reject.

Pay Factor	**Number of Non-complying Tests**
1.00	0
0.95	1
0.90	2
0.85	3
Reject	4

C. **Placement**:
   1. Mat appearance.
      a. No runoff onto concrete curbs, gutter pans, and shoulders.
      b. No streaking, drag marks, or squeegee marks.
      c. No light spots.
      d. No de-bonding
      e. Straight longitudinal edges with proper joints.
      f. Pay Reduction: Not applicable. Correct deficiencies at no additional cost to OWNER
   2. Mat thickness, bitumen content and aggregate content.
      a. Lot size is one (1) day production. Sub-lot size is 0.5 lane mile.
      b. Collect and test five (5) equally spaced samples from the initial sub-lot. Upon review of the initial sub-lot test results and at ENGINEER's discretion, acceptance of subsequent sub-lots may be based upon one or less samples from each subsequent sub-lot.

c. Pay Adjustment: Not Applicable. Correct mat placement deficiencies at no additional cost to OWNER.

1.8 WARRANTY

A. Both the CONTRACTOR and Supplier shall provide a two (2) year minimum written warranty when the existing pavement is in an appropriate condition (CONTRACTOR and Supplier to determine condition). Warranty covers delaminating, peeling and pre-mature surface wear.
   1. Before placement, notify ENGINEER if pavement condition or application condition voids the warranty.
   2. ENGINEER may allow or cancel product application at no cost to OWNER if warranty cannot be given.

B. After two (2) year period, acceptable performance is no delaminating, peeling, or inter-aggregate loss in surface wear. Mechanical disturbances by snow plow chatter, studded tires, etc. are excluded from warranty. Repair defective coverage at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 ASPHALT BINDER

A. Crack Pouring Asphalt: Rubberized asphalt or asphalt rubber hot pour, Section 32 01 17.

B. Tack Coat: SS or CSS grade, Section 32 12 13.13. Use a tack coat that is compatible with seal coat application.

C. Emulsified Asphalt: Inorganic, non-iconic thixotropic mineral colloid at 77 deg C that meets the following requirements. Inorganic is defined as a non-carbon based emulsifier.

Table 1 – Asphalt Properties

	Standard	Min	Max
Brookfield Viscosity at 77 deg F (Spindle 5, 20 rpm), cPs	D2196	11,000	20,000
pH	E70	5.0	7.5
Density, lbs/gal	T59	8.5	9.0
Solids, percent by weight	D2939	50	54
Asphalt cement content, percent by weight	D2172	45	50
Solids content, percent by weight	T59	50	54
Ash content, percent by weight	T111	4.0	6.0

2.2 AGGREGATE

A. Clean and free from organic matter or other detrimental substances. Composed by clay, corundum, slate, sand or other round particles meeting the following properties.

Table 2 – Aggregate Properties		
	Min	**Max**
Bentonite and attapulgite clay, percent		1.8
Refined corundum and slate content, percent	34.5	
Ash content, percent by weight		6
NOTES (a) Corundum Properties: Specific gravity is 3.9 minimum (ASTM C128) Knoop 100 hardness is 2,000 minimum (ASTM C1326) Ball mill friability (14grit) is 50 maximum (ANSI B74.8) (b) Slate Properties Specific gravity is 2.7 maximum (ASTM C128) Compressive strength is 11,000 minimum (ASTM C170)		

2.3 ADDITIVES

A. Water that is clean, non-detrimental, and free from salts and contaminant.
B. Polymers, clays, other additives as necessary to achieve mix design performance.

2.4 MIX DESIGN

A. Completed high density mineral bond material, prior to being loaded for install, meets the following requirements.

Table 3 – Mix Properties			
	Standard	**Min**	**Max**
Asphalt content, percent by weight	D2172	17	20
Solids content, percent by weight	D1644	55	63
Initial Brookfield viscosity at 72 deg. F, (Spindle 4, 20 rpm), cPs	D2196	5,500	9,000
Ash content, percent by weight	T111	38	--
Ash content of solids, percent by weight (a)	T111	65	--
Density, lbs/gal	T59	11	--
pH	E70	6.0	8.0

Total inorganic aggregate content, percent by weight (b)		T111	37	--
Total sand content, percent by weight		--	--	6.0
Maximum VOC, g/L		D3960	--	5
Resistance to re-emulsification		D2939	None	
Wear resistance, percent loss by weight	©	D2486	--	4

NOTES
(a) Ash content as a percentage of solids content.
(b) Ash content of completed mix minus ash content of base non-ionic emulsion. Total inorganic aggregate content is defined as slate, refined corundum, and sand.
(c) ASTM D2486 (Modified): Prepare sample at 48 wet mils on glass panel. Dry at 77 deg F. Test scrub resistance with 1,000 gram brass brush for 12,000 cycles. Report percent of dry film lost.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Paver: Use a continuous flow mixing unit.
   1. Capable of applying at least 15,000 square yards of material per day.
   2. Equipped with full sweep agitation system to assure proper suspension of fine aggregates.
   3. Equipped with an operator control station that adjusts material spread rate in accordance with project calibration process.
   4. Equipped with a filtering system to catch particles that plug nozzles.
   5. Equipped with a retractable spray bar capable of applying mixture without drilling. The bar should be positioned to meet calibration requirements.

B. Storage Tanks:
   1. When delivering mix from the central mixing plant to a job site storage tank, use only storage tanks with a capacity to contain the entire transport load.
   2. Ensure that all site storage tanks have internal full sweep mixing mechanisms and mixing capability that can provide at any given point in the tank a homogeneous mix.

3.2 PREPARATION

A. **Paver Calibration**: on a test strip at least 300 feet long, determine the correct pump settings, spray bar height, and ground speed for the application equipment. Apply material with pump settings at 80 percent of maximum output (plus or minus 5 percent) and a ground speed of 300 to 400 feet per minute.
   1. Do not begin or continue application without ENGINEER's knowledge of the calibration process and equipment settings.

2. Do not deviate from calibration settings without ENGINEER's knowledge.

B. **Surface Repair**: Method of payment to be determined by ENGINEER if any of the following repairs are required.
   1. Raising low areas to grade, lowering high areas to grad, hole patching, inlays.
   2. Providing tack coat on highly absorbent, polished, oxidized, or raveled bituminous surfaces or on brick and concrete surfaces.
   3. Crack filling and crack sealing, Section 32 01 17.
   4. Pushing or shoving pavement to be repaired as follows.
      a. Mill damaged area at least three (3) inches below required surface elevation. Section 32 01 16.71
      b. Install and compact PG64-22, DM-3/4, 50 blow bituminous concrete in lifts not less than three (3) inches after compaction. – See additional requirements in Section 33 05 25.

C. **Masking**: Mask-off Street Fixtures, end of streets, intersections.

D. **Traffic Control**:
   1. Implement traffic control plan requirements, Section 01 55 26. Provide safe passage for pedestrians and vehicles. Do not proceed without flaggers if work requires maintaining two-way vehicular traffic.
   2. Grind off existing pavement markings and lane stripes. If existing markings and stripes are to be reestablished, use reflective tabs to mark existing locations before applying seal coat. Unless specified otherwise, cost is included in the work of this section.

E. **Cleaning**:
   1. Remove loose material that may cause drag marks.
   2. Remove mud spots, sand, dust, oil, vegetation and other objectionable material.
   3. Do not flush water or apply pressurized water over cracked pavement unless ENGINEER allows its' use and a sufficient time is allowed for drying.

3.3 PROTECTION

A. Trees, Plants, Ground Cover:
   1. Protect trees, plants and other ground cover from damage.
   2. Prune trees to allow equipment passage underneath, Section 32 01 93. Repair tree damage at no additional cost to OWNER.

B. Protect structures, curb, gutter, sidewalks, guard rails, guideposts, etc. from physical damage.

3.4 APPLICATION

A. **General**:

Two separate application coats are required. The first application must be thoroughly set and free of any damp areas before the second application begins.

B. **Spreading**:

1. Keep material delivery at a constant rate even if forward speed of lay-down machine varies.
2. Do not reduce application rate along edges or around manhole covers.
3. Apply both applications right to the edge of the pavement. Do not leave uncovered areas near curbs, Street Fixtures, or edges on either application.
4. Make straight lines at all locations.
5. Place product out to right-of-way line on side streets and intersections.
6. Use hand squeegees to spread mix in areas that cannot be reached with distribution spray bar.
    a. Provide complete and uniform coverage.
    b. Avoid unsightly appearance from hand work.

C. **Joints**:

1. Make transverse joints straight-cut butt type, not over-lap type.
2. Place longitudinal joints on lane lines. Limit overlap to three (3) inches maximum.
3. Stop and correct paving operation if longitudinal or transverse joints have uncovered areas or unsightly appearance.

D. **Lines**:

1. Make straight lines along lip of gutters, shoulders, end of streets and in street intersections. No runoff on these areas will be permitted.
2. Vary edge lines no more than one (1) inch per 100 feet.

3.5 TOLERANCES

A. First application = **0.20 gallons per square yard minimum.**
B. Second application = **0.16 gallons per square yard minimum.**

3.6 FIELD QUALITY CONTROL

A. Emulsion density testing, ASTM D6937. If testing shows material non-compliance, remove installed product and halt operations until new material is delivered and is known to be in compliance.
B. Measure the total amounts of material installed, and verify it meets the application rate.

3.7 AFTER APPLICATION

A. Raise reflective tabs that were covered over by application.
B. Clean Street Fixtures.

C. Do not apply permanent pavement markings or striping material until layout and method of payment has been determined by ENGINEER and final application of seal coat has been in -place at least 10, days or as permitted by ENGINEER. Layout must be verified by ENGINEER prior to application.

3.8 **REPAIR**

A. Remove delaminated or non-compliant product found after installation and apply acceptable product.
B. Remove spatter, mar and overcoat from curb, gutter, sidewalk, guard rails, guideposts, etc.
C. Remove over coat from Street Fixtures.
D. Make edge and end lines straight. Provide a good appearance.
E. Leave no streaks, holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement.
F. Repair collateral damage caused by construction.

3.9 **OPENING TO TRAFFIC**

A. Cure time depends on type of asphalt, mixture characteristics and weather. Keep traffic off of treated surface until seal coat does not track out.

END OF SECTION

SECTION 32 01 13.69

MICRO-SURFACE SEAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Stone and an asphalt binder slurry evenly mixed and spread in variably thick cross-sections as a seal coat for roadways and thoroughfares.

1.2 REFERENCES

A. **ASTM Standards**:

- C88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
- C117 Material Finer Than 0.075 mm Sieve in Aggregate.
- C131 Resistance to Degradation of Small-Size coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- C136 Sieve Analysis of Fine and Coarse Aggregates.
- D5 Penetration of Bituminous Materials.
- D36 Softening Point of Bitumen (Ring-and-Ball Apparatus).
- D242 Mineral Filler for Bituminous Paving Mixtures
- D244 Emulsified Asphalts.
- D1664 Coating and Stripping of Bitumen-Aggregate Mixtures.
- D2170 Kinematic Viscosity of Asphalts (Bitumens).
- D2419 Sand Equivalent Value of Soils and Fine Aggregate.
- D3319 Accelerated Polishing of Aggregates Using the British Wheel.
- D3628 Selection and Use of Emulsified Asphalts.
- D3740 Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- D3910 Design, Testing, and Construction of Slurry Seal.
- D4791 Flat or Elongated Particles in Coarse Aggregate.
- D5821 Determining the percentage of Fractured Particles in Coarse Aggregate.

1.3 SUBMITTALS

A. **Mix Design**: Provide the following. Allow ENGINEER 10 days to evaluate the submittal.

1. Date of mix design. If older than 365 days from date of submission recertify mix design.
2. Target Grading Curve for aggregate.
3. Percentages of emulsion, aggregate, water and additives in the mix.
4. Emulsion type and time target for opening up a thoroughfare to traffic.
5. Results of asphalt stripping test and wet track abrasion test.

6. Type and minimum amount of polymer solids to be incorporated in the asphalt emulsion by Supplier. (in general, three (3) percent based on asphalt weight is considered minimum).
7. Identity of additives added to the emulsion mix or to any of the component materials for control of the quick traffic properties.
8. Slurry application rate.
9. Aggregate physical properties (this section article 2.2). The information is for suitability of source and not for project control. A new report may be required if aggregate source is changed. Test results shall not be older than 455 days from the date of submissions.

B. **Before Placement**: Submit at least 48 hours before delivery.
1. Traffic control plan. Section 01 55 26.
2. List of the construction equipment to be used.
3. Aggregate hardness, soundness, and polishing test results (this section article 2.2). Aggregate analysis to be no more than 180 days old.
4. Meter settings for micro-surfacing machine. Previously determined settings for the meters may be submitted providing such determinations are no more than 180 days old and the materials used in such determinations match those specified herein.
5. Test results of five (5) day settlement test, ASTM D244 on emulsions stockpiled longer than 36 hours by CONTRACTOR. This submittal may be waived, providing the CONTRACTOR's storage unit has continuous mixing capability, or the emulsion has an additional emulsion blended into it before use.
6. Certificate by emulsion supplier identifying:
   a. the mix design for which the emulsion is formulated.
   b. the emulsion meets requirements of this section article 2.1.
   c. the type of polymer modifier added to the emulsion.
   d. the amount of polymer modifier added to the emulsion.
7. Asphalt Bill of Lading: Identify weight of asphalt, weight of emulsified asphalt (after water ahs been and the Asphalt Binder complies with Section 32 12 03 requirements).

C. Reports: If requested by ENGINEER, submit source and field quality control testing reports performed by CONTRACTOR and Suppliers.

1.4 QUALITY ASSURANCE

A. Foreman of CONTRACTOR's crew has completed at least three (3) projects of similar scope.
B. Use a laboratory that follows and complies with ASTM D3740 and Section 01 45 00 requirements.
C. Verify asphalt emulsion delivered to site is the same emulsion specified in the mix design.

D. Do not change source of asphalt emulsion or aggregate without supporting changes in the mix design.
E. Reject product that does not meet requirements.

1.5 **WEATHER**

A. Temperature:
   1. Apply seal coat when air and pavement surface temperatures in the shade are 45 deg F and rising.
   2. Do not apply seal coat if air or pavement surface is below 55 deg F and falling or if the finished product will freeze before 24 hours.
B. Moisture and Wind: Do not apply seal coat to a wet surface, (no visible standing water or high sheen) during rain, if humidity prolongs curing, or in unsuitable windy weather.

1.6 **NOTICE**

A. Follow Laws and Regulations concerning when and to whom notices are to be given at least three (3) days before applying seal coat.
B. Indicate application time and when new surface can be used. If necessary, include a map showing closed-off areas.
C. Provide phone numbers of at least two (2) individuals who represent the CONTRACTOR who can be reached at any time during the work.
D. Warn of potential vehicle tow away and other construction issues affecting neighborhood.
E. Should work not occur on specified day, issue an updated notice advising when work will be performed.

1.7 **ACCEPTANCE**

A. **General**:
   1. Acceptance is by Lot.
   2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring complying material as part of its installation, Section 01 29 00.
   3. Dispute resolution, Section 01 35 10.
   4. Opening new seal coat to traffic does not constitute acceptance.
   5. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing: however, may be used by ENGINEER for acceptance if requirements of Section 01 35 10 are met.
B. **Mix Design**: Use the following as a guide in evaluating the mix design.
   1. Residual Asphalt: 5.5 to 10.5 percent by dry weight of aggregate.

2. Mineral Filler: 0 to 3 percent by dry weight of aggregate.
3. Polymer Based Modifier: Less than 3 percent solids based on bitumen weight content.
4. Sand Equivalency: Control of set time.

C. **Asphalt Binder**:
1. Lot size is total contracted product placement. Sub-lot size is one (1) day production.
2. Of all sub-lot samples collected, randomly select one sub-lot and test it for the physical properties in this section. The lot is acceptable if tests on this sub-lot sample meets requirements. If the sample does not meet requirements, continue testing other samples for a sample that complies.
3. Pay Reduction: At ENGINEER's discretion, a lot with a deficient sub-lot test may be accepted if pay for the lot is reduced using one of the following applicable pay factors, or lot may be accepted at 50 percent pay if lot is in Reject.

Pay Factor	**Number of Non-complying Tests**
1.00	0
0.95	1
0.90	2
0.85	3
Reject	4

D. **Aggregate**:
1. Lot size is one (1) day's production with 500 tons sub-lots.
2. Collect Samples randomly before mixing. Test gradation, ASTM C136. Test thickness. Lot will be acceptable if:
   a. Average gradation of each sieve for the Lot is within the Target Grading Band for the sieve.
   b. Number of Samples in the Lot with any sieve measurement outside of the Target Grading Band does not exceed two (2).
   c. No sample varies from Target Grading Band by more than target tolerance on any one (1) sieve.
3. Price Adjustment: Aggregate gradation defects may be accepted if 2.5 percent price reduction is applied against Lot for each condition not met. Maximum price reduction for a Lot is five (5) percent.

E. **Mat Appearance**: Correct deficiencies at no cost to OWNER
1. No runoff onto concrete curbs, gutter pans, and shoulders.
2. No streaking, drag marks or squeegee marks.
3. No light spots.

4. No de-bonding
5. Straight longitudinal edges with proper joints.

PART 2 PRODUCTS

2.1 ASPHALT BINDER

A. Crack Pouring Asphalt: Rubberized asphalt or asphalt rubber hot pour, Section 32 01 17.
B. Tack Coat: SS-1 or CSS-1, Section 32 12 13.13. Use a tack coat that is compatible with seal coat application.
C. Emulsified asphalt: CSS-1h quick-traffic type, ASTM D3628 with a two (2) hour return to traffic quickset. The use of polymer solids is CONTRACTOR's choice.

Table 1 – Asphalt Binder Properties

	Standard	Target	Min	Max
Tests on emulsion				
Viscosity at 25 deg C, SSF				
Sieve test, percent				
Settlement, 5-day, percent				
Storage stability, 1 day, percent				
Residue by distillation				
Tests on residue from evaporation				
Penetration at 25 deg C, 0.1mm				
Softening point, deg C				
Kinematic viscosity cSt/sec				
Saybolt furol viscosity at 77 deg F, cSt/sec				
Polymer solids based on mass of residual asphalt, percent				

NOTES
(a) Cement mixing test waived.
(b) Polymer solids are to be milled or blended into the asphalt or emulsifier solution before the emulsification process.

2.2 AGGREGATE

A. **Material**:
1. Clean and free from organic matter or other detrimental substances.
2. Stone, slag or other high-quality particle or combination, 100 percent crushed with the following physical properties.

Table 2 – Aggregate Properties				
		Standard	Max	Min
Angularity (fractured faces), percent		D5821	80	--
Wear (hardness or toughness), percent		C131	--	30
Soundness (weight loss in 5 cycles), percent	Na_2SO_4	C88	--	15
	Mg_2SO_4	C88	--	25
Clay content (sand equivalent), percent		D2419	65	--
Polishing BPN		D3319	35	--

NOTES

(a) Angularity of aggregate retained on No. 4 sieve with at least one (1) mechanically fractured face or clean angular face.

(b) Wear of aggregate retained on No. 8 sieve.

(c) Soundness for combined coarse and fine aggregate.

(d) Clay content before additives.

B. **Gradation**: Analyzed by ASTM C136 on a dry weight and percent passing basis:

1. Material passing any sieve and retained on the next consecutive sieve is 45 percent maximum.
2. For heavy-duty surface applications use 100 percent crushed material.
3. Target Grading Curve must lie within one of the following Master Grading Bands. Field Samples shall not vary from the Target Grading Curve by more than the target tolerance.

Table 3 – Master Grading Band and Target Tolerance Limits			
Sieve	Master Grading Band		Target Tolerance
	Type II	Type III	
1/2 in.	--	100	--
3/8 in.	100	>85	+/-5
No. 4	70 – 90	60 – 87	+/-5
No. 8	45 – 70	40 – 60	+/-5
No. 16	28 – 50	28 – 45	+/-5
No. 30	19 – 34	19 – 34	+/-5
No. 50	12 – 25	12 – 25	+/-4
No. 100	7 – 18	7 – 18	+/-3
No. 200	5 – 15	4 – 8	+/-2

NOTES

(a) Target tolerance is the allowable variation from the Target Grading Curve.

(b) Portion retained on No. 4 sieve.

- clean and free of clay coatings
- more than 80 percent of the particles by weight, with at least 1 mechanically fractured face or clean angular face.

(c) Portion passing No. 200 sieve includes mineral filler, ASTM C117.

2.3 **ADDITIVES**

A. Use water that is clean, non-detrimental, free from salts and contaminant.
B. Mineral filler, ASTM D242.
C. Portland cement, hydrated lime, limestone dust, fly ash, or aluminum sulfate to regulate setting time and improve workability.
D. Limestone dust, fly ash, and rock dust to alter aggregate gradation.

2.4 **MIX DESIGN**

A. Proportioning: Using procedures for mix design developed by the International Slurry Surfacing Association, determine the proportions of aggregate, mineral filler (minimum and maximum), water (minimum and maximum), polymer modified asphalt emulsion, and additives in the mix.
B. Set and Cure Time: Select to meet opening to traffic requirements.
C. Striping: More than 90 percent of bituminous-coated particles retain asphalt coating, ASTM D1664.
D. Wet Track Abrasion: ASTM D3910
    1. 50 grams per square foot maximum in a one (1) hour soak.
    2. 75 grams per square foot maximum in a six (6) day soak.

PART 3 EXECUTION

3.1 **CONSTRUCTION EQUIPMENT**

A. Mixing Equipment: Use a storage and mixing device capable of accurately proportioning and delivering aggregate, emulsified asphalt, mineral filler, additive, and water on a continuous flow basis to a spreader box. Mixing equipment must perform as follows.
    1. Capable of applying at least 15,000 square yards per day.
    2. Equipped with proportioning devices based upon either volume or weight control.
    3. Its' mixer is to be a multi-blade, multi-shaft unit:
        a. Autonomous if lay-downs are longer than 600 feet.
        b. Truck mounted is permitted for lay-downs less than 600 feet.
B. Spreader:
    1. Equipped with a spreader box that has a front seal, so no loss of mixture occurs at road contact and an adjustable rear seal to act as a final strike-off device.
    2. Equipped with a secondary strike-off device to improve surface texture.
C. Rut Filling Box: Wide enough to bridge ruts.

3.2 **PREPARATION**

A. **Meter Calibration**: On a test strip at least 500 feet long, determine the correct meter settings on the mixing equipment. Settings are to produce a product that complies with the following:
   1. Thirty (30) minutes maximum initial set time. Initial set occurs when blotting of the seal coat yields only water (no emulsion).
   2. No distress when exposed to traffic two (2) hours after placement.

B. **Surface Repair**: Method of payment to be determined by ENGINEER if any of the following repairs are required.
   1. Raising low areas to grade, lowering high areas to grade, hole patching, inlays.
   2. Providing tack coat on highly absorbent, polished, oxidized, or raveled bituminous pavement or on brick or on Portland cement concrete surfaces.
   3. Crack filling and crack sealing, Section 32 01 17.
   4. Pushing or shoving pavement to be repaired as follows.
      a. Mill damaged area at least three (3) inches below required surface elevation. Section 32 01 16.71.
      b. Install and compact PG64-22, DM-3/4, 50 blow bituminous concrete in lifts not less than three (3) inches after compaction. See additional requirements in Section 33 05 25.

C. **Masking**: Mask-off Street Fixtures, end of streets, intersections.

D. **Traffic Control**:
   1. Implement traffic control plan requirements, Section 01 55 26. Provide safe passage for pedestrians and vehicles. Do not proceed without flaggers if work requires maintaining two-way vehicular traffic.
   2. Grind off existing pavement markings and lane stripes. If existing markings and stripes are to be reestablished, use reflective tabs to mark existing locations before applying seal coat. Unless specified otherwise, cost is included in the work of this section.

E. **Cleaning**:
   1. Remove loose material, mud spots, sand, dust, oil, vegetation, and other objectionable material.
   2. Do not flush water or apply pressurized water over cracked pavement unless ENGINEER allows its' use, and a sufficient time is allowed for drying.

3.3 **PROTECTION**

A. Trees, Plant, Ground Cover:
   1. Protect trees, plants, and other ground cover from damage.

2. Prune trees to allow equipment passage underneath, Section 32 01 93. Repair tree damage to no additional cost to OWNER.

B. Protect structures, curb, gutter, sidewalks, guard rails, guideposts, etc. from physical damage.

3.4 **SPOT LEVELING**

A. Where rut deformation is less than 1/2 inch apply only amount of seal coat needed to level the surface (scratch course).
   1. Mill high spots.
   2. Use a rut-filling box.
   3. Use multiple placements when ruts depth exceed 1-1/2 inches. For every inch of seal coat add 1/8th to 1/4 of an inch of material as a crown (allows for compaction under traffic).
   4. Allow three (3) days cure time under traffic.

3.4 **APPLICATION**

A. **General**:
   1. Machine meter settings must match mix design.
   2. Pre-wet existing pavement surface to prevent premature breaking or to improve bonding.
   3. Wait at least two (2) hours if an adjacent pass has broken and started to cure.
   4. When cured, the seal coat shall present a uniform, skid-resistant appearance with all cracks filled.

B. **Additives**: During application, water and additives may be increased or decreased (per mix design) for better consistency or set time.

C. **In the Spreader Box**:
   1. No spreading of material remaining in box when mixer is shut off.
   2. No additional water added to the box.
   3. No lumping, balling or unmixed aggregate.
   4. No segregation of the emulsion and aggregate fines from the coarse aggregate.
   5. No breaking of emulsion.
   6. No overloading. Carry a sufficient amount of seal coat in all parts of the spreader for complete coverage.

D. **Spreading**:
   1. Dampen surface immediately before seal coat application. All surfaces are to be uniformly damp with no fee water standing on the surface or in cracks when seal coat is applied.

2. If coarse aggregate settles to bottom of mix, remove seal coat from pavement.
3. Butt joint adjacent lanes at edges and provide complete sealing at joint.
4. In areas where spreader box cannot be used, apply seal coat by hand.

E. **Joints**:
1. Make transverse joints straight-cut butt type, not over-lap type.
2. Place longitudinal joints on lane lines. Limit overlap to three (3) inches maximum.
3. Tolerance for joint match is 1/4 inch difference in elevation when measured with a 10 feet long straight edge over the joint.
4. Stop and correct paving operation if longitudinal or transverse joints have uncovered areas or unsightly appearance.

F. **Lines**:
1. Make straight lines along lip of gutter and shoulders. No runoff on these areas will be permitted. Remove if happens.
2. Vary edge lines no more than two (2) inches per 100 feet.

3.6 **TOLERANCES**

A. Type II aggregate thickness = **16 to 18 pounds per square yard.**
B. Type III Aggregate thickness = **20 to 25 pounds per square yard.**

3.7 **FIELD QUALITY CONTROL**

A. If an ASTM C136 sieve analysis shows aggregate gradation non-compliant, either remove the material or blend in other aggregates to bring it into compliance. This may require a new mix design. Screening may be required at the stockpile to remove any defective materials.
B. Measure total amounts of material installed, and verify it meets the application rate.

3.8 **AFTER APPLICATION**

A. Raise reflective tabs that were covered over by application.
B. Clean Street Fixtures.
C. Do not apply pavement markings or stripe materials until layout and method of payment has been determined by ENGINEER and final application of seal coat has been in-place at least 14 days, or as permitted by ENGINEER. Layout must be verified by ENGINEER prior to marking application.
D. If coarse aggregate settles to the bottom of the mix, remove and replace the application. When cured, the application shall be uniform and skid resistant.

3.9 **REPAIR**

A. Remove spatter, mar and overcoat from curb, gutter, sidewalk, guardrails, guideposts, etc.
B. Remove overcoat from Street Fixtures.
C. Make edge and end lines straight. Provide a good appearance.
D. Leave no streaks, holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying Pavement.
E. Repair collateral damage caused by construction.

3.10 **OPENING TO TRAFFIC**

A. Cure time depends on type of asphalt, mixture characteristics, and weather. Keep traffic off of surface until seal coat material does not track-out.

END OF SECTION

SECTION 32 01 16.71

COLD MILLING BITUMINOUS PAVEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Lower surface elevation of bituminous concrete Pavement by milling.
B. If grinding is required to smooth-out surface bumps or depressions refer to Section 32 01 26.

1.2 PAYMENT PROCEDURES

A. No payment for leveling course to correct over milling or for additional milling to correct shallow milling.

1.3 REFERENCES

A. **APWA (Utah) Standards:**
   Plan 253 Bituminous concrete pavement overlay.

1.4 SUBMITTALS

A. Traffic control plan, Section 01 55 26.
B. Arborist's certification.
C. Pre-milling profilographs for full width mills.
D. Redline drawings showing discovered existing utilities.

1.5 QUALITY ASSURANCE

A. Provide a person capable of calculating grades and cross-slopes in degrees and percentages. Cross slopes vary when the crown line is not parallel to pavement edge line.

1.6 SITE CONDITIONS

A. Existing Street Fixtures may have been paved over making them hidden (or buried). Locate and protect them. Failure to find them may result in damage to milling equipment. Repair damaged CONTRACTOR machinery and Street Fixtures at no cost to OWNER.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 **CONSTRUCTION EQUIPMENT**

A. Detector: Able to find Street Fixtures (utility frames and covers, valve boxes, etc.) that are buried under pavement surface.
B. Milling Machine:
    1. Equipped to prevent air pollution.
    2. Equipped with a system to control depth and slope of mill cut.
C. Cleaning equipment able to pick up millings and wastewater.

3.2 **PREPARATION**

A. Notify neighborhood at least 48 hours before day and time of milling.
B. Coordinate utility locations, Section 01 31 13. Preserve all active utilities.
C. Implement traffic control plan requirements in Section 01 55 26.
D. Mark areas in the field that are to be milled. Mark existing utilities on redline drawings.
E. Use a detector to find hidden (or buried) Street Fixtures.

3.3 **PROTECTION**

A. Install Invert Covers, Section 01 71 13.
B. Lower utility frames, covers, and other Street Fixtures.
C. Trees may require pruning, Section 32 01 93. Avoid or minimize damage to tree branches. Provide certified arborist observation of tree branch cuts larger than four (4) inches diameter. Notify ENGINEER of such tree branch cut or damage.
D. CONTRACTOR is liable for any property damage due to loose material on pavement surface, vertical pavement cuts, drop-offs, etc.
E. Protect plant and animal habitat. Follow federal, state or local work permit requirements.

3.4 **MILLING**

A. If not indicated elsewhere meet cross slopes and depth of milling shown on APWA Plan 253.
B. Meet profile grade required or indicated by ENGINEER.

C. Do not disfigure adjacent work or existing surface improvements by accidentally cutting into them. Make appropriate repairs.
D. If milling exposes smooth underlying pavement surface, mill the smooth surface to make it rough.
E. Mill off additional material if standing water has a potential to accumulate or if surface has been damaged by water since beginning of milling operation.
F. Where vehicles or pedestrians must pass over milled edges provide safe temporary ramps suitable to speed of user vehicles (or suitable for wheelchair user needs).
G. Unless stipulated elsewhere, all residues from the milling process become property and responsibility of CONTRACTOR. Waste millings legally. Do not discharge millings into storm drains, ditches, or waters of the State.
H. If work equipment is removed from the milling site and milled surface awaits further work, provide appropriate traffic control and cleaning.
I. Notify ENGINEER when milling exposes weak or unstable surfaces. Verify extent of exposure by proof rolling at no additional cost to OWNER.

3.5 **TOLERANCES**

A. Milling Depth: As indicated plus or minus 10 percent not uniformly high or uniformly low.
B. Striation Texture: Uniform, discontinuous, longitudinal, 3/16 inch deep maximum, ¾ inch center to center.
C. Smoothness:
    1. On Longitudinal Grade: Plus or minus 5/16 inch in 25 feet.
    2. At Longitudinal Grade Breaks: Plus or minus 1/4 inch in 10 feet.
D. Cross Slope:
    1. In the Parking Lane: Two (2) percent target, five (5) percent maximum.
    2. In the Travel Lane: Two (2) percent target, 15.5 percent minimum.

3.6 **FIELD QUALITY CONTROL**

A. Edge Mill: Verify cross slopes. Advise ENGINEER if a two (2) percent maximum break-over angle on an edge mill indicated on APWA Plan 253 cannot be achieved.
B. Full Width Mill:
    1. Verify cross slopes. Advise ENGINEER if a four (4) percent maximum break-over angle on a full width mill indicated on APWA Plan 253 cannot be achieved.
    2. On thoroughfares exceeding 25 mph use laser profiling to determine depth of milling along the proposed crown line or other breakover point.
    3. Verify cut depth calculations with ENGINEER before milling.

3.7 **CLEANING**

A. Unless indicated elsewhere, all residues from the milling process become property and responsibility of CONTRACTOR. Waste millings legally. Do not discharge millings into storm drains, ditches or waters of the State. Legally dispose of milled material.

END OF SECTION

SECTION 32 01 16.74

IN-PLACE HOT REUSED BITUMINOUS PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Seamless repair of bituminous concrete pavement by applying evenly distributed heat over the pavement surface, then mixing and compacting the heated pavement in-place.

1.2 REFERENCES

A. **APWA (Utah) Standards:**

Plan 254 Patch repair – in place hot reused bituminous paving.

1.3 SUBMITTALS

A. Manufacturer's product data, equipment, and material specifications.
B. Traffic control plan, Section 01 55 26.

1.4 PERFOMANCE REQUIREMENTS

A. Use a method that does not burn the pavement surface or burn off any existing bituminous pavement volatiles.

PART 2 PRODUCTS

2.1 MATERIAL

A. Rejuvenating agent, bituminous concrete mix, and reclaimed RAP or ROSP aggregate.

PART 3 EXECUTION

3.1 PREPARATION

A. Implement traffic control plan requirements in Section 01 55 26.
B. Mark areas in the field that are to be repaired. Mark existing utilities on redline drawings.
C. Use a detector to find hidden (or buried) Street Fixtures.

3.2 REPAIRS

A. Apply heat to areas to be repaired:
   1. Do not exceed a surface temperature of 350 deg F

2. Minimum surface temperature is as indicated in Section 32 12 16.13.

B. Follow APWA Plan 254 requirements. Mechanically scarify and thoroughly mix the repair area. Provide beveled sides.
C. Add and thoroughly mix additional bituminous material and rejuvenating agent as required to fill depressions, potholes, or to match grade of adjacent pavement surfaces.
D. Screed and level the repair area in preparation for compaction and allow the material to become integral with edges of repair area.
E. Compact surface with a steel drum roller. Match the grade of the adjacent pavement after compaction. No longitudinal surface bumps allowed.
F. Cool repaired area to 150 deg F before opening to vehicular traffic.
G. Reapply heat and rework area in the case where bumps and depressions are present in finished surface.
H. Sweep up and dispose of excess material and debris.
I. Repair any damage at no additional cost to OWNER.

END OF SECTION

SECTION 32 01 17

SEALING CRACKS IN BITUMINOUS PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Filling and sealing cracks in bituminous concrete pavements.

1.2 REFERENCES

A. **APWA (Utah) Standards:**

Plan 265 Crack sealing
Plan 266 Crack filling.

B. **ASTM Standards**

D 36 Softening Point of Bitumen (Ring-and Ball Apparatus)
D 977 Emulsified Asphalt.
D 1190 Concrete Joint Sealer, Hot-Poured Elastic Type.
D 2397 Cationic Emulsified Asphalt.
D 3381 Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
D 3405 Joint Sealants, Hot-Poured, For Concrete and Asphalt Pavements
D 5078 Crack Filler for Asphalt Concrete and Portland Cement Concrete Pavements.
D 5329 Sealants and Fillers, Hot-Applied for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.

1.3 DEFINITIONS

A. **Crack Filling:** The placement of materials into cracks to substantially reduce infiltration of water and to reinforce the adjacent Pavement. The crack receives no special preparation other than cleaning.
B. **Crack Sealing:** The placement of specialized materials in or above cracks to prevent the intrusion of incompressible and water into the crack. The crack receives unique crack configuration preparation.
C. **Pothole:** Loss of surface material in a Pavement to the extent that a patch is necessary to restore Pavement ride quality.

1.4 SUBMITTALS

A. Product Data sheets.

1.5 QUALITY ASSURANCE

A. Do not use crack repair product that has been over-heated, suffered prolonged heating or ravels or can be pulled out by hand after placement.

B. Do not mix different manufacturer's brands or different types of crack repair material.
C. Do not depress crack repair product temperature at the wand tip below the manufacturer's recommended application temperature when loading product into product tank.

1.6 **NOTICE**

A. Send written notice to residents and businesses within affected area at least three (3) days before application of Crack Filling or Crack Sealing material.
B. Indicate application time and when pavement surface can be used.
C. Warn of potential vehicle tow away and other construction issues affecting neighborhood.
D. Should work not occur on the specified day, send a new notice.

1.7 **ACCEPTANCE**

A. Visually inspect areas for adhesion Failure, damage to crack repair product, missed cracks, foreign objects in the product, or other problems that indicate work is not acceptable.

PART 2 PRODUCTS

2.1 FILLER AND SEALER MATERIAL

A. Selection of Filler: Asphalt emulsion, unless specified otherwise.
B. Selection of Sealer: Hot applied asphalt rubber or hot applied rubberized asphalt, unless specified otherwise.
C. Thermoplastic products.

Table 1 – Fillers and Sealers

Material Type	Standard	Application
Hot-applied		
Asphalt Rubber	D 5078	Sealing (possibly filling)
Rubberized Asphalt	D 1190 D 3405	Sealing
Low Modulus Rubberized Asphalt	(a)	Sealing
Asphalt Cement	D 3381	Filling
Mineral-filled Asphalt Cement (b)	D 3381	Filling
Fiberized Asphalt Cement (b)	D 3381	Filling
Chemically Cured		
Silicone	(c)	Sealing
Cold Applied		

Asphalt Emulsion	D 977 D 2397	Filling
Polymer-modified liquid asphalt	D 977 D 2397	Filling (possibly sealing)

NOTES

(a) ASTM D3405 or ASTM D5078 except as follows,
- Softening point, 85 deg. C. minimum, ASTM D36.
- Resilience: At least 30 percent recovery at 25 deg. C plus or minus 1 deg. C., ASTM D5329

(b) Additives such as mineral fillers and fibers provide minimal elasticity to asphalt and do not significantly affect temperature susceptibility.

(c) Manufacturer's recommended specification.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Sealant Heating Equipment: Indirect heating using double boiler or circulating hot oil heat transfer for heating product. Do not use direct heat transfer units (tar pots). Unit must have means of constant agitation.

B. Hot Compressed Air Lance: Provide clean, oil-free compressed air at a volume of 100 cubic feet per minute at a pressure of 120 pounds per square inch.

3.2 PREPARATION

A. Allow at least one week for repaired cracks to cure and harden before placing thin overlays (chip seal, slurry seal, micro-surface, high density mineral bond, etc.).

B. Repair potholes full depth.

3.3 CRACK FILLING AND SEALING

A. Blow cracks clean. Remove foreign matter, loosened particles, and weeds.

B. Use a hot air lance when surfaces are wet or when air temperature is less than 40 deg F. Do not burn the surrounding Pavement. Fill cracks immediately before cool down or reheat.

C. Crack fill: Provide Type A cap fill per APWA Plan 266, unless indicated otherwise.

D. Crack seal: Provide Type C backer rod seal per APWA Plan 265, unless indicated otherwise.

E. If a thin overlay is to be applied, remove crack overfill by squeegee.

3.4 **PROTECTION**

A. Place sand on surface of crack repair product if traffic or construction activities are likely to cause pull out. Replace pull out at no additional cost to OWNER.
B. Repair vehicles or other property damaged by crack repair operation.

END OF SECTION

SECTION 32 01 19

PATCHING RIGID PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Full depth removal and replacement of Portland cement concrete roadway pavement panels.

1.2 REFERENCES

A. **APWA (Utah) Standards:**
   Plan 256 Concrete pavement patch.
   Plan 261 Concrete pavement joints.

B. **ASTM Standards**
   A615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcing.
   C1315 Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.3 SUBMITTALS

A. Joint filler board data sheet.

B. Joint sealer data sheet.

C. Bond breaker data sheet.

D. Traffic control plan, Section 01 55 26.

E. Concrete mix design.

1.4 ACCEPTANCE

A. Concrete compressive strength.
B. Profile and cross-section tolerance.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcement: Grade 60 ksi galvanized or epoxy coated steel, ASTM A615:

1. Dowel Bar: Smooth.
2. Tie Bar: Deformed.
3. Mat: Deformed.

B. Dowel Bar End Cap: Non-metallic that allows 1/4 inch longitudinal movement of bar.

2.2 CONCRETE

A. Class 4000 cast-in-place, Section 03 30 04.
B. Slump range per mix design.

2.3 ACCESSORIES

A. Bond Breaker: Paraffin wax, lithium grease, or other semi-solid, inert lubricant.
B. Expansion Joint Filler: F1 sheet 1/2 inch thick, Section 32 13 73.
C. Contraction Joint Filler (Backer Rod): Closed cell, Type 1 round, Section 32 13 73.
D. Contraction Joint Sealer: HAS1 or HAS4 hot applied, Section 32 13 73.
E. Curing and Sealing Compound: Membrane type, ASTM C1315. Type II Class A or B (white pigmented).
F. Tackifier: Epoxy gel Type II, Section 03 61 00 for attaching plastic concrete to existing hard concrete or for securing dowel and deformed tie bars in drilled holes.
G. Water Repellant: Penetrating compound, Section 07 19 00.

2.4 SOURCE QUALITY CONTROL

A. Use concrete accelerating admixtures in cold weather only when approved in the mix design. Use of admixtures will not relax cold weather placement requirements.
B. Use set retarding admixtures during hot weather only when approved by ENGINEER.

PART 3 EXECUTION

3.1 PREPARATION

A. Implement traffic control plan requirements, Section 01 55 26.
B. Make full depth saw cuts around the perimeter of the rectangular section to be removed. Do not over cut.
C. Make full depth re-cuts along any edge that is damaged during repairs, including failures on the underneath of the slab caused by insufficient saw-cut depths.
D. Remove panels without damaging remaining panels. Use chains and lift pins.

E. Repair foundation materials, grade, and compact.
F. Repair concrete damaged by removal operations.

3.2 **LAYOUT**

A. Panels:
   1. Follow APWA Plan 256 requirements.
   2. Determine extent and dimensions of removal from Drawings, or acceptable to ENGINEER.
   3. Form any side that does not have an adjacent panel. Form to match existing panels providing a vertical edge.
B. Joints:
   1. Follow APWA Plan 261 requirements.
   2. Tackifier required on vertical surface of cold joints, both transverse and horizontal. Do not apply bond breaker to cold joints.
   3. Keep existing pavement joint layout when scoring.
   4. Saw new concrete joint on same line if repairs straddle an existing joint line.

3.3 **BAR PLACEMENT**

A. Drill holes for bars using a rigid drill frame. Prevent bits from wandering.
B. Drill holes at mid-depth of the slab. Do not damage remaining pavement section. Remove contaminants from holes.
C. Deformed Bar: For drilled holes that receive deformed bars, place adhesive at far end of each hole. Fit retention ring to bar to prevent adhesive grout from flowing out of hole.
D. Dowel Bar: For drilled holes that receive smooth dowel bars, place grease at far end of drilled bar hole.bar before insertion. Grease and place an expansion end cap on protruding end of dowel bars.]
E. Repair any bar coating damage with appropriate repair material.
F. Repack loose bars prior to placing concrete mix.
G. Before placing concrete in the work area:
   1. Allow firm set of adhesive grout around bar.
   2. Coat dowel bar extension with bond breaker.

3.4 **CONCRETE PLACEMENT**

A. Section 03 30 10
B. Make sure base course is uniformly damp at time of placement.
C. Prevent segregation of concrete mix.

D. Consolidate concrete along face of existing panels and under reinforcement. Keep vibrators away from joint assemblies and reinforcement. Do not dislocate reinforcement, dowels, and tie bars during consolidation.

3.5 **FINISH**

A. Section 03 35 00.
B. Profile and cross-section tolerance is ±1/8 inch.
C. Do not tool joints that are to be saw-cut and sealed.
D. Texture surface to match existing.

3.6 **CURING**

A. ASTM C1315. Apply total coverage in two (2) directions after texturing.
B. Eliminate thermal shock of concrete by keeping cure temperature even throughout extent and depth of concrete slab.

3.7 **PROTECTION AND REPAIR**

A. General: Protection and repair expenses are at no additional cost to OWNER.
B. Protection: Section 03 30 10:
   1. Do not open to traffic until 4000 psi concrete strength is reached.
   2. Protect concrete pavement surface against damage and marking. Place barricades at the proper locations to prevent traffic from using the pavement.
C. Repair:
   1. Remove and replace any concrete slab replacement that exhibit cracking, shrinkage, or failure caused by traffic.
   2. Correct patch profiles in excess of 1/8 inch **higher** or **lower** than the existing pavement profile through surface grinding or removal and replacement. Apply water repellant over surface grindings.

END OF SECTION

SECTION 32 01 20

DOWEL BAR RETROFIT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Dowel bar assemblies across existing transverse joints and cracks in concrete roadway pavement slabs eight (8) inches thick or thicker.
B. Concrete patch.

1.2 REFERENCES

A. **APWA (Utah) Standards:**
   Plan 262 Dowel bar retrofit.
B. **ASTM Standards**
   A615 Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcing.
   C882 Bond Strength of Epoxy Resin Systems Used With Concrete By Slant Shear.
   C1315 Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.3 SUBMITTALS

A. Sample of dowel bar and end cap.
B. Data Sheets for:
   1. Joint filler board.
   2. Joint sealer.
   3. Bond breaking compound on dowel bar.
   4. Dowel bar epoxy or galvanizing coating.
C. Concrete mix design.

1.4 ACCEPTANCE

A. Concrete compressive strength. APWA Section 03 30 10.
B. Field quality control by CONTRACTOR, this section article 3.2.

PART 2 PRODUCTS

2.1 DOWEL BAR ASSEMBLIES

A. Dowel Bars:
   1. Smooth, grade 60 ksi galvanized or epoxy coated steel, ASTM A615. Bars must be free from burrs or other deformations detrimental to free movement of the bars in the concrete. Bars must be sawn by manufacturer, not sheared.
   2. White pigmented bond breaking curing compound or other semi-solid, insert lubricant applied at the manufacturing facility. DO NOT apply bond breaker while the dowel bar assembly is in the reservoir.

B. Chair Device: Non-metallic designed to press securely against the reservoir bottom and sides providing 1/2 inch clearance between reservoir bottom and bottom of bar.

C. End caps: Non-metallic that allow 1/4 inch bar movement required at both ends of bar.

2.2 CONCRETE PATCH

A. 3/8 inch aggregate maximum.

B. 3000 psi in 3 hours and 5000 psi in 24 hours, ASTM C109

C. Shrinkage maximum in 4 days 0.13 percent, ASTM C157.

D. Bond Strength of 1,000 psi in 24 hours. ASTM C882.

2.3 ACCESSORIES

A. Joint Products: Section 32 13 73.

B. Curing and Sealing Compound: Membrane type, ASTM C1315

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Jackhammers: Less than nominal 30 pound class to prevent spalling.

B. Saws: Capable of cutting a minimum of three (3) slots simultaneously if more than 100 bars are to be placed in the Work. Less than 100, a walk behind saw may be used providing a template is used to ensure the slot locations are within the specified tolerances.

3.2 **PREPARATION**

A. Before the start of major operations, provide a test section consisting of at least 24 complete dowel bar retrofits.
B. In the presence of the ENGINEER and 24 hours after completing the test section randomly check dowel positioning by coring. Drill two cores, one on each end of a dowel bar to expose both ends and allow measurement for proper alignment. If the dowels are located incorrectly or air voids exist around the dowel bars, additional cores will be taken under ENGINEER's direction to determine severity.
C. CONTRACTOR will perform and patch all testing at no additional cost to OWNER.
D. Backfill all core locations using the acceptable dowel bar retrofit patching material.

3.3 **INSTALLATION**

A. Preparation: See APWA Plan 262 requirements.
B. Reservoir:
    1. Saw, remove concrete, then sand blast. Remove dust, concrete slurry, and debris.
    2. Skewed joints or cracks may require slots longer than the length shown in the plan. Increase length at no additional cost to OWNER.
    3. If work is delayed for any reason reclean patching areas as necessary.
    4. Apply CAS-5 silicone joint sealer to crack and joint in the reservoir walls and bottom.
C. Bars:
    1. Place bars on chairs in middle of slab.
    2. 1/2 inch clearance from bottom of reservoir.
    3. Maximum allowable skew is 0.375 inches per 12 inches (3 percent) in horizontal and vertical planes.
D. Filler Board: Place in vertical plane of the transverse joint or crack. Fit tightly at reservoir bottom, sides and circumference of the bar.
E. Concrete: install and consolidate. Finish and apply curing and sealing compound.
F. After cure: Remove joint filler board across width of reservoir to a depth of two (2) inches. Seal joint with HAS-4 sheet, on component elastomerit type joint sealer.

3.4 **PROTECTION AND REPAIR**

A. General: All expenses are at no additional cost to OWNER.
B. Protection: Section 03 30 10. Protect down stream habitat from saw-cutting slurry.
C. Repair: Replace any non-functioning or damaged dowel bar retrofit.

END OF SECTION

SECTION 32 01 26

GRINDING PAVEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Smooth-out surface bumps or depressions in bituminous or Portland cement concrete Pavement by grinding.
B. If Milling is required to lower a bituminous pavement surface refer to Section 32 01 16.71.

1.2 SUBMITTALS

A. Traffic control plan, 32 01 16.71.

1.3 QUALITY ASSURANCE

A. Worker Experience: Provide a person capable of calculating grades and cross-slopes in degrees and percentages.

1.4 SITE CONDITONS

A. Existing Street Fixtures may have been paved over making them hidden (or buried). Locate and protect them. Failure to find them may result in damage to grinding equipment. Repair damaged machinery and Street Fixtures at no cost to OWNER.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION AND EQUIPMENT

A. Detector: Able to find Street Fixtures (utility frames and covers, valve boxes. Etc) that are buried under Pavement surface.
B. Roadway Grinding Machine: Self-propelled:
    1. Cutting head 36 inches wide minimum.
    2. 50 to 60 diamond blades per foot of head.

3. Equipped to prevent air pollution.
4. Equipped with a system to control depth and slope of grind cut.

C. Water truck, waste truck and cleaning equipment able to pick up grindings and wastewater.

3.2 **PREPARATION**

A. Notify neighborhood at least 48 hours before day and time of grinding.
B. Preserve all active utilities. Coordinate utility locations, Section 01 31 13.
C. Implement traffic control plan requirements, Section 01 55 26.
D. Mark areas in the field that are to receive grinding.
E. Use a detector to find hidden (or buried) Street Fixtures.
F. Mark hidden and existing utilities on redline Drawings.

3.3 **PROTECTION**

A. Install Invert Covers, Section 01 71 13.
B. CONTRACTOR is liable for any property damage due to loose material on pavement surface, vertical pavement cuts, drop-offs, etc.
C. Protect transverse or longitudinal joints.
D. Avoid or minimize damage to tree branches. Provide certified arborist observation of tree branch cuts larger than four (4) inches diameter. Notify ENGINEER of such tree branch cuts or damage.
E. Protect plant and animal habitat. Follow federal, state or local work permit requirements.

3.4 **GRINDING**

A. Grind until pavement on both sides of transverse joints and cracks is in the same plane and meets the same tolerance. Provide a smoot uniform finish texture.
B. Perform grinding in a longitudinal direction. Skid resistance of final ground surface must be comparable to adjacent sections not requiring corrective work.
C. Do not grind structures. Protect adjacent concrete flat work.
D. Surface treatment of grind areas as follows:
   1. Bituminous Surface: Tack coat, Section 32 12 13.13
   2. Concrete Surface: Water repellant, Section 07 19 00.
E. If work equipment is removed from the grinding site and grinding surface awaits further work, provide appropriate traffic control and cleaning.

3.5 **TOLERANCES**

A. Roadway Striation Texture: Uniform, continuous, longitudinal:
   1. Groove width between 0.09 and 0.15 inches wide.
   2. Peaks of ridges between grooves approximately 1/16 inch higher than the bottom of the grooves.
   3. Width of peak ridges from 0.06 to 0.13 inches.

B. Smoothness: Required tolerances are indicated in Section 32 01 31.
   1. No dent (or lip) at start or finish in longitudinal direction.

C. Cross Slope:
   1. Uniform with no depressions or misalignment of slope greater than 1/4 inch 10 feet between grade breaks (roadway crown line excepted).
   2. 1/8 inch maximum dent (or lip) transverse to the direction of pedestrian or vehicle travel. Potential for standing water not allowed.

D. Taper lane grinding into shoulder (parking lane) area. Target is two (2) percent with a maximum allowable slope of five (5) percent.

3.6 **CLEANING**

A. All residues from the grinding process become property and responsibility of CONTRACTOR. Waste grindings legally. Do not discharge grindings into storm drains, ditches, or waters of the State.

END OF SECTION

SECTION 32 01 29

CONCRETE PAVING RAISING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Raising settled concrete flat work to grade.

1.2 REFERENCES

A. ASTM C 150: Standard Specification for Portland cement.

1.3 SUBMITTALS

A. Plan for containing mud in the jacking process.
B. Data sheet for shrinkage resistant grout.

PART 2 PRODUCTS

2.1 MATERIALS

A. Grout Mix: Shrinkage resistant, Section 03 61 00.
B. Concrete Patch:
   1. Portland cement, Type I or II ASTM C 150.
   2. Silica sand.
   3. Shrinkage compensating agent with plasticizing and water reducing agents.

PART 3 EXECUTION

3.1 JACKING

A. Raise slabs to be level with existing surfaces.
B. Contain mud during the jacking process. If containment is lost, implement remediation procedures immediately. Do not permit displacement of adjacent surfaces.
C. Raising adjacent slabs or structures not scheduled for raising is considered damage.
D. Repair or restore damaged item.

3.2 CLEANING

A. Do not permit rain or sprinkler system water to wash away dust.

END OF SECTION

SECTION 32 01 31

PAVEMENT SMOTHNESS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Smoothness tolerances for placing flexible pavements, rigid pavements, and pavement patchers.
B. Procedure for correcting defective smoothness.

1.2 REFERENCES

A. **ASTM Standards**

E950 Measuring the Longitudinal profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling References.

E1274 Measuring Pavement Roughness Using a Profilograph.

1.3 DEFINITIONS

A. **Must Grind**: Areas of roadway pavement not meeting profile deviation tolerance.
B. **Road Class**: Attribute of a public or private thoroughfare based upon equivalent single axel loads (ESAL).

Class I: (ESAL < 10^4 per year). Includes heavy traffic residential streets, rural farm collector roads, non-industrial parking lots, urban low volume collector streets.

Class II: (ESAL between 10^4 and 10^6 per year). Includes heavy traffic residential streets, rural farm collector roads, non-industrial parking lots, urban low volume collector streets.

Class III: (ESAL > 10^6 per year). Includes high volume collectors, arterials, industrial parking lots (primary load from 3-axle or greater vehicles), claiming lanes, truck weigh stations.

1.4 SUBMITTALS

A. Traffic control plan, Section 01 55 26.
B. Certifications for profilographs, profilers, and operators.
C. Summary report of smoothness profile testing.

1.5 QUALITY ASSURANCE

A. Provide testing equipment and a person capable of calculating grades and cross-slopes in degrees and percentages. Cross slopes vary when the crown line is not parallel to pavement edge line.

1.6 ACCEPTANCE

A. **General**:
   1. Acceptance is by Lot.
   2. Dispute resolution, Section 01 35 10.
   3. Opening a profiled surface to traffic does not constitute acceptance.
   4. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing; however, may be used by ENGINEER for acceptance if requirements of Section 01 35 10 are met.

B. **Profile Roughness**:
   1. Lot is 0.1 lane mile (528 feet long one lane wide). Add segments shorter than 250 feet to preceding lot. Treat partial segments longer than 250 feet as a lot.
   2. Excluded form the lot are turn lanes, parking lanes, medians, Street Fixtures, crowns of intersecting streets, bridge decks, grades greater than eight (8) percent, and vertical curves less than 1,000 feet radius (including super-elevation transitions).

C. Verify "Must Grind" bumps and depressions are removed from the lot surface. Lot is area of total placement. No area is excluded.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. **Profilograph**:
   1. Capable of producing results required by ASTM E950 and ASTM E1274.
   2. Set profilograph readings with corresponding project survey stationing, or as a minimum, correlate equipment station 0+00 with a specific project station number. ENGINEER to select.

B. **Milling and Grinding Machines**:
   1. Equipped to prevent air pollution.
   2. Equipped with a system to control depth and slope of pavement cut.

C. Cleaning equipment able to pick up millings and wastewater.

3.2 PREPARATION

A. **Traffic Control**: Implement traffic control plan requirements, Section 01 55 26. Provide safe passage for pedestrians and vehicles. Do not proceed without certified flaggers if work requires.

B. **Surface Repair**: Method of payment to be determined by ENGINEER if preliminary profiling of existing pavement is required before placement of thin bonded overlay, micro-surfacing, slurry seal, chip seal, etc.

3.3 TOLERANCES

A. **Profile Roughness and Profile Deviation** Verify bumps and depressions meet tolerance. Trace all wheel paths in direction of travel. Begin traces 50 feet before edge of new pavement or patch and end traces 50 feet after edge of new pavement or patch. Areas (including the 50 feet end trace areas) exceeding profile deviation tolerance are "Must Grind" areas.

Table 1 – Roughness and Deviation Tolerance

Speed mph	Road Class	Profile Roughness Index (PRI) Inches / Mile				Profile Deviation Inches/25 feet Maximum
		IRI		PI		
		Min	Max	Min	Max	
0 to 30	I	-	-	-	-	0.4
	II or III	129	177	46	66	0.4
31 to 45	I or II	90	155	35	50	0.4
	III	70	90	21	35	0.4
>45	All Classes	-	70	-	21	0.3

NOTES
(a) IRI (International Roughness Index), ASTM E 950. Use a 1/4 car.
(b) PI (Profile Index), ASTM E 1274. Use a zero-blanking band.
(c) Profile deviation applies to bump and depression measurements.

3.4 REPAIR

A. **General**:
1. Do not begin repairs without ENGINEER's knowledge of such activity.
2. All repair expenses are at no additional cost to OWNER.

B. **Bituminous Concrete Repair**
   1. Smooth out profile irregularities by grinding. See Section 32 01 26.
   2. Apply Section 32 12 03 cationic or anionic emulsion at 0.11 ± 0.01 gallons per square yard and a sand friction blotter over all grind areas.
   3. If depressions cannot be corrected by grinding, do a cold mill and inlay repair per Section 32 01 16.71 or do a remove and replace patch repair per Section 33 05 25. **Raising depressions with a skin patch and feathered edges is NOT ACCEPTABLE**. Patch profile must meet this section's smoothness requirements.

C. **Portland Cement Concrete Repair**:
   1. Smooth out profile irregularities by grinding. See Section 32 01 26.
   2. Apply penetrating sealer over all grind areas. See Section 07 19 00.
   3. If depressions cannot be corrected by grinding, remove concrete and provide a concrete pavement patch per Section 32 01 19. Patch profile must meet this section's smoothness requirements.

END OF SECTION

SECTION 32 01 34

WHITE TOP INLAY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Portland cement concrete inlays in existing bituminous pavements.

1.2 REFERENCES

A. **ASTM Standards**

C1116 Fiber-Reinforced Concrete or Shotcrete.
C1399 Obtaining Average Residual Strength of Fiber-Reinforced Concrete.

1.3 DEFINITIONS

A. **Inlay**: A volume with sides and a bottom located within a existing roadway pavement surface.
B. **Moderate Exposure Condition**: Exposure in a climate where freezing is expected but where concrete will not be continually exposed to moisture or free water for long periods before freezing and will not be exposed to deicing agents or other aggressive chemicals.
C. **Severe Exposure Condition**: Exposure to deicing chemicals or other aggressive agents or where the concrete may become highly saturated by continued contact with moisture or free water before freezing.

1.4 SUBMITTALS

A. Section 32 13 13.

1.5 WEATHER

A. Section 32 13 13.

1.6 NOTICE

A. Section 32 13 13.

1.7 ACCEPTANCE

B. Section 32 13 13.

PART 2 PRODUCTS

2.1 CONCRETE

A. Concrete: Fiber reinforced, 4000 psi minimum, ASTM C116.
B. Aggregate: Maximum size one-third of white top thickness.
C. Fiber: Synthetic, with a minimum strength of 80 psi, ASTM C1399.
   1. 3 pounds per cubic yard.
   2. 1.5 inches long.
D. Slump: Over four (4) inches requires ENGINEER's acceptance.
E. Air Content: Severe exposure unless specified otherwise.

Table 1 – Total Air Content, Percent

Nominal Maximum Aggregate Size, (in.)	Mild Exposure	Moderate Exposure	Severe Exposure
1	3.0	4.5	6.0
3/4	3.5	5.0	6.0
1/2	4.0	5.5	7.0
3/8	4.5	6.0	7.5

PART 3 EXECUTION

3.1 PREPARATION

A. Mill bituminous surface to depth specified. Remove debris and loose particles. Pressure wash exposed surface. Allow surface to dry before proceeding.
B. Do not place concrete when the bituminous surface temperature is less than 35 deg F.
C. Cool hot bituminous pavement surfaces to 100 deg F or less. Allow surface to dry before proceeding.
D. Do not allow traffic on pavement once final cleaning is performed.

3.2 FORMWORK

A. Section 03 11 00.

3.3 **PLACEMENT**

A. Section 03 30 10 and as follows.
   1. Do not move concrete horizontally with vibrator.
   2. 1/8 inch in 10 feet tolerance
   3. Uniform and sharp corners. Do not use excess mortar to build up slab edges or round slab corners.

3.4 **FINISH**

A. For Speed Less Than 45 mph: 1/16-inch-deep burlap drag, turf drag, or broom.
B. For Speed 45 mph and Greater: 1/8-inch-deep groove 80 degrees to the crown line and randomly spaced between 3/8 and 1-1/2 inches.

3.5 **CURE**

A. Section 03 39 00.
B. Apply at two (2) times the manufacturer's recommended rate Type II Class A or B (white pigmented) membrane forming compound. Apply total coverage in two (2) directions for total white coverage on all exposed surfaces after texturing.
C. Eliminate thermal shock by keeping ground and air temperature close to cure temperature.

3.6 **JOINTS**

A. General:
   1. Construct joints at locations, depths and dimensions indicated or match alignment of joints in adjacent panels.
   2. Minimum angle between any two intersecting joints is 90 degrees plus or minus 10 degrees.
   3. Joints must intersect pavement free edges at a 90 degree angle and extend straight for a minimum of 1-foot from the fee pavement edge.
B. Contraction Joints:
   1. Single saw cut 1/8 inch wide, 1/3 slab depth.
   2. Saw transverse joints first.
   3. Saw only when concrete is hard enough to prevent raveling and finish sawing before conditions favor uncontrolled cracking.
   4. The larger dimension of any panel shall not exceed 125 percent of the smaller dimension. If drawings do not indicate joints spacing, provide the following.

White Top Thickness, (in.)	Approximate Spacing (ft.)
2	2 – 3
2.5	2.5 – 3.5
3	3 – 4
3.5	3.5 – 5.0
4	4 – 6

C. Isolation Joints: F1 sheet 1/2 inch thick, Section 32 13 73. Use this joint where pavement abuts building, manholes and other fixed objects.
D. Joint Sealing: Not required.

3.7 PROTECTION AND REPAIRS

A. General: All expenses are at no cost to OWNER.
B. Protection: Immediately after placement protect concrete from graffiti or other types of mechanical injury.
C. Repair:
   1. Remove and replace cracked panels.
   2. Patch spall with Section 03 61 00 shrinkage resistant grout.
   3. Remove graffiti.

3.8 OPENING TO TRAFFIC

A. Not sooner than 3,000 psi.

END OF SECTION

SECTION 32 01 90

MAINTENANCE OF PLANTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Landscape maintenance and replacement.
B. Guarantees.

1.2 GRASS MAINTENANCE

A. General: Maintain surfaces until Work is accepted, but in any event for a period of not less than 60 days after planting. Supply additional topsoil where necessary, including areas affected by erosion or settlement.

B. Watering: Water to ensure uniform seed germination and to keep surface of soil damp. Apply water slowly so soil will not puddle and crust. Unless indicated otherwise, OWNER will pay for cost of water supplied.

C. Fertilizing: Fertilize during seeding and 2 weeks after seeding and sodding.

D. Mowing: Cut grass first time when it reaches a height of 2-1/2 inches and maintain to minimum height of 2 inches. Do not cut more than 1/3 of blade at any one mowing. Remove clippings. After first mowing, water to moisten soil from 3 inches to 5 inches deep. Allow a minimum of 5 days between mowings.

E. Grading: Roll when required to remove minor depressions or irregularities.

F. Control Growth of Weed: When using herbicides, apply in accordance with manufacturer's recommendations. Remedy damage from improper use.

G. Protection: Protect planted areas with warning signs during maintenance period. Erect when necessary, temporary fences, or barriers, to control pedestrians.

1.3 TREES, PLANTS, AND GROUND COVER MAINTENANCE

A. General: Care for planted areas. Maintain, water, weed, repair, and protect until Work is accepted, but in any event for a period of not less than 60 days after planting. Supply additional topsoil where necessary, including areas affected by erosion or settlement.

B. Watering: After planting, keep ground continuously moist until healthy growth is established. Thereafter, thoroughly water once a day until Work is accepted. Prevent erosion.

C. Weeding: Uproot and remove weeds completely. Do not allow growth and germination of weed seeds. Fill in large holes caused by weeding with topsoil and rake smooth.

D. Protection: Protect planted areas against traffic by erecting barricades and warning signs. Replant damaged planted areas.

E. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep wires tight. Repair or replace accessories when required.

1.4 **REPLACEMENTS**

A. When any portion of surface becomes gullied or otherwise damaged and planting has failed to grow, repair and replant.

B. At conclusion of maintenance period, replant areas showing root growth Failure, bare or thin spots, and eroded or settled areas with materials of like kind and size as specified for original planting.

C. Throughout the maintenance period, replace any unsatisfactory or dead plants within 10 days of written notice.

1.5 **ACCEPTANCE**

A. Seeded areas will be accepted at end of maintenance period when seeded areas are established and have been mowed at least 3 times.

B. All other areas will be accepted not less than 60 days after planting and successful growth.

1.6 **GUARANTEE**

A. Guarantee covers plant material establishment 1 year from date of acceptance.

B. Replace plant materials found dead or not in a healthy growing conditions with plant materials of same size and species with a new guarantee commencing on date of replacement.

C. At end of guarantee period if landscaped surfaces have settled causing poor drainage conditions, correct grade deficiencies. Make corrections after receiving approval of corrective methods and schedules.

D. Perform corrective work at no additional cost to OWNER.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 32 01 91

TREE ROOT CUTTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cutting and removing tree roots.

B. Protecting surface improvements from future tree root growth.

1.2 REFERENCES

A. International Society of Arboriculture. (ISA).

1.3 PROJECT CONDITIONS

A. Provide written watering instructions to neighbors in property abutting the tree root cuts to advise them of the tree's watering requirements.

1.4 QUALITY ASSURANCE

A. Provide an ISA certified arborist to observe tree root cutting. Upon ENGINEER's request, provide a copy of the arborist's ISA certificate and registration number on file with the State Division of Commercial Code.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 AVOIDING ROOT CUTS

A. When placing or replacing concrete sidewalk;

1. Adjust alignment to curve around, over or away from tree trunks. Do not proceed in this work until alignment has been reviewed by ENGINEER.
2. Adjust thickness and concrete contraction score marks.

B. When replacing concrete curb and gutter.

1. Adjust thickness and concrete contraction score marks over tree roots.
2. Do not vary gutter invert from straight grade.

3.2 CUTTING TREE ROOTS

A. Never cut buttress roots [i.e. roots at the broadened base of the tree trunk] without written authorization of arborist. Avoid injury to trunk.

B. Keep root cutting at least 4 feet away from tree trunk. Limit cutting to

one side of tree unless authorized otherwise in writing by arborist.

C. Cut roots clean and straight (no ragged or torn edges). Use an axe, saw, or appropriate equipment that properly cuts roots. Do not make partial root cuts.

D. Do not injure roots to remain.

E. Cut roots back to root laterals.

3.3 BACKFILLING

A. Backfill all cut and exposed roots the same day of root cutting, or cover with wood chips, mulch and water until backfilling is accomplished.

B. Place soil below root cut.

C. To prevent vertical root growth, place an impermeable membrane over root cuts. Bend membrane edges to plane below cut root. Place backfill materials adjacent to and above impermeable membrane.

3.4 PROTECTION

A. After cutting roots of tree.

1. Immediately water tree after backfilling.
2. Apply a minimum of 1 inch of water over the entire area under the tree canopy and well beyond over a period of 4 hours.
3. Restrict water runoff.

END OF SECTION

SECTION 32 01 93

PRUNING TREES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pruning branches of existing trees.

1.2 REFERENCES

A. ANSI A 300: Tree Care Operation-Tree, Shrub, and Other Woody Plants.

B. ANSI Z 133.1: Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush-Safety Requirements.

C. International Society of Arboriculture. (ISA) -Current Standards for Pruning.

D. Utah Community Forest Council: Utah Shade Tree Pruning Standards

1.3 SUBMITTALS

A. Tree protection plan that identifies trees to be pruned and reasons for pruning.

B. Upon ENGINEER's request, submit a copy of the arborist's certificate from ISA and registration number on file with the State Division of Commercial Code.

1.4 QUALITY ASSURANCE

A. Provide an ISA certified arborist to observe tree pruning. Upon ENGINEER's request, provide a copy of the arborist's ISA certificate and registration number on file with the State Division of Commercial Code.

PART 2 PRODUCTS

2.1 PRUNING PAINT

A. Formulated for horticultural application to cut or damaged plant tissue.

2.2 DISINFECTANT

A. Chlorine based.

PART 3 EXECUTION

3.1 PREPARATION

A. Pruning work in any publicly owned right of way requires CONTRACTOR notifying the adjacent property owner and giving them a brief description of why and how the work will be done. Notification needs to be given at least 2 weeks before any work is done so the property owner has a chance to respond if they choose to do so. The arborist selected to provide pruning service shall provide the notices. A written record of delivery dates of notices by address is required of the arborist.

B. Pruning trees on private property require tree owner approval. ENGINEER and CONTRACTOR shall jointly contact the owners for approval prior to performing any work.

3.2 TREE PRUNING

A. Adhere to safety requirements, ANSI A133.1

B. Conform to ANSI A300 and the Utah Shade Tree Pruning Standards when pruning.

C. Conform to OSHA 1910.269 if there are power or communication lines within the area occupied by the tree's branches or adjacent to the tree.

D. Remove tree branches extending over the roadway to provide a clear height of

1. 16 feet over the travel lane.*
2. 14 feet over the Driveway.
3. 12 feet over finished grade.
4. 6 feet over street light.
5. 12 feet over signal light.

* The travel lane means the lane vehicles typically use for travel which is different than the parking lane which is the lane adjacent to the street along the curb normally used for parking.

E. The contracted arborist may need to reduce the above referenced clearances based on tree size, species, or location.

F. Remove dead, diseased, damaged, broken, hanging, obstructing, crossing or weak branches.

G. Prune trees to make them shapely, symmetrical, and typical of the natural form of the species being pruned. Thin no more than 25 percent of the live canopy. Do not remove branches that would deform the appearance of the tree.

H. Cut deadwood back to existing callous growth. **Do not remove callous growth.**

I. Reduce length of limbs as ordered by ENGINEER.

J. Do not remove any live branch larger than 6 inches in diameter unless authorized by ENGINEER.

K. pre-cut branches to reduce weight of final cut. Select final cuts by the location of the branch bark ridge and branch collar.

L. No intermodal final cuts permitted unless authorized by ENGINEER.

M. The use of climbing spurs (gaffs) are prohibited.

N. Disinfect pruning equipment that comes in contact with diseased plant material. Remove disinfectant from equipment prior to proceeding with work.

O. Use the "Natural Target" or "Drop Crotch" pruning method when removing limbs.

P. Do not top, pollard, stub or dehorn any tree.

Q. Make all pruning cuts sufficiently close to the trunk or parent limbs without cutting into or removing the "branch collar" or the "branch bark ridge".

3.3 BRANCH DISPOSAL

A. Remove branches from site.

B. Remove all wood chips.

END OF SECTION

SECTION 32 05 10

BACKFILLING ROADWAYS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roadway backfill materials.
B. Roadway backfilling requirements.

1.2 DEFINITIONS

A. Embankment: A raised earthen structure to carry a roadway.
B. Pavement: Artificially covered surfaces including but not limited to roadway surfaces, parking lot surfaces, sidewalks, curb, gutter, curb ramps, Driveway ramps, etc.
C. Subgrade: A surface of earth or Rock leveled off as to receive backfill materials.

1.3 SUBMITTALS

A. Submit maximum laboratory dry density and optimum laboratory moisture content for:
   1. Subgrade material, and
   2. Each type of fill to be used.
B. Submit aggregate batch delivery tickets showing name of material source, Serial number of ticket; date and truck number; name of Supplier; job name and location; volume of material delivered, And aggregate classification.
C. Upon ENGINEER's request, submit a written quality control Inspections and testing report describing source and field quality control activities performed by CONTRACTOR and its Suppliers.

1.4 QUALITY ASSURANCE

A. Do not change material sources, or aggregate without ENGINEER's knowledge.
B. Reject backfill material that does not comply with requirements specified in this section.

1.5 STORAGE

A. Safely stockpile backfill materials.
B. Separate differing materials, prevent mixing, and maintain optimum moisture content of backfill materials.
C. Avoid displacement of and injury to Work while compacting or operating equipment.

D. Movement of construction machinery over Work at any stage of construction is solely at CONTRACTOR's risk.

1.6 SITE CONDITIONS

A. Do not place, spread, or roll any backfill material over material that is damaged by water. Remove and replace damaged material at no additional cost to OWNER.

B. Control traffic and erosion. Keep area free of trash and debris. Repair settled, eroded, and rutted areas.

C. Reshape and compact damaged structural section re required density.

D. Soil Cement: Do not spread soil cement mixture when air temperature is less than 40 deg. F. in the shade.

E. Drainage: Immediately prior to suspension of construction operations for any reason, provide proper and necessary drainage of Work area.

1.7 ACCEPTANCE

A. General:

1. Native material may be wasted if there is no additional cost to substitute material acceptable to ENGINEER.
2. For material acceptance refer to.
   a. Common fill, Section 31 05 13.
   b. Crushed aggregate base, Section 32 11 23.
   c. Cement treated fill, Section 31 05 15.

B. Backfilling: One test per Lot.

Table No.1 – Lot Sizes

Material	Test Criteria	Lot Size
Subgrade	Standard (a)	1000 square yards
Common Fill	Standard (a)	PCC or AC Surface Course: 1,000 square yards per lift Driveway Approach: 400 square feet per lift Sidewalk: 400 lineal feet per lift
Crushed Aggregate Base	Modified (a)	PCC or AC Surface Course: 1,000 square yards per lift Driveway Approach: 400 square feet per lift Sidewalk: 400 lineal feet per lift Curb, Gutter, and Waterways: 200 lineal feet per lift
Flowable Fill	Strength (b)	250 cubic yards

NOTES
(a) Proctor density, Section 33 05 05
(b) Cement treated fill, Section 31 05 15
(c) Lift thickness before compaction, 8 inches.

1.8 **WARRANTY**

A. Any settlement noted in Embankment or Pavement construction will be considered to be caused by improper compaction methods and shall be corrected at no cost to the OWNER.

B. Restore incidentals damaged by settlement at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 **BACKFILL MATERIALS**

A. Common Fill, Section 31 05 13.

B. Crushed aggregate base, Section 32 11 23.

C. Cement treated fill, Section 31 05 15.

2.2 **ACCESSORIES**

A. Water:

1. Make arrangements for sources of water during construction and make arrangements for delivery of water to site.
2. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

B. Geotextile Fabric, Section 31 05 19.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Verify.

1. Backfill material meets gradation requirements.
2. Areas to be backfilled are free of debris, snow, ice or water, and
3. Bearing surfaces are not frozen.

B. If extra excavation is required, secure ENGINEER's written permission and follow Section 31 23 16 requirements.

C. Place geotextile fabrics, Section 31 05 19.

3.2 **SUBGRADE PREPARATION**

A. Protect Subgrade from desiccation, flooding, and freezing.

B. If ground water table is in the intended construction operations, dewater.

C. Before beginning backfilling operations over Subgrade, secure ENGINEER's

review of Subgrade surface preparations.

3.3 EMBANKMENTS

A. Place backfill material in lifts not exceeding 8 inches after compaction.

B. Build shoulders to a grade higher than that of adjacent fills. Provide surface runoff at all times.

C. Commence compaction along edge of area to be compacted and gradually advance toward center.

D. Operate compaction equipment along lines parallel or concentric with the center-line of the Embankment being constructed.

E. Do not damage subsurface structures or utilities.

3.4 BASE COURSES

A. Place backfill material in lifts not exceeding 8 inches before compaction.

B. Maintain moisture content in compaction operations.

C. Avoid segregation when spreading backfill. Keep surfaces free from pockets of coarse and fine aggregate.

D. Rework fills which do not conform to compaction requirements until requirements are met.

E. Protect cement treated fill against freezing and traffic for 7 days.

3.5 MODIFIED BACKFILL LAYER METHOD

A. Section 33 05 20.

3.6 COMPACTION

A. Compact backfill, Section 33 05 05 as follows.

1. A-1 soils: greater than or equal to 95 percent of a Modified Proctor Density.
2. Other soils: greater than or equal to 95 percent of a Standard Proctor Density.

3.7 COMPRESSIVE STRENGTH

A. Where a flowable fill is used, provide compressive strength indicated in Section 31 05 15.

3.8 PROOF ROLLING TEST

A. Prior to placing fill material for roadbed backfills, proof roll Subgrade using gross weight of 18,000 pounds/tandem axle, with a tire pressure at least 90 psi.

B. All proof roll passes will traverse the Subgrade parallel to the roadbed centerline. All subsequent passes will be offset 1/2 the vehicle width until the entire Subgrade is

tested.

C. ENGINEER will analyze, determine, designate and measure the areas, if any, requiring additional compaction or reconstruction.

D. Once Subgrade passes the proof rolling test, protect the surface from construction operations and traffic damage. Repair all cuts, ruts, and breaks. Keep surface in a satisfactory condition until geotextile fabric or base course has been placed.

3.9 **CLEANING**

A. Remove stockpiles from the site upon Work Completion. Grade site to prevent free standing surface water.

B. Leave borrow areas clean and neat.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Treated or untreated base course requirements.

1.2 REFERENCES

A. ASTM C 29: Standard Test Method for Unit Weight and Voids in Aggregate.

B. ASTM C 131: Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

C. ASTM C 136: Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

D. ASTM D 75: Standard Practice for Sampling Aggregates.

E. ASTM D 448: Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

F. ASTM D 1883: Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.

G. ASTM D 2419: Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

H. ASTM D 3665: Standard Practice for Random Sampling of Construction Materials.

I. ASTM D 3740: Standard Recommended Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

J. ASTM D 4318: Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

K. ASTM D 5821: Standard Test Method for Determining the percentage of Fractured Particles in Coarse Aggregate.

1.3 DEFINITIONS

A. Aggregate Grading Band: Allowable deviation from Target Gradation Curve based upon the number of gradation tests in a Lot. It is possible that gradation for any sieve may lie outside of its respective Master Grading Band limits.

B. Master Grading Band: Gradation limits allowed for various sieve sizes ranging from the maximum size sieve to the No. 200 sieve.

C. Mean of Deviations: The sum of the absolute values of the variance between each screen target value and each measured value divided by the number of tests in the Lot.
D. RAP (acronym for reclaimed asphalt pavement): See Section 32 01 16.
E. Target Gradation Curve: A smooth locus of points within the limits of the Master Grading Band.

1.4 SUBMITTALS

A. Name of Supplier and aggregate source.

B. Target Gradation Curve.

1.5 QUALITY ASSURANCE

A. Use a laboratory that follows and complies with Section 01 45 00 and ASTM D 3740.

1.6 ACCEPTANCE

A. General:
   1. Defective work, Section 01290.
   2. Dispute resolution, Section 01460.

B. Treated or Untreated Base Course: Lot size is one day's production. Sub-lot size is 500 tons.
   1. ENGINEER is not obligated to accept changes in Target after any material is delivered to site.
   2. Lot is acceptable if gradation test deviations are within pay factor 1.00 limits. At ENGINEER's discretion, a Lot with a sub-lot test deviation greater than pay factor 0.70 limits may stay in place at 50 percent cost.
   3. Suitability of Source: Meet Table 2 properties. A reduction in aggregate class will be accepted providing any costs for difference in excavation, backfill, and alternate design for CBR does not increase the Contract Price.

Table 1-Pay Factors for Price Determination						
Criteria	Pay Factor	Mean of Deviations of Acceptance Tests From the Target Gradation Curve Expressed in Percentage Points				
		1 Sample	2 Samples	3 Sample	4 Sample	5 or More Sample
1/2" Sieve	1.00 0.95 0.90 0.80 0.70	0 – 15 16 – 17 18 – 19 20 – 21 22 – 23	0.0 – 12.1 12.2 – 13.9 14.0 – 15.1 15.2 – 17.2 17.3 – 18.8	0.0 – 10.8 10.9 – 12.4 12.5 – 13.5 13.6 – 15.3 15.4 – 16.7	0.0 – 10.0 10.1 – 11.5 11.6 – 12.5 12.6 – 14.2 14.3 – 15.5	0.0 – 9.5 9.6 – 11. 11.1 – 11.9 12. – 13.5 13.6 – 14.7
3/8" Sieve	1.00 0.95 0.90 0.80 0.70	0 – 15 16 – 17 18 – 19 20 – 21 22 – 23	0.0 – 11.5 11.6 – 13.2 13.3 – 14.4 14.5 – 16.3 16.4 – 17.9	0.0 – 9.8 9.9 – 11.3 11.4 – 12.3 12.4 – 13.9 14.0 – 15.2	0.0 – 8.8 8.9 – 10.1 10.2 – 11 11.1 – 12.5 12.6 – 13.6	0.0 – 8.0 8.1 – 9.2 9.3 – 10.0 10.1 – 22.4 11.5 – 12.4
No. 4 Sieve	1.00 0.95 0.90 0.80 0.70	0 – 14 15 – 17 18 19 – 20 21 – 22	0.0 – 10.5 10.6 – 12.1 12.2 – 13.1 13.2 – 14.9 15.0 – 16.3	0.0 – 8.8 8.9 – 10.1 10.2 – 11 11.1 – 12.5 12.6 – 13.6	0.0 – 7.8 7.9 – 9.0 9.1 – 9.8 9.9 – 11.1 11.2 – 12.1	0.0 – 7.0 7.1 – 8.0 8.1 – 8.7 8.8 – 10.0 10.1 – 10.8
No. 16 Sieve	1.00 0.95 0.90 0.80 0.70	0 – 11 12 – 13 14 15 – 16 17	0.0 – 8.2 8.3 – 9.4 9.5 – 10.3 10.4 – 11.6 11.7 – 12.7	0.0 – 6.9 7.0 – 7.9 8.0 – 8.6 8.7 – 9.8 9.9 -10.7	0.0 – 6.2 6.3 – 7.1 7.2 – 7.8 7.9 – 8.8 8.9 – 9.6	0.0 – 5.6 5.7 – 6.4 6.5 – 7.0 7.1 – 8.0 8.1 – 8.7
No. 50 Sieve	1.00 0.95 0.90 0.80 0.70	0 – 9 10 11 12 – 13 14	0.0 – 7.0 7.1 – 8.0 8.1 – 8.8 8.9 – 10.0 10.1 -10.9	0.0 – 6.1 6.2 – 7.0 7.1 – 7.6 7.7 – 8.7 8.8 – 9.5	0.0 – 5.5 5.6 – 6.3 6.4 – 6.9 7.0 – 7.8 7.9 – 8.5	0.0 – 5.2 5.3 – 6.0 6.1 – 6.5 6.6 – 7.4 7.5 – 8.1
No. 200 Sieve	1.00 0.95 0.90 0.80 0.70	0 – 4.5 4.6 – 5.2 5.3 – 5.6 5.7 – 6.4 6.5 – 7.0	0.0 – 3.4 3.5 – 3.9 4.0 – 4.3 4.4 – 4.9 4.9 – 5.3	0.0 – 2.9 3.0 – 3.3 3.4 – 3.6 3.7 – 4.1 4.2 – 4.5	0.0 – 2.5 2.6 – 2.9 3.0 – 3.1 3.2 – 3.6 3.7 – 3.9	0.0 – 2.3 2.4 – 2.6 2.7 – 2.9 3.0 – 3.3 3.5 – 3.6

PART 2 PRODUCTS

2.1 UNTREATED BASE COURSE

A. Material: Crushed rock, gravel, sand or other high quality mineral particle, or combination.

Table 2 - Properties

Physical Property	Units	Aggregate Class			ASTM Test
		A	B	C	
Dry Rodded Unit Weight, min.	lb/ft^3	75			C 29
Liquid Limit, max.		25			D 4318
Plastic Index, max.		0	0	6	D4318
Sand Equivalent, min.	percent	35			D2419
Wear (hardness), max.	percent	50			C131
Gradation		Table 3			C 136
Two Fractured Faces, min	percent	90	50	50	D 5821
CBR, min.		70	55	40	D 1883

Notes:
(a) Liquid limit, plastic limit, sand equivalent: Passing No. 40 sieve.
(b) Wear: Retained on No. 8 sieve.
(c) CBR: Use 10 lb surcharge measured at 0.20 inch penetration at 95 percent of modified Proctor.
(d) Faces: Retained on No. 4 sieve.

Table 3 – Gradation

US Sieve Size	Master Grading Bands Limits		
	Grade 1-1/2	Grade 1	Grade 3/4
2"	–	–	–
1-1/2"	100	–	–
1"	–	100	–
3/4 "	81 – 91	–	100
1/2 "	67 – 77	79 – 91	–
3/8"	–	–	78 – 92
No. 4	43 – 53	49 – 61	55 – 67
No. 16	23 – 29	27 – 35	28 – 38
No. 200	6 – 10	7 – 11	7 – 11

2.2 ASPHALT TREATED BASE COURSE

A. Meet requirements of this Section Article 2.1 and the following.

1. Sand equivalent and fractured face measured after asphalt residue is burned off.
2. Plasticity and wear requirements apply to virgin aggregate portion only.
3. Allowable asphalt content is controlled by CBR.

B. If aggregate contains RAP.

1. Screen crushed RAP to remove debris.
2. Mechanically blend virgin and RAP aggregates. Do not use windrows for blending.

2.4 SOURCE QUALITY CONTROL

A. Sample, ASTM D 75 on a random basis, ASTM D 3665.

B. Reject crushed aggregate base products that do not meet requirements of this Section.

PART 3 EXECUTION

3.1 INSTALLATION

A. Trenches, Section 33 05 20.

B. Structures, Section 31 23 23.

C. Landscaping, Section 32 92 19.

D. Pavements, Section 32 05 10.

3.2 FIELD QUALITY CONTROL

A. Remove any product found defective after installation and install acceptable product at no additional cost to the OWNER.

END OF SECTION

SECTION 32 11 24

PULVERIZED PAVEMENT BASE COURSE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Full depth reclamation by pulverizing and mixing an existing bituminous pavement and road base in-place to produce a bituminous aggregate base course mix.

1.2 REFERENCES

A. **ASTM Standards**

C136 Fiber-Reinforced Concrete or Shotcrete.
C150 Obtaining Average Residual Strength of Fiber-Reinforced Concrete.
C595 Blended Hydraulic Cement.
D558 Moisture-Density Relations of Soil-Cement Mixtures.
D2922 Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).
D4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
D5102 Unconfined Compressive Strength of Compacted Soil-Lime Mixtures.

1.3 SUBMITTALS

A. Traffic control plan, Section 01 55 26.
B. List of equipment to be used.
C. Mix design showing percentage and quantity of stabilizer needed.

1.4 ACCEPTANCE

A. Gradation: Random measure.
B. Depth: Random measure each 1,000 square yards.
C. Density: Nuclear gage or proof roll.
D. Quantity of stabilizer added matches submittal data.

PART 2 PRODUCTS

2.1 TACK COAT CURING COMPOUND

A. Cationic or anionic emulsified asphalt, Section 32 12 03.

2.2 STABILIZER

A. Cement:
   1. Type I or II, ASTM C150, or
   2. Type IP or IS, ASTM C595

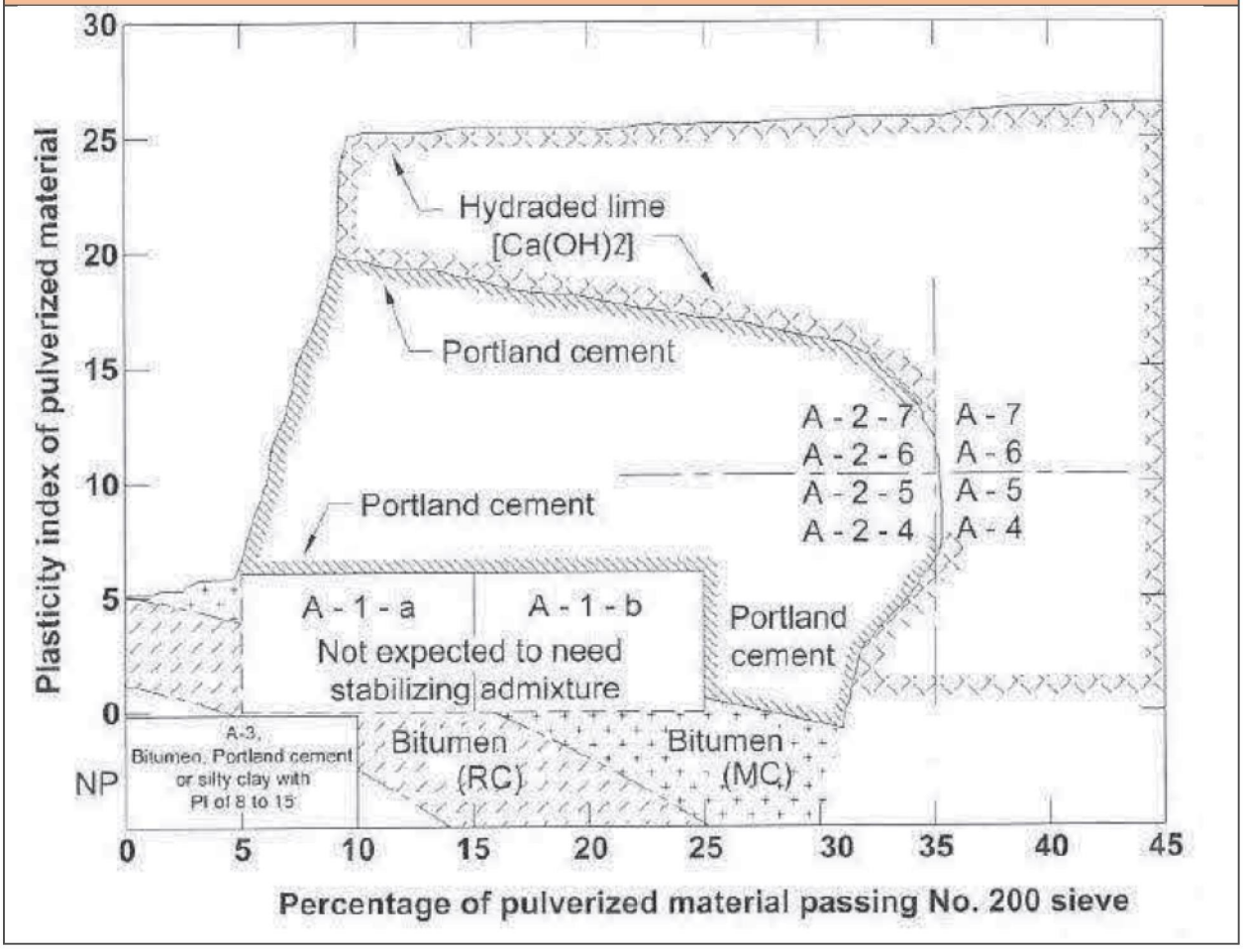
B. Aggregate: Gravel, untreated base course, crushed Portland cement concrete.

C. Chemical Stabilizer: Use type allowed by ENGINEER.

2.3 MIX DESIGN

A. Stabilizer Selection: If required, use the following table as a guide the amount and type should be determined by laboratory tests.

Table 1 – Stabilizer Selection Guide



Characteristics of Reclaimed Aggregate Before Addition of Stabilizer	Stabilizer
Bituminous Binder content is greater than 15 percent.	Aggregate
Material passing No. 4 sieve is more than 45 percent.	Aggregate or Cement
Material passing No. 4 sieve has a plasticity index more than 10, (ASTM D4318)	Cement or Chemical
NOTES: (a) Unless indicated elsewhere, cement stabilization per ASTM D5102 is to be in the range of 300 to 800 psi at seven (7) days.	

B. Gradation, ASTM C136.

Sieve	Percent Passing by Weight
3”	100
1”	85 to 95
No. 4	45 maximum

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Pulverizing Machine: Capable of cutting to the required depth, pulverizing, and sizing the material.

3.2 PREPARATION

A. Identify location of all buried utilities.
B. Notify neighborhood of day and time of operation.
C. Implement traffic control plan requirements, Section 01 55 26.
D. Install Invert Covers, Section 01 71 13.
E. Lower Street Fixtures.
F. Determine need for stabilizer.

3.3 CONSTRUCTION

A. Pulverize full depth of bituminous pavement and untreated base course.
B. Control dust, Section 01 57 00.

C. Do not remove pulverized material from site. To meet specified grade, remove material below the pulverized product.
D. Install Invert Covers, Section 01 71 13.
E. Lower Street Fixtures.
F. Determine need for stabilizer.

3.4 **FIELD QUALITY CONTROL**

A. Compaction:
   1. Reclaimed Aggregate: Ninety-five (95) percent or greater relative to a modified proctor density, Section 31 23 26. Use the following procedures:
      a. Optimum water content and maximum density, ASTM D558.
      b. Nuclear gage shallow depth, ASTM D2922
   2. Stabilized Reclaimed Aggregate: Proof roll (after cement set).

3.5 **REPAIR**

A. Repair surface irregularities.
B. Seal cracks in cured stabilized material.

3.6 **OPENING TO TRAFFIC**

A. Completed portions of pulverized pavement can be opened to low-speed traffic and to construction equipment, provided the curing material or moist curing operations are not impaired and provided and pulverized material is sufficiently stable to withstand marring or permanent deformation.
B. After the pulverized material has received a curing compound or a subsequent overlay surface or is sufficiently stable to withstand marring or permanent deformation it may be opened to all traffic.

END OF SECTION

SECTION 32 12 03

ASPHALTS BINDER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Performance graded asphalt, asphalt cement, cutback asphalt, emulsified asphalt, recycle asphalt, and crack patch asphalt.

B. Requirements for accepting non-complying paving asphalts.

1.2 REFERENCES

A. ASTM D 113: Standard Test Method for Ductility of Bituminous Materials.

B. ASTM D 977: Standard Specification for Emulsified Asphalt.

C. ASTM D 2026: Standard Specification for Cutback Asphalt (Slow-Curing Type).

D. ASTM D 2027: Standard Specification for Cutback Asphalt (Medium-Curing Type).

E. ASTM D 2028: Standard Specification for Cutback Asphalt (Rapid-Curing type).

F. ASTM D 2397: Standard Specification for Cationic Emulsified Asphalt.

G. ASTM D 3381: Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

H. ASTM D 4552: Standard Practice for Classifying Hot-Mix Recycling Agents.

I. ASTM D 5710: Standard Specification for Trinidad Lake Modified Asphalt.

J. ASTM D 6373: Standard Specification for Performance Graded Asphalt Binder.

1.3 SUBMITTALS

A. Submit bill of lading for each shipment of paving asphalt from vendor. Identify the following.

1. Source of product (manufacturer);
2. Type and grade of asphalt, And
3. Type and amount of additives in the product.

1.4 QUALITY ASSURANCE

A. Reject paving asphalts which are not uniform in appearance and consistency or which foam when heated to mixing temperature.

B. Do not use storage containers contaminated with other types or grades of Petroleum products.

C. Do not use Petroleum product that does not comply with contract requirements.

1.5 **ACCEPTANCE**

A. General:

1. Acceptance is by Lot. One Lot is one day's production.
2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation. Section 01 29 00
3. Dispute resolution, Section 01 35 10.

B. Performance Graded Asphalt Binder (PGAB): Sub-lot size is 20,000 gallons. Collect sub-lot Sample randomly from oil storage unit.

1. Refer to limits identified in Section 209 of UDOT's "Manual of Instruction Part 8 Materials". Pay factors are as follows.
   a. If none of the critical properties are outside rejection limit a composite price adjustment of 25 percent or less is allowed.
   b. If one or more of the critical properties falls outside the rejection limit or if a composite price adjustment is more than 25 percent, paving asphalt will be rejected.

C. Asphalt Cement (AC) Binder: Sub-lot size is 20,000 gallons. Collect sub-lot Sample randomly from oil storage unit.

1. Ductility: Meet this Section's requirements, or
2. Viscosity or Penetration: Meet graphics published in Section 955 of UDOT's "Manual of Instructions, Part 8 Materials".
   a. Lot may be accepted using the published graphics. If price adjustment exceeds 30 percent, reject paving asphalt, or
   b. If allowed to remain after placement, price adjustment will be 50 percent.

D. Cut-back Binder: Meet this Section's requirements for ductility.

E. Trinidad Lake Modified Asphalt: Supplier's certificate for ASTM compliance.

F. Emulsifie Asphalt: Supplier's certificate for ASTM compliance.

G. Recycle Asphalt: Identity of source (asphalt cement or tar products).

H. Crack Patch: Meet material requirements in Section 32 01 17.

PART 2 PRODUCTS

2.1 **PERFORMANCE GRADE ASPHALT BINDER (PGAB)**

A. Petroleum asphalt that complies with ASTM D 6373. Blending the paving asphalt with polymers or natural asphalts is CONTRACTOR's choice.

2.2 **ASPHALT CEMENT (AC)**

A. Petroleum asphalt that complies with Table 2 of ASTM D 3381 except as follows:

1. Replace ductility at 77 deg. F. (25 deg. C.) with ductility at 39.2 deg. F. (4 deg. C.). Use the following values.

- AC-5: greater than 25.
- AC-10: greater than 15.
- AC-20: greater than 5.

2. Delete the loss on heating requirement on residue from "Thin-Film Oven Test".

B. AC-5 Latex Additive: Anionic emulsion of butadiene-styrene low-temperature copolymer consisting of 2 percent by weight (solids basis), stabilized with fatty-acid soap for storage stability.

2.3 TRINIDAD LAKE MODIFIED ASPHALT (TLA)

A. Petroleum asphalt that complies with ASTM D 5710 (a blend of natural asphalts).

2.4 SLOW CURE CUT-BACK ASPHALT (SC)

A. Petroleum asphalt that complies with ASTM D 2026 (fluxed with a light oil) except if penetration of residue is more than 200 and its ductility at 77 deg. F (25 deg. C) is less than 100 cm., the material will be acceptable if the ductility at 59 deg. F. (15 deg. C) is greater than 100.

2.5 MEDIUM CURE CUT-BACK ASPHALT (MC)

A. Petroleum asphalt that complies with ASTM D 2027 (fluxed or blended with a kerosene-type solvent, non-foaming when heated to application temperature) except if penetration of residue is more than 200 and its ductility at 77 deg. F. (25 deg. C) is less than 100 cm., the material will be acceptable if the ductility at 59 deg. F. (15 deg. C) is greater than 100.

2.6 RAPID CURE CUT-BACK ASPHALT (RC)

A. Petroleum that complies with ASTM D 2028 asphalt (fluxed or blended with a naphtha-solvent, non-foaming when heated to application temperature).

2.7 EMULSIFIED ASPHALT

A. Petroleum asphalt uniformly emulsified with water, homogeneous throughout, and when stored, shows no separation within 30 days after delivery. Frozen emulsions not accepted.

1. Anionic, ASTM D 977 (breaks by evaporation).
2. Cationic, ASTM D 2397 (breaks chemically).

2.8 RECYCLE ASPHALT (RA)

A. Petroleum asphalt that complies with ASTM D 4552 (homogeneous, free-flowing at pumping temperature made from maltene fractions of asphalt cement for surface revitalization or from tar products to make Pavements resistant to fuel spillage.

1. RA-1, RA-5, RA-25 or RA-75 for recycling RAP when less than 30 percent virgin aggregate is added.
2. RA-250 or RA-500 when more than 30 percent virgin aggregate is added to the RAP.

PART 3 EXECUTION

3.1 INSTALLATION

A. Prime coat, Section 32 12 13.
B. Tack coat, Section 32 12 14.
C. Plant mix paving, Section 32 12 17.
D. Road mix paving, Section 32 12 17.
E. Seal coating, Section 32 01 13.
F. Crack patch, Section 32 01 17.

END OF SECTION

SECTION 32 12 05

BITUMINOUS CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Composition of a bituminous concrete mix.

1.2 REFERENCES

A. **AASHTO Standards**:

M323 Superpave Volumetric Mix Design, Single User Digital Publication
R30 Mixture Conditioning of Hot-Mix Asphalt (HMA)
T324 Hamburg Wheel-Track Testing of Compacted Hot-Mix Asphalt (HMA)

B. **AI Standards**:

MS-2 Asphalt Mix Design Methods.

C. **ASTM Standards**:

C29 Unit Weight and Voids in Aggregate.
C88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
C117 Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
C131 Resistance to Degradation of Small-Size coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
C136 Standard Method of Sieve Analysis of Fine and Coarse Aggregates.
C142 Clay Lumps and Friable Particles in Aggregates.
D75 Sampling Aggregates.
D140 Sampling Bituminous Materials.
D242 Mineral Filler for Bituminous Paving Mixtures
D979 Sampling Bituminous Paving Mixtures.
D995 Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
D2041 Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.
D2419 Sand Equivalent Value of Soils and Fine Aggregate.
D3203 Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
D3515 Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
D3665 Random Sampling of Construction Materials.

D5821 Determining the percentage of Fractured Particles in Coarse Aggregate.

D6307 Determining Asphalt Content of Hot-Mix Asphalt by Ignition Method.
D6373 Performance Graded Asphalt Binder.
D6927 Marshall Stability and Flow of Bituminous Mixtures.

1.3 DEFINITIONS

A. **Mix Design**: An alphanumeric code that identifies binder grade, aggregate grade, and compaction level for a bituminous concrete mix. For example.
   - *PG70-28, SP-1, 75Nd*: PG70-28 is a Performance Graded Asphalt Binder. SP-1 is the aggregate grade. 75Nd is the compaction level at Superpave mix design.
   - *OS/PG, SP-3/4, 75Nd*: OS/PG is a Blended Binder. SP-3/4 is the aggregate grade. 75ND is the compaction level at Superpave mix design.
   - *PG64*-22, DM-1/2, 50 *blow*: PG64-22 is a Performance Graded Asphalt Binder. DM-1/2 is the aggregate grade. 50 blow is the compaction level at Marshall mix design.
   - *OS/PG, DM-3/4, 50 blow*: OS/PG is a Blended Binder. DM-3/4 is the aggregate grade. 50 blow is the compaction level at Marshall mix design.

B. **Bituminous Binder**: A cement composed of any of several viscous or solid mixtures of hydrocarbons and their nitrogen and sulfur derivatives.
   1. Asphalt Binder: A refined or manufactured bituminous cement known as performance graded asphalt binder (PG or PGAB) whether virgin or contained in a RAP.
   2. Bitumen Binder: A natural bituminous cement contained in an Oil Sand (OS) or contained in a ROSP.
   3. Blended Binder: A Mixture of Asphalt Binder and Bitumen Binder.

C. **Mean of Deviations**: Defined in Section 32 11 23.

D. **Nominal Maximum Size**: One sieve size larger than first sieve size retaining more than 10 percent of the Sample. One hundred percent of the aggregate might be able to pass through the nominal maximum size sieve, but not more than 10 percent will be retained on that sieve. The maximum size sieve will be one (1) sieve size larger than the nominal maximum size.

E. **Oil Sand (OS)**: Naturally occurring sediments or sedimentary rock containing gravel, sand, clay, water and bituminous cement.

F. **RAP**: Acronym for reclaimed asphalt pavement. A granular product recovered from a bituminous pavement containing aggregate and an Asphalt Binder.

G. **ROSP**: Acronym for reclaimed Oil Sand pavement. A granular product recovered from a bituminous pavement containing aggregate and a Bitumen Binder.

1.4 SUBMITTALS

A. **General**:
   1. Pre-approved Mix Design: Submit name and address of Supplier.
   2. Allow ENGINEER 10 days to evaluate mixing equipment and mix design submittals.

3. Once a mix design is accepted, a new mix design submittal is required if the following occurs.
    a. Asphalt Binder grade is changed.
    b. Aggregate source is changed. When this occurs, submit a physical properties report on the proposed aggregates.

B. **Quality Assurance**:
1. Independent Laboratory: Submit names, certification levels, and years of experience of testing agency's field technicians that are assigned to the Work. Verify laboratory complies with ASTM D3666 and follows Section 01 45 00 requirements.
2. Mix Production Equipment: Submit verification by an individual acceptable to ENGINEER, that plant equipment complies with requirements of ASTM D995.
3. Testing Report: If requested by ENGINEER, submit a report of source and field quality control testing performed by CONTRACTOR and Suppliers.

C. **Mix Design**:
1. Date of mix design. If the date exceeds the following times, the mix design is invalid and must be redesigned.
    a. One (1) year for non-commercial plants.
    b. Two (2) years for commercial plants if there is no change in the aggregate source. A new mix design will be required if aggregate source is changed.
2. Binder source, type, and grade. Disclose is RAP or ROSP is used in the mix.
3. Optimum compaction temperature at the project site.
4. Theoretical maximum specific gravity.
5. Compaction density at design target air voids.
6. Target Grading Curve for aggregate.
7. Binder target percentage, dust to binder ratio, and the following as applicable.
    a. For Superpave mix design provide 1) voids in the mineral aggregate (VMA), and 2) voids filled with Bituminous Binder also known as VFA, and 3) Hamburg Wheel Tracker results.
    b. For Marshall mix design provide 1) tensile strength ratio (moisture sensitivity), 2) voids in the mineral aggregate (VMA), 3) stability, 4) flow and 5) voids in the bituminous mix, and 6) voids filled with Bituminous Binder also known as VFA.
8. Percentages of 1) mineral filler, 2) anti-strip, 3) reclaimed bituminous pavement (RAP or ROSP), 4) recycle agent in the mix and 5) virgin aggregate.
9. Aggregate physical properties (this section article 2.2). The information is for suitability of source and not for project control. A new report may be required if aggregate source is changed. Test results shall not be older than two (2) calendar years from the date of submission.

1.5 **QUALITY ASSURANCE**

A. Do not change aggregate source or binder source until ENGINEER accepts new sources and mix design.

1.6 **ACCEPTANCE**

A. **General**:
   1. Acceptance is by Lot. One (1) Lot is one (1) days' production.
   2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring complying material as part of its installation, Section 01 29 00.
   3. If test results are not within this section's limits, options include correction of production, procedures or production of an alternate mix design acceptable to ENGINEER.
   4. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing: however, may be used by ENGINEER for acceptance if requirements of Section 01 35 10 are met.
   5. Dispute resolution, Section 01 35 10.

B. **Mix Sampling and Testing**:
   1. Sub-lot size is 500 tons or part thereof.
   2. Sampling Protocol: ASTM D3665 and ASTM D979. Collect at least one (1) random Sample per sub-lot from behind paver and before compaction. Any sample collected because of non-uniform appearance shall not be used in determining a pay factor for the Lot.
   3. Testing Protocol: Field samples will be compacted in the laboratory and tested for:
      a. Air voids, ASTM D3203
      b. Voids in the mineral aggregate, AI MS 2.
      c. Binder Content ASTM D6307
      d. Aggregate gradation, ASTM D5444.

C. **Pay Reduction**: Lot is acceptable if binder content and aggregate gradation test deviations are within pay factor 1.00 limits in Table 1 or Table 2 as applicable. At ENGINEER's discretion a Lot with a sub-lot test deviation greater than pay factor 0.85 limits may stay in place at 50 percent pay.

Table 1 – Pay Factors – Superpave Mix Design					
Criteria	**Pay Factor**	**Range of Mean of Deviations of Tests Results in Percentage Points from Binder and Gradation Targets**			
		500 Tons	**1,000 Tons**	**1,500 Tons**	**≥ 2,000 Tons**
Binder Content	1.00	0.0 – 0.7	0.0 – 0.54	0.0 – 0.46	0.0 – 0.41
	0.975	0.71 – 0.8	0.55 – 0.61	0.47 – 0.52	0.42 – 0.46
	0.95	0.81 – 0.9	0.62 – 0.68	0.53 – 0.58	0.47 – 0.52
	0.90	0.9 – 1.0	0.69 – 0.75	0.59 – 0.64	0.53 – 0.56
	0.85	1.01 – 1.1	0.76 – 0.82	0.65 – 0.69	0.57 – 0.61
1/2" and larger Sieve	1.00	0.0 – 10.0	0.0 – 7.3	0.0 – 6.3	0.0 – 5.6
	0.975	11.0 – 12.0	7.4 – 8.3	6.4 – 7.1	5.7 – 6.3
	0.95	13.0 – 13.9	8.4 – 9.3	7.2 – 7.9	6.4 – 7.0
	0.90	14.0 – 14.9	9.4 – 10.3	8.0 – 8.7	7.1 – 7.7
	0.85	15.0 – 16.0	10.4 – 11.3	8.8 – 9.5	7.8 – 8.4
3/8" Sieve	1.00	0.0 – 9.9	0.0 – 6.9	0.0 – 5.9	0.0 – 5.3
	0.975	10.0 – 10.9	7.0 – 7.8	6.0 – 6.6	5.4 – 5.9
	0.95	11.0 – 11.9	7.9 – 8.7	6.7 – 7.3	6.0 – 6.6
	0.90	12.0 – 13.9	8.8 – 9.6	7.4 – 8.0	6.7 – 7.2
	0.85	14.0 – 15.0	9.7 – 10.5	8.1 – 8.9	7.3 – 7.9
No. 4 Sieve	1.00	0.0 – 9.9	0.0 – 6.7	0.0 – 5.7	0.0 – 5.2
	0.975	10.0 – 10.9	6.8 – 7.6	5.8 – 6.3	5.3 – 5.8
	0.95	11.0 – 11.9	7.7 – 8.5	6.4 – 6.9	5.9 – 6.4
	0.90	12.0 – 12.9	8.6 – 9.4	7.0 – 7.5	6.5 – 7.0
	0.85	13.0 – 14.0	9.5 – 10.2	7.6 – 8.0	7.1 – 7.6
No. 8 Sieve	1.00	0.0 – 7.9	0.0 – 5.6	0.0 – 4.8	0.0 – 4.3
	0.975	8.0 – 8.9	5.7 – 6.3	4.9 – 5.4	4.4 – 4.8
	0.95	9.0 – 9.9	6.4 – 7.0	5.5 – 6.0	4.9 – 5.3
	0.90	10.0 – 10.9	7.1 – 7.7	6.1 – 6.6	5.4 – 5.8
	0.85	11.0 -12.0	7.8 – 8.5	6.7 – 7.2	5.9 – 6.4
No. 200 Sieve	1.00	0.0 – 3.0	0.0 – 2.4	0.0 – 2.0	0.0 – 1.8
	0.975	3.1 – 3.5	2.5 – 2.7	2.1 – 2.2	1.9 – 2.0
	0.95	3.6 – 4.0	2.8 – 3.0	2.3 – 2.4	2.1 – 2.2
	0.90	4.1 – 4.5	3.1 – 3.3	2.5 – 2.7	2.3 – 2.4
	0.85	4.6 – 5.0	3.4 – 3.6	2.8 – 3.0	2.5 – 2.6

NOTES

(a) Test binder content using a burn-off oven, ASTM D6307.

(b) Determine aggregate gradation by extraction, ASTM D5444.

Table 2 – Pay Factors – Marshall Mix Design						
Criteria	**Pay Factor**	**Range of Mean of Deviations of Tests Results from the Binder and Gradation Targets in Percentage Points**				
		500 Tons	**1,000 Tons**	**1,500 Tons**	**2,000 Tons**	**≥ 2,500 Tons**
Binder Content	1.00	0.00 – 0.70	0.00 – 0.54	0.00 – 0.46	0.00 – 0.41	0.00 – 0.38
	0.975	0.71 – 0.80	0.55 – 0.61	0.47 – 0.52	0.42 – 0.46	0.39 – 0.43
	0.95	0.81 – 0.90	0.62 – 0.68	0.53 – 0.58	0.47 – 0.52	0.44 – 0.47
	0.90	0.91 – 1.00	0.69 – 0.75	0.59 – 0.64	0.53 – 0.56	0.48 – 0.52
	0.85	1.01 – 1.10	0.76 – 0.82	0.65 – 0.69	0.57 – 0.61	0.53 – 0.56
1/2" and larger Sieve	1.00	0.0 – 10.9	0.0 – 7.3	0.0 – 6.5	0.0 – 5.6	0.0 – 5.2
	0.975	11.0 – 12.9	7.4 – 8.3	6.4 – 7.1	5.7 – 6.3	5.3 – 5.8
	0.95	13.0 – 13.9	8.4 – 9.3	7.2 – 7.9	6.4 – 7.0	5.9 – 6.4
	0.90	14.0 – 14.9	9.4 – 10.3	8.0 – 8.7	7.1 – 7.7	6.5 – 7.1
	0.85	15.0 – 16.0	10.4 – 11.3	8.8 – 9.5	7.8 – 8.4	7.2 – 7.7
3/8" Sieve	1.00	0.0 – 9.9	0.0 – 6.9	0.0 – 5.9	0.0 – 5.3	0.0 – 4.9
	0.975	10.0 – 10.9	7.0 -7.8	6.0 – 6.6	5.4 – 6.9	5.0 – 5.5
	0.95	11.0 – 11.9	7.9 – 8.7	6.7 – 7.3	6.0 – 6.6	5.6 – 6.1
	0.90	12.0 – 13.9	8.8 – 9.6	7.4 – 8.0	6.7 – 7.2	6.2 – 6.6
	0.85	14.0 – 15.0	9.7 – 10.5	8.1 – 8.9	7.3 – 7.9	6.7 – 7.2
No. 4 Sieve	1.00	0.0 – 9.9	0.0 – 6.7	0.0 – 5.7	0.0 – 5.2	0.0 – 4.8
	0.975	10.0 – 10.9	6.8 – 7.6	5.8 – 6.3	5.3 – 5.8	4.9 – 5.4
	0.95	11.0 – 11.9	7.7 – 8.5	6.4 – 6.9	5.9 – 6.4	5.5 – 5.9
	0.90	12.0 – 12.9	8.6 – 9.4	7.0 – 7.5	6.5 – 7.0	6.0 – 6.5
	0.85	13.0 – 14.0	9.5 – 10.2	7.6 – 8.0	7.1 – 7.6	6.6 – 7.0
No. 8 Sieve	1.00	0.0 – 7.9	0.0 – 5.6	0.0 – 4.8	0.0 – 4.3	0.0 – 4.0
	0.975	8.0 – 8.9	5.7 – 6.3	4.9 – 5.4	4.4 – 4.8	4.1 – 4.5
	0.95	9.0 – 9.9	6.4 – 7.0	5.5 – 6.0	4.9 – 5.3	4.6 – 4.9
	0.90	10.0 – 10.9	7.1 – 7.7	6.1 – 6.6	5.4 – 5.8	5.0 – 5.4
	0.85	11.0 – 12.0	7.8 – 8.5	6.7 – 7.2	5.9 – 6.4	5.5 – 5.8
No. 16 Sieve	1.00	0.0 – 7.9	0.0 – 5.2	0.0 – 4.6	0.0 – 4.2	0.0 – 3.9
	0.975	8.0 – 8.9	5.3 – 5.8	4.7 – 5.1	4.3 – 4.6	4.0 – 4.3
	0.95	9.0 – 9.9	5.9 – 6.4	5.2 – 5.6	4.7 – 5.1	4.4 – 4.7
	0.90	10.0 – 10.9	6.5 – 7.0	5.7 – 6.1	5.2 – 5.5	4.8 – 5.1
	0.85	11.0 – 12.0	7.1 – 7.6	6.2 – 6.6	5.6 – 5.9	5.2 – 5.4

No. 50 Sieve	1.00	0.0 – 6.9	0.0 – 4.3	0.0 – 3.8	0.0 – 3.4	0.0 – 3.2
	0.975	7.0 – 7.9	4.4 – 4.8	3.9 – 4.1	3.5 – 3.8	3.3 – 3.5
	0.95	8.0 – 8.9	4.9 – 5.3	4.2 – 4.5	3.9 – 4.1	3.6 – 3.8
	0.90	9.0 – 9.9	5.4 – 5.8	4.6 – 4.9	4.2 – 4.4	3.9 – 4.1
	0.85	10.0 – 11.0	5.9 – 6.4	5.0 – 5.5	4.5 – 4.9	4.2 – 4.5
No. 200 Sieve	1.00	0.0 – 3.0	0.0 – 2.4	0.0 – 2.0	0.0 – 1.8	0.0 – 1.7
	0.975	3.1 – 3.5	2.5 – 2.7	2.1 – 2.2	1.9 – 2.0	1.8 – 1.9
	0.95	3.6 – 4.0	2.8 – 3.0	2.3 – 2.4	2.1 – 2.2	2.0 – 2.1
	0.90	4.1 – 4.5	3.1 – 3.3	2.5 – 2.7	2.3 – 2.4	2.2 – 2.3
	0.85	4.6 – 5.0	3.4 – 3.6	2.8 – 3.0	2.5 – 2.6	2.4 – 2.5
NOTES (a) Test binder content using a burn-off oven, ASTM D6307. (b) Determine aggregate gradation by extraction, ASTM D5444.						

D. **Installation**: See Section 32 12 16.13 acceptance requirements.

PART 2 PRODUCTS

2.1 BINDER

A. **Performance graded Asphalt Binder (PGAB)**: See ASTM D6373.
   1. Blending with polymers is allowed.
   2. Do not use acid blends without documentation supporting need.
   3. Adjust binder grade according to AASHTO M323 to account for any binder stiffness caused by adding RAP or ROSP to the mix.

B. **Bitumen Binder**: Oil Sand (OS) source is CONTRACTOR's choice.

C. **Blended Binder**: CONTRACTOR's choice. A blended ratio or Asphalt Binder in the range of about 1:4 to about 4:1 may require patent licensure (Reference: US RE39, 289 E). CONTRACTOR to verify.

2.2 AGGREGATE

A. Crushed stone, crushed gravel, slag, sand, or combination.

B. Use Table 3 to determine suitability of aggregate source.

Table 3 – Aggregate Physical Properties				
		Standard	Road Class	
			I & II	III
Coarse Aggregate				
Angularity, percent, minimum	One Fractured face	D5821	90	95
	Two Fractured faces		90	90
Wear (hardness or toughness), percent, maximum.		C131	35	35
Flats or elongates (3:1 length to width), percent, maximum.		D4791	--	20
Fine Aggregate				
Angularity (uncompacted void content), percent, maximum.		T304	40	45
Sand equivalent, percent, minimum.		D2419	45	60
Plastic limit, maximum		D4318	0	0
Blended Physical Properties				
Dry-rodded Unit Weight, lb/ft³, minimum		C29	75	75
Weight Loss (Soundness), percent, maximum		C88	16	16
Friable particles, percent, maximum		C142	2	2

NOTES

(a) Road Class is defined in Section 32 01 31.
(b) Coarse aggregate does not pass No. 4 sieve. Fine aggregate does pass.
(c) Angularity is determined by weight.
(d) Wear aggregate may have higher values if aggregate source is known to have higher values.
(e) Sand equivalent is waived for RAP or ROSP aggregate but applies to the remainder of the aggregate blend.
(f) Plastic limit, passing No. 40 sieve. Aggregate is non-plastic even when filler material is added to the aggregate.
(g) Weight loss, using sodium sulfate.
(h) Friable particles are clay lumps, shale, wood, mica, coal passing the No. 4 sieve, and other deleterious materials.

2.3 **ADDITIVES**

A. Mineral Filler: ASTM D242
B. Recycle Agent: ASTM D4552.
C. Anti-strip Agent: Heat stable cement slurry, lime slurry, or chemical liquid.
D. RAP or ROSP: Free of detrimental quantities of deleterious materials.
   1. Allowed up to 15 percent by weight of RAP or binder, whichever is lesser, with no change in specified binder grade.

2. Allowed from 15 to 30 percent by weight of RAP or binder, whichever is lesser, if the binder grade is adjusted according to AASHTO M323 to meet the specified binder grade.
3. Determine RAP binder content by chemical extraction.

2.4 MIX DESIGN

A. **Preparation**:
   1. Get the Mix Designator and the Road Class from the OWNER, ENGINEER, or bid documents.
   2. Use paragraph 1.4C to determine submittal requirements.

B. **Aggregate Gradation – Superpave Mix Design**: See Table 4. The Target Gradation Curve for the specified aggregate grade must lie within the Master Grading Band limits. The target grading band limits for the Target Grading Curve are the appropriate grading limits for pay factor 1.00 in Table 1. The target grading band limits are allowed to extend outside of the Master Grading Band limits.

Table 4 – Master Grading Bnds – Superpave Mix Design

Sieve	Grade			
	SP-1	SP-3/4	SP-1/2	SP-3/8
1.5 inch	100.0	--	--	--
1 inch	90.0 – 100.0	100.0	--	--
3/4 inch	< 90	90.0 – 100.0	100.0	--
1/2 inch	--	< 90	90.0 – 100.0	100.0
3/8 inch	--	--	< 90	90.0 – 100.0
No. 4	--	--	--	< 90
No. 8	19.0 – 45.0	23.0 – 49.0	28.0 – 58.0	32.0 – 67.0
No. 200	1.0 – 7.0	2.0 – 8.0	2.0 – 10.0	2.0 – 10.0

NOTES

(a) Gradation is expressed in percent passing by weight per ASTM C136. Percentage of fines passing No. 200 sieve determined by washing per ASTM C117.

(b) The alpha portion of the grade designator (SP) represents Superpave mix. The numerical portion (1, 3/4, 1/2, 3/8) represents the ***nominal maximum*** sieve size.

C. **Aggregate Gradation – Marshall Mix Design**: See Table 5. The Target Gradation Curve for the specified aggregate grade must lie within the Master Grading Band limits. The target grading band limits for the Target Grading Curve are the appropriate grading limits for pay factor 1.00 in Table 2. The target grading band limits are allowed to extend outside of the Master Grading Band limits.

Table 5 – Master Grading Band Limits – Marshal Mix Design						
Sieve	**Aggregate Grades**					
	DM-1	**DM-3/4**	**DM-/2**	**OM-1/2**	**FM-1**	**FM-1/2**
1 inch	100					
3/4 inch		100			100	
1/2 inch	75 – 91		100	100	90 – 100	100
3/8 inch		75 – 91		93 – 100	60 – 100	90 – 100
No. 4	47 – 61	46 – 62	60 – 80	36 – 44	15 – 40	30 – 50
No. 8				14 – 21	4 – 12	5 – 15
No. 16	23 – 33	22 – 34	28 – 42			
No. 50	12 – 22	11 – 23	11 – 23			
No. 200	3 – 7	3 - 7	3 – 7	2-5	2-5	2-5

NOTES

(a) Gradation is expressed in percent passing by weight, ASTM C136. Percentage of fines passing No. 200 sieve determined by washing, ASTM C117.

(b) Friction Mixture, ASTM D3515

(c) The alpha portion of the grade designator (DM, OM, FM) represents dense mix, open mix and friction mix. The numerical portion (1, 3/4, 1/2) represents the ***maximum*** sieve size.

D. Design Parameters: Determined by AI MS-2

Table 6 – Mix Design Parameters						
		SuperPave			**Marshall**	
Compaction Level	(b)	50Nd	75Nd	100Nd	50 blow	50 blow
Stability, lbs., minimum	(c)	--			1200	1800
Flow, in 0.01-inch units	(c)	--			10 – 18	
Design Air Void Target, Percent	(d)	3.5			3.5	
Voids in Mineral Aggregate (VMA) relative to maximum or nominal sieve size grading and calculated using Gsb(dry), percent, minimum.		ASTM D3203			ASTM D6927	
		Nominal Grading			Maximum Grading	
		1	12.0		1	13.0
		3/4	13.0		3/4	14.0
		1/2	14.0		1/2	15.0
		3/8	15.0		3/8	16.0
RAP or ROSP specific gravity for calculations.		Gsb (dry) by chemical extraction				
Dust to Binder Ratio, maximum		1.4			1.6	

Tensile Strength Ratio (moisture sensitivity), minimum (e)	-	0.080	
Rutting (Hamburg rut test) (f)	AASHTO T324		
Road Class I	--	--	--
Road Class II	15mm/10,000 passes	--	--
Road Class III	10mm/20,000 passes	--	--

NOTES

(a) Road Class is defined in Section 32 01 31.

(b) 100Nd mix is for very high traffic applications only as defined by ENGINEER. 100Nd mix is intended for lower lift applications or surface applications with proactive seal coat program.

(c) Design Density Target: See ASTM D2041. Percent of maximum theoretical specific gravity.

(d) Stability, Flow, Voids: See ASTM D6927

(e) Tensile Strength Ratio (moisture sensitivity): See ASTM D4867. Use freeze thaw conditioning. Compact test specimen to seven (7) percent plus or minus one (1) percent air voids.

(f) With testing performed at temperatures representing the specified binder grade in the Hamburg rut test, the average rut depth of two (2) mix design test Samples is less than the amount shown for the respective Road Classes.

2.3 SOURCE QUALITY CONTROL

A. Collect Samples randomly, ASTM D3665. Do not change sampling points:
   1. Sampling aggregate, ASTM D75. Collect samples before the drum mixer.
   2. Sampling binder. ASTM D140.
   3. Sampling bituminous paving mixture. ASTM D979.

B. Validate binder grade received by from Supplier, Section 32 12 03.

C. Test mix every production day for the following:
   1. Combined aggregate gradation in the mix, ASTM D5444.
   2. Binder content in the mix. ASTM D6307.
   3. Temperature of mix placed in the transport vehicle at the production plant.
      a. Asphalt Binder mixes.
         1) Hot Mix: 325 deg F maximum.
         2) Warm Mix: 325 deg F maximum.
      b. Bitumen Binder mixes or Blended Binder mixes.
         1) Hot Mix: NOT ALLOWED.
         2) Warm Mix: 230 degrees maximum.

D. Warm Mix Testing: When rutting or moisture susceptibility tests are required on plant produced warm mix, condition the warm mix material before testing for two (2) hours at

275 plus or minus five (5) deg F per AASHTO R30 (short term aging). The material may be cooled to room temperature before conditioning.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Mixing Plant: ASTM D995. Provide:
   1. Positive means to determine the moisture content of aggregate.
   2. Positive means to sample all material components.
   3. Sensors to measure the temperature of the mix at discharge.
   4. Ability to maintain discharge temperature of mix.
   5. Capability of maintaining plus or minus five (5) percent tolerance on component percentages in final mix.
   6. Oil Sand Introduction System: **Do not burn off the light oils in Bitumen Binder (oil sand).**

3.2 INSTALLATION

1. Pavement placement, Section 32 12 16.13.
2. Pavement restoration, Section 33 05 25.

END OF SECTION

SECTION 32 12 08

RUBBERIZED ASPHALT CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Mixing aggregate, rubber, and Asphalt Binder to make a rubberized bituminous concrete mix.

1.2 REFERENCES

A. **ASTM Standards**

D5 Penetration of Bituminous Materials.
D36 Softening of Bitumen (Ring-and-Ball Apparatus).
D75 Sampling Aggregates.
D92 Flash and Fire Points by Cleveland Open Cup Tester.
D140 Sampling Bituminous Materials.
D242 Mineral Filler for Bituminous Paving Mixtures.
D979 Sampling Bituminous Paving Mixtures.
D995 Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
D2196 Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield type) Viscometer.
D3203 Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
D3665 Random Sampling of Construction Materials.
D3666 Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.
D4867 Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures.
D5329 Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements.
D5444 Mechanical Size Analysis of Extracted Aggregate.
D6114 Asphalt Rubber Binder
D6307 Determining Asphalt Content of Hot-Mix Asphalt by Ignition Method.
D6373 Performance Graded Asphalt Binder.
D6927 Marshall Stability and Flow of Bituminous Mixtures.

1.3 **DEFINITIONS**

A. **Mix Designator**: An alphanumeric code that identifies components of a rubberized asphalt concrete mix. For example.
   - *PG64-22, SP-1, 75Nd, TR*: is a Performance Graded Asphalt Binder. SP-1is the aggregate grade. 75Nd is the compaction level at Superpave mix design. TR means the mix has a Tire Rubber modifier.
   - *PG64-22 DM-1/2, 50 blow. TR:* is a Performance Graded Asphalt Binder. DM-1/2 is the aggregate grade. 50 blow is the compaction level at Marshall mix design. TR means the mix has a Tire Rubber modifier.

1.4 **SUBMITTALS**

A. **Quality Assurance**:
   1. Independent Laboratory: Submit names, certification levels, and years of experience of testing agency's field technicians that are assigned to the Work. Verify laboratory complies with ASTM standards.
   2. Mixing Equipment: Submit certification of plant equipment.

B. **Asphalt Rubber Binder Compliance**:
   1. Submit the values obtained from the source quality control tests, along with the following information: percent, grade and source of the asphalt rubber binder used; and percent, gradation and source(s) of rubber used.
   2. Provide a certificate form the asphalt rubber binder Supplier assuring that the rubber is derived from automotive, truck or other vehicle tire material.

C. **Mix Design**: Provide the following. Allow ENGINEER 10 days to evaluate the submittal.
   1. Industry standard used for mix design (i.e. Marshall or Superpave). If the industry standard will be modified or a different mix design procedure will be used, get ENGINEER's approval.
   2. Date of mix design. If older than 365 days from date of submission, recertify mix design.
   3. Target Grading Curve for aggregate.
   4. Dust to binder ratio, tensile strength ratio (moisture sensitivity), and percentage of Asphalt Binder in the mix.
   5. Percentages of mineral filler, anti-strip, and tire rubber in the mix.
   6. Aggregate physical properties (this section article 2.3): The information is for suitability of source and not for project control. A new report may be required if aggregate source is changed. Test results shall not be older than 455 days from the date of submission.

D. **Testing Report**: if requested by ENGINEER, submit a report describing source and field quality control testing performed by CONTRACTOR and Suppliers.

1.5 QUALITY ASSURANCE

A. Use a laboratory that follows and complies with ASTM D3666 and follows Section 01 45 00 requirements.
B. Do not change aggregate source or rubberized Asphalt Binder source until ENGINEER accepts a new source and a new mix design.

1.6 ACCEPTANCE

A. **General**:
   1. Acceptance is by Lot. One (1) Lot is one (1) day's production.
   2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring complying material as part of its installation. Section 01 29 00.
   3. If test results are not within acceptable limits, options include correction of production procedures or production of an alternate mix design acceptable to ENGINEER.
   4. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing; however, may be used by ENGINEER for acceptance if requirements in Section 01 35 10 are met.
   5. Dispute resolution, Section 01 35 10.
B. **Rubberized Asphalt Concrete Mix**:
   1. Sub-lot size is 500 tons or part thereof.
   2. Sampling Protocol: ASTM D3665 and ASTM D979. Collect at least one random Sample per sub-lot from the following locations.
      a. Behind paver before compaction, or
      b. Where sub-lot exhibits non-uniform appearance.
   3. Testing Protocol: Field Samples will be compacted in the laboratory and tested for:
      a. Air Voids: ASTM D3203 or ASTM D6927.
      b. Dust to binder ratio.
      c. Asphalt content, ASTM D6307 and aggregate gradation, ASTM D5444.
C. **Pay Reduction**: Defective binder content or aggregate gradation defects may be accepted at reduced pay as indicated in Section 32 12 05 (Superpave design or Marshall design) as applicable.
D. **Installation**: Acceptance requirements are stipulated in Section 32 12 16.13.

PART 2 PRODUCTS

2.1 ASPHALT BINDER

A. Performance Graded Asphalt Binder (PGAB), ASTM D6373: able to produce properties indicated in ASTM D6114 when interacted with ground recycled tire rubber.

2.2 GROUND RECYCLED TIRE RUBBER

A. Contains less than 0.75 percent moisture, is free flowing, contains no more than 0.01 percent of ferrous metal particles by weight, and has no more than 0.5 percent fabric in hot-mix applications. The use of rubber from multiple sources is acceptable provided that the overall blend of rubber meets gradation requirements.
B. Gradation: Percent passing No. 8 mesh is 100 percent.
C. Additives: Calcium carbonate or tale, up to four (4) percent by weight to prevent particles from sticking together.

2.3 AGGREGATE

A. Crushed stone: crushed gravel, slag, sand or combination with physical properties indicated for bituminous concrete mix (Marshal mix design or Superpave mix design). Section 32 12 05.

2.4 ADDITIVES

A. Mineral Filler: ASTM D242
B. Anti-strip Agent: Heat stable cement slurry or lime slurry
C. Reclaimed Asphalt Pavement (RAP); NOT ALLOWED

2.5 MIX DESIGN

A. Asphalt Rubber Binder: Type I, Type II, or Type III per ASTM D6114 with the following components.

Table 1 – Components of Asphalt Rubber Binder				
Property	**Standard**	**Binder Designation**		
		Type I	**Type II**	**Type III**
Climate		Hot	Moderate	Cold
Base Asphalt Binder	D6373	PG70-22	PG64-22	PG58-28
Rubber added to base Asphalt Binder, percent, min.	--	15	15	15

B. Additives: Cement or lime slurry for tensile strength in the mix, CONTRACTOR's choice.
C. Aggregate Structure and Mix Properties: Refer to Section 32 12 05 for Superpave or Marshall aggregate structure and properties.

2.6 SOURCE QUALITY CONTROL

A. Collect Samples randomly, ASTM D3665. Do not change sampling points.
   1. Sampling aggregates, ASTM D75. Collect sample before the drum mixer or after going through the drier.
   2. Sampling asphalt rubber binder, ASTM D140
   3. Sampling bituminous pavement mixture, ASTM D979.
B. Do one (1) test of asphalt rubber binder every 20,000 gallons for the following properties.
   1. Apparent viscosity, ASTM D2196 method A.
   2. Penetration, ASTM D5.
   3. Softening pint ASTM D36.
   4. Resilience, ASTM D5329.
   5. Flash point, ASTM D92.
   6. Penetration retention, ASTM D75.
C. **Test mix every production day** for the following:
   1. Combined aggregate gradation in the mix, ASTM D5444.
   2. Asphalt Binder content in the mix, ASTM D6307.
   3. Tensile strength of the mix, ASTM D4867.
   4. Temperature of mix placed in the transport vehicle.
D. Equipment: Certify at least every two (2) years through the services of a design professional licensed in the State of Utah, that plant equipment complies with requirements of ASTM D995.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Mixing Plant: ASTM D995. Provide.
   1. Positive means to determine the moisture content of aggregate.
   2. Positive means to sample all material components.
   3. Sensors to measure the temperature of the mix at discharge.
   4. Ability to maintain discharge temperature of mix.
   5. Capability of maintaining component percentages of final mix within acceptable industry standards.

3.2 INSTALLATION

A. Pavement placement, Section 32 12 16.13.
B. Pavement restoration, Section 33 05 25.

END OF SECTION

SECTION 32 12 13.13

TACK COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of asphaltic material to existing bituminous concrete or Portland Cement concrete surfaces before placing on bituminous concrete pavement.

1.2 SUBMITTALS

A. Certificate showing asphaltic material complies with Section 32 12 03:
   1. Identify water/asphalt dilution ratio.
   2. Identify tack coat application rate.
B. Identify asphalt material recommended by fabric manufacturer.

1.3 WEATHER

A. Apply tack coat only when air and roadbed temperatures in the shade are greater than 40 deg F Temperature restrictions may be waived only with ENGINEER's concurrence.
B. Do not apply tack coat during rain, fog, dust, or other unsuitable weather. Do not apply coat to wet surfaces.

1.4 NOTICE

A. Send written notice to residents or business owners 24 hours before applying coat.

PART 2 PRODUCTS

2.1 ASPHALT MATERIAL

A. Select from the following:
   1. Emulsified Asphalt: Grade MS-1, SS-1, or SS-1h, Section 32 12 03.
   2. Cationic Emulsified Asphalt: Grade CSS-1 or CSS-1h, Section 32 12 03.
   3. Rapid Cure Cutback Asphalt: Grade RC-70, Section 32 12 03.

PART 3 EXECUTION

3.1 PREPARATION

A. Select and advise ENGINEER of the type of tack material to be used.
B. Clean surface to be treated free of dust or other foreign material. If flushed, allow surface to dry. If leaves from trees, blow clean.
C. Provide safe pedestrian access across tack coat.
D. Prevent pedestrians, vehicles, pets, etc., access to tack surfaces.

3.2 APPLICATION

A. General:
   1. Triple coverage by spray bar required. Stop application if any nozzle is not working properly.
   2. Apply tack only to area covered with bituminous concrete in the same day.
B. Application Rate: Typically as follows:
   1. Emulsions, 0.05 to 0.15 gallons per square yard.
   2. Cutback, CONTRACTOR's choice.
C. Tack for Fabric Application: Comply with manufacturer's recommendation. If non, then as follows:
   1. Dry pavement surface, 0.20 to 0.30 gallons per square yard. Within street intersections, on steep grades and in zones where vehicle speed changes are commonplace reduce application rate to no less than 0.20 gallons per square yard.
   2. Heavy duty fabrics, 0.30 to 0.40 gallons per square yard.

3.3 PROTECTION

A. Protect all surfaces exposed to public view from being spattered or marred. Remove any spattering, over-coating, or marring.
B. Do not discharge bituminous material into borrow pits or gutters.

3.4 OPENING TO TRAFFIC AND MAINTENANCE

A. Do not permit traffic to travel over the tacked surface until bituminous tack coat has cured or is not picked up by traffic.
B. If detours cannot be provided, Restrict operations to a width suitable at least for one-way traffic over the remaining portion of the road.
C. If one-way traffic is provided, control traffic appropriately.

END OF SECTION

SECTION 32 12 13.19

PRIME COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of liquid asphalt to aggregate base before placing bituminous concrete or Portland cement concrete pavement.
B. Placing sand on areas that are over-primed.

1.2 SUBMITTALS

A. Certificate showing asphaltic material complies with Section 32 12 03.

1.3 WEATHER

A. Apply prime coat only when air and roadbed temperatures in the shade are greater than 40 deg F Temperature restrictions may be waived only with ENGINEER's knowledge.
B. Do not apply prime coat during rain, fog, dust, or other unsuitable weather.

PART 2 PRODUCTS

2.1 ASPHALT MATERIAL

A. Select from the following:
   1. Slow Cure Cutback Asphalt: Grade SC-70, or SC-250, Section 32 12 03.
   2. Medium Cure Cutback Asphalt: Grade MC-30, MC-70, or MC-250, Section 32 12 03.
   3. Rapid Cure Cutback Asphalt: Grade RC-1, RC-2, or, RC-250, Section 32 12 03.

2.2 SAND

A. Clean natural aggregate passing the No. 4 sieve and retained on the No. 200 Sieve.

PART 3 EXECUTION

3.1 **PREPARATION**

A. If aggregate base course to be primed contains an appreciable amount of loose material or is excessively dusty; moisten, blade, roll, and recompact to make the surface dense.
B. Do not start priming until all free surface moisture has disappeared.
C. Notify residents and business owners 24 hours before applying prime coat.
D. Provide pedestrian access across prime coat if required.

3.2 **APPLICATION**

A. If pavement surface is to be applied over loosely bonded surface, apply prime coat at 0.10 to 0.50 gallons per square yard to penetrate and seal. Do not flood surface.
B. Cure and dry as long as necessary to attain penetration and evaporation of volatile.
C. Blot over-primed surface with a light, uniform layer of sand.
D. Prime under-primed areas with additional asphalt.

3.3 **PROTECTION**

A. Protect all structures, including curb, gutter, sidewalks, guardrails and guideposts from being spattered or marred. Remove any spattering, over-coating, or marring at no additional cost to OWNER.
B. Do not discharge bituminous material into borrow pits or gutters.
C. Prevent tracking of prime coat onto adjacent surfaces.

3.4 **OPENING TO TRAFFIC AND MAINTENANCE**

A. Do not permit traffic to travel over freshly primed surface until prime coat has cured. If detours cannot be provided, restrict operations to a width suitable at least for on-way traffic over the remaining portion of the road. If one-way traffic is provided, control traffic by flagging or pilot car operation.
B. After prime coat application, leave work area undisturbed. If prime coat is tacky or tends to pick up under traffic after four (4) hours, blot excess prime coat with blotter sand. Prime coats can be opened to traffic after blotting.
C. Clean and maintain primed surfaces until surface pavement course is placed. Maintenance includes spreading any necessary additional blotter material, replacing all portions of prime coat that have been destroyed, and patching any break in primed surfaces.

END OF SECTION

SECTION 32 12 16.13

PLANT-MIX BITUMINOUS PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Place a bituminous concrete pavement base course, leveling course, surface course, overly course, or an inlay course.

1.2 REFERENCES

A. **AASHTO Standards**

- R9 Acceptance Sampling Plans for Highway Construction.
- TP68 Bulk Specific Gravity and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method.
- T324 Hamburg Wheel-Track Testing of Compacted Hot-Mix Asphalt (HMA).

B. **ASTM Standards**

- D979 Sampling Bituminous Paving Mixtures.
- D1188 Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples.
- D2041 Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.
- D2725 Bulk Specific Gravity Density of Non-Absorptive Compacted Bituminous Mixtures.
- D2950 Density of Bituminous Concrete In Place by Nuclear Method.
- D3549 Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
- D3665 Random Sampling Construction Materials.
- D5361 Sampling Compacted Bituminous Mixtures for Laboratory Testing.
- D6927 Marshall Stability and flow Bituminous Mixtures.

1.3 DEFINITIONS

A. Must Grind: Defined in Section 32 01 31.
B. Road Class: Defined in Section 32 01 31.

1.4 SUBMITTALS

A. **Before Delivery**: Submit 48 hours before delivery:
   1. Location and name of bituminous concrete production facility.
   2. Mix design method.

3. Mix identification number and code.
4. Type, grade, and weight of binder.
5. Type, grade, and weight of aggregate.
6. Traffic control plan, Section 01 55 26.
7. Type and number of rollers.
8. Manufacturer's certificate of compliance for paving geotextiles. (Refer to Section 31 05 19).
9. Certification of profilograph and profilograph operator.
10. Cold weather paving plan.

B. **At Delivery**: For each batch delivered to site identity:
1. Date and project description.
2. Producer and plant.
3. Name of contractor.
4. Serial number of ticket.
5. Mix identification number or code.
6. Truck number and time dispatched.
7. Volume of mix delivered.

C. **After Placement**: Before final payment submit summary report describing profile deviation and profile roughness. See Section 32 01 31.

1.5 QUALITY ASSURANCE

A. Do not change aggregate source or binder grade until ENGINEER accepts new source and new mix design.
B. Reject product found defective after installation and install acceptable product at no additional cost to OWNER.
C. Remove product found defective after installation and install acceptable product at no additional cost to OWNER.
D. Foreman of paving crew has completed at least three (3) projects of similar size and nature.
E. If requested, submit a quality control and testing report describing source and field quality assurance activities performed by CONTRACTOR and Suppliers.
F. For all equipment and hand tools used to mix, haul, and place the bituminous concrete, use a release agent that does not dissolve asphalt and is acceptable to ENGINEER.

1.6 WEATHER

A. Temperature:

1. April 15 to October 15: Place pavement when air temperature in the shade and the roadway surface temperature are above 50 deg F. The ENGINEER determines may provide written approval if it is acceptable to place outside of this temperature limit.
2. Before April 15 and After October 15: Provide a Cold Weather Paving Plan. ENGINEER must accept the plan before proceeding.

Include the following details.

a. Haul details.
b. Placement details.
c. Compaction aids used in production.
d. Coordination procedure for acceptance testing.

B. Moisture: Do not place on frozen base, during adverse climatic conditions such as precipitation, or when roadway surface is wet or icy.

1.7 **NOTICE**

A. Follow Laws and Regulations concerning when and to whom notices are to be given. Send written notice at least three (3) days before start of paving.
B. Indicate paving time and when new surface can be used.
C. Warn of potential vehicle tow away and other construction issues affecting neighborhood.
D. Should work not occur on specified day, send a new notice.

1.8 **ACCEPTANCE**

A. **General**:
   1. Acceptance is by Lot.
   2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring complying material as part of its installation, Section 01 29 00.
   3. Dispute resolution, Section 01 35 10.
   4. Opening a paved surface to traffic does not constitute acceptance.
   5. Observation of CONTRACTOR's field quality control testing does not constitute acceptance. Such testing; however, may be used by ENGINEER for acceptance if requirements of Section 01 35 10 are met.
B. **Mix Material**: Accepted as specified for bituminous concrete, Section 32 12 05, or rubberized asphalt concrete, Section 32 12 08.
C. **Mix Temperature at Site**:
   1. Reject mixes in the transport material exceeding the following temperatures.
      a. Hot mix, 425 deg F.
      b. Warm mix, 300 deg F.

c. Oil sand bituminous concrete, 230 deg F.

2. Dispose of cold mix in paver hopper as thin spread underlay.

D. **Grade, Cross Slope**: Verify tolerances are not exceeded.

E. **Compaction**: Options for acceptance are 1) core density, 2) non-destructive test density, or 3) control strip density with visual observation. Use core density unless specified elsewhere. A Lot is acceptable if density tests are within pay factor 1.00 limits. At ENGINEER's discretion, a Lot with deficient sub-lot density tests may be accepted if pay is adjusted using an applicable pay factor in the following table or accepted at 50 percent pay if a sub-lot is in Reject.

Table 1 – Compaction Pay Factors

Pay Factor	Density, in Percent Relative to ASTM D2041	
	Average	Lowest Test
0.70	More than 96	--
1.00	**92 to 96**	**89 or greater**
0.90	92 to 96	Less than 89
0.80	Less than 92	89 or greater
Reject	Less than 92	Less than 89

1. **Core Density**: This method compares the average density of cores extracted from a pavement surface to maximum theoretical density:
   a. Lot Size: One (1) day production with 1,000 square yard sublots or part thereof.
   b. Sampling Protocol: Use ASTM D3665 to randomly select in each sub-lot at least one (1) surface test location and (1) longitudinal joint test location. Collect at least two (2) test samples at each test location, ASTM D5361. Samples are full depth or overlay depth in overlay construction.
   c. Testing Protocol: ASTM D2725 for core density and ASTM D2041 (Rice) for maximum theoretical density.
2. **Non-Destructive Density Testing by Gage**:
   a. Lot Size: One (1) day production with 1,000 square yard sublots or part thereof.
   b. Sampling Protocol: Use ASTM D3665 to randomly select in each sub-lot at least one (1) surface test location and one (1) longitudinal joint test location.
   c. Testing Protocol: ASTM D2950 (nuclear gage) or AASHTO TP68 (non-nuclear gage) and ASTM D2041 (Rice)for maximum theoretical density.
3. **Control Strip Density with Visual Observation**:
   a. Lot: One (1) day production.
   b. Sampling Protocol: Not required after rolling pattern is determined.

c. Testing Protocol: ASTM D6927 (Marshall) and D2041 (Rice method) to determine rolling pattern for 94 percent compaction, thereafter visual examination.

4. **Compaction Dispute Resolution**:
   a. CONTRACTOR:
      1) Provide an Independent Testing Agency, Section 01 45 00.
      2) Take two (2) supplement cores midway between deficient acceptance test locations, and midway between a deficient test location and the next adjacent acceptable test location.
      3) Patch core holes.
      4) Conduct testing at no additional cost to OWNER.
   b. ENGINEER:
      1) Accept Lot at full pay if new information shows compliance, or
      2) Accept Loat at pay reduction using new test information, or
      3) Reject Lot.

F. **Thickness**: A lot is acceptable if test deficiencies are within pay factor 1.99 limits. At ENGINEER's discretion, a Lot with sub-lot deficiencies greater than allowed for pay factor 1 in the following table may be accepted if pay is adjusted using one of the following applicable pay factors or accepted at 50 percent pay if a sub-lot is in Reject.

Table 2 – Thickness Pay Factor

Pay Factors	Deficiency Limits, in Inches
1.00	0.00 to 0.375
0.90	0.376 to 0.50
0.70	0.51 to 0.75
Reject	0.76 to 1.00

1. **Lot Size**: One (1) day production with 1,000 square yard sub-lots or part thereof.
2. **Sampling Protocol**: Use ASTM D3665 to randomly select at least one surface test location and one longitudinal joint test location in each sub-lot. Collect at least two (2) core samples at each test location, ASTM D5361. Samples are full depth. Overlay construction measured only on overlay portion of core sample.
3. **Testing Protocol**: ASTM D3549:
   a. Minimum Specified Thickness: A Lot specified to have minimum thickness will be accepted if all sub-lot measurements meet or exceed minimum. If thickness is deficient, additional material may be placed over the deficient thickness if there is no pavement feathering; placement matches this section's thickness tolerance; surface continues to drain; and roughness tolerance is met.

b. Actual Specified Thickness: A Lot specified to have actual thickness is acceptable if any sub-lot measurement does not exceed deficiency limits for thickness pay factor 1.00.

4. **Thickness Dispute Resolution**:
   a. CONTRACTOR:
      1) Hire an Independent Testing Agency, Section 01 45 00.
      2) Take two (2) supplement cores midway between deficient acceptance test locations, and midway between a deficient test location and the next adjacent acceptable test location.
      3) Patch core holes.
      4) Conduct testing at no additional cost to OWNER>
   b. ENGINEER:
      1) Graph deficient areas by plotting new cores and original cores to define deficient areas assuming the following.
         a) The graph represents the thickness of the pavement.
         b) Thicknesses vary linearly along the pavement length from core depth to core depth.
         c) The pavement is a constant depth in the transverse direction.
      2) Accept Lot at full pay if new information shows compliance or,
      3) Accept Lot at pay reduction using new test information, or
      4) Reject Lot.

G. **Profile Roughness and Profile Deviation**: Section 32 01 31.

1.9 WARRANTY

A. Joints at Street Fixtures and Portland Cement Concrete Flat Work: If wider than 1/2 inch before end of the correction period seal joints with asphalt rubber or rubberized asphalt; Section 32 01 17.

PART 2 PRODUCTS

2.1 MATERIALS

A. Bituminous concrete, Section 32 12 05.
B. Rubberized asphalt concrete, Section 32 12 08.
C. Tack coat, Section 32 12 13.13.
D. Prime coat, Section 32 12 13.19.
E. Paving geotextile, Section 31 05 19.
F. Paving geogrid, Section 31 05 21.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Paver Machine: Use track equipment when operating on fabrics, geogrids or pavement mats hotter than 180 deg F.
B. Compactors: Steel wheeled static or vibratory. Use a pneumatic tire roller for intermediate rolling only.

3.2 PREPARATION

A. General:
    1. Locate and preserve utilities Section 01 31 13. Contact utility companies and other agencies, for dangerous concentration of combustible, flammable, or explosive matter.
    2. Lower Street Fixtures if paving machine is not capable of passing over the fixtures.
    3. Remove vegetation from cracks, edges and joints. Sweep surface clean. Blow cracks clean. Remove leaves.
    4. Fill cracks and fix Potholes, Section 32 01 17.
    5. Stabilize Portland cement concrete subgrade slabs.
B. Traffic Control:
    1. Implement notification and traffic control plan requirements. Section 01 55 26. Do not proceed without certified flaggers.
    2. Apply temporary lane marking tape or paint after layout has been verified with ENGINEER.
C. Aggregate Base Course:
    1. Verify base course is placed to grade, compacted, and dampened.
    2. If indicated, follow Section 31 31 19 requirements for herbicide treatment or Section 32 12 13.19 for prime coat applications.

3.3 PROTECTION

A. Trees, Plants, Ground Cover:
    1. Protect trees, plants and other ground cover from damage.
    2. Prune trees to allow equipment passage underneath, Section 32 01 93. Repair tree damage at no additional cost to OWNER.
B. Protect all structures, including curb, gutter, sidewalks, guard rails and guideposts from physical damage. Remove spatter, over-coat, or mar.

C. Do not discharge bituminous materials into borrow pits or gutters.
D. Protect hot pavement from traffic until cool enough not to become marred.
E. Remove saw-cut dust immediately. Protect neighborhood, storm drains and down-stream fish habitat.

3.4 TEMPORARY SURFACING

A. Place, roll, maintain, remove, and dispose of temporary Pavement surfaces.
B. In sidewalk areas construct temporary pavements at least 1 inch thick and in all other areas at least two (2) inches thick. At major intersections and other critical locations, a greater thickness may be required.

3.5 LINE AND GRADE CONTROL

A. Provide necessary survey stakes for horizontal and vertical control.
B. Furnish, place, and maintain supports, wire devices, and materials as required to provide continuous line and grade reference controls for placing pavement, matching existing pavement surfaces, etc.

3.6 FABRIC PLACEMENT

A. Section 31 05 19

3.7 PAVEMENT PLACEMENT

A. General:
   1. Barricade off or eliminate fall off edges.
   2. Provide continuous forward paver movement so temperature 10 feet behind paver is as follows:
      a. Warm Mix Placement: 200 deg F minimum.
      b. Hot Mix Placement:

Table 3 – Minimum Pavement Temperature in Degrees F.

Air Temperature Deg F	Compacted Mat Thickness					
	3/4"	1"	1-1/2"	2"	3"	4"+
45 – 50	--	--	--	--	280	265
50 – 59	--	--	--	280	270	255
60 – 69	--	--	285	275	265	250

70 – 79	285	285	280	270	265	250
80 – 89	280	275	270	265	260	250
90+	270	270	265	260	250	250

B. Overlays or Subsequent Lifts:
   1. Allow new base pavement or new inlay pavement to cure (harden) before placing overlays.
   2. Apply tack coat per Section 32 12 13.13 if inlay or sub-base Pavement surface is dirty or older than 24 hours.

C. Irregular Areas: Handwork is acceptable if specified grade, slope, compaction and smoothness are achieved.

D. Compaction:
   1. Test mix placement until a compaction pattern is acceptable to CONTRACTOR. Continue random quality control testing.
   2. Do not over compact or under compact.
   3. Complete compaction before the following temperature are reached:
      a. 180 deg F for hot mixes.
      b. 140 deg F for warm mixes.

E. Joints:
   1. Construct joints to industry standards for texture, density, and smoothness.
   2. Clean contact surfaces and apply tack coat. Ensure continuous bond between old and new pavements, or between successive day's work.
   3.

F. Blade Mixing Method:
   1. Spread and windrow aggregate on the prepared base, after that, uniformly apply bituminous material over the aggregate.
   2. Apply bituminous material in two (2) or more applications over a section of definite limits. Limit amount of bitumen spread in any 1 application to 0.50 gallon per square yard. Exercise care to avoid overlapping of spreads onto adjoining sections. Immediately after each application, partially mix the bituminous material with the aggregate.
   3. After the last application of bituminous material and partial mixing, windrow the entire mass of bitumen and aggregate and mix by blading material from side to side of roadway. Blade to produce a satisfactory mixture that is uniform in appearance, texture, and bitumen content, and free from pockets of segregated aggregates and continue until not more than 50 percent of original volatiles present in the bitumen remain in the mix. ASTM D1461. While mixing, take care to avoid cutting into underlying base course or contaminating the bituminous mixture with earth or other foreign matter.

G. Stationary Mixing Method:

1. Dry aggregate to optimum moisture content before mixing. Use same application of bituminous material and mixing as required for traveling mixer.
2. After mixing, haul and place mix on the roadway surface in windrows. All requirements as to uniformity, percent of volatiles, and textures are as required for traveling mixer that may require supplemental blade mixing.

3.8 **TOLERANCES**

A. Compaction: Target is 94 percent of ASTM D2041 (Rice density) plus or minus two (2) percent.
B. Lift Thickness: If not indicated, meet the following tolerances.

Table 4 – Lift Thickness Tolerance

Mix Design Method	Minimum	Maximum
Marshall	2 times maximum aggregate size	Not more than limits established by manufacturer of compactor equipment.
Performance Grade (Superpave)	4 times *nominal* aggregate size	
NOTES (a) Thickness is measured after compaction.		

C. Smoothness:
   1. Parallel to Centerline: Section 32 01 31.
   2. Cross Slope: 1/4 inch in 10 feet except at cross section grade breaks.

3.9 **REPAIR**

A. Repair ride disturbing or unsafe butt joints. Repair expense is at no additional cost to OWNER.
B. If pavement smoothness is deficient, follow Section 32 01 31 repair requirements.
C. Corrective Action for Profile Deviations ("Must Grinds"): Grinding is acceptable. See Section 32 01 26. Apply a fog seal over grind areas. See Section 32 01 13.50. If depressions cannot be corrected by grinding, remove and replace.
D. Corrective Action for Profile Roughness Index: Grinding is acceptable. Re-profile corrected segments to verify ride index meets tolerance. Apply a fog seal over grind areas. See Section 32 01 13.50.
E. When thickness is deficient, place additional material over deficient areas. DO NOT skin patch. Mill for inlay if necessary.
F. Defective Joints, Seams, Edges: Repair.
G. Unacceptable Paving: Remove and replace.

3.10 **OPENING TO TRAFFIC**

A. Temperature of pavement surface is not more than 180 deg F.

END OF SECTION

SECTION 32 12 16.18

RECYCLE BITUMINOUS PAVEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Make a base, leveling, or surface course using an existing bituminous concrete that is in-place.
B. Mix design requirements.

1.2 REFERENCES

A. **ASTM Standards**

D2950 Density of Bituminous Concrete In Place by Nuclear Method
D3549 Thickness or Height of Compacted Bituminous Paving Mixture Specimens.

1.3 DEFINITIONS

A. **RAP**: Acronym for reclaimed asphalt pavement. Refer to Section 32 12 05.
B. **RAC**: Acronym for recycled asphalt concrete. A bituminous mix product consisting of RAP or ROSP, new aggregates and Binder or Binder with recycle rejuvenating agent, the mixture of which creates a new bituminous concrete.
C. **ROSP**: Acronym for reclaimed Oil Sand pavement. Refer to Section 32 12 05.

1.4 SUBMITTALS

A. Before commencing work of this Section, submit:
   1. Traffic control plan, Section 01 55 26.
   2. A list of equipment to be used.
   3. Type of Binder to be used, Section 32 12 03.
B. RAC Mix Design: Determine conditions and properties of existing materials. Identify recycling agent and submit the following data as applicable:
   1. If RAP or ROSP is 15 percent or less of the RAC, submit a mix design formula if Supplier does not have a mix design formula at the plant. The formula shall be based on current test data.
   2. If RAP or ROSP added to the RAC is over 15 percent, submit a mix design formula.
C. RAC Delivery Tickets, Section 32 12 16.19.

1.5 QUALITY ASSURANCE

A. Section 32 12 16.13.

1.6 WEATHER

A. Section 32 12 16.13.

1.7 NOTICE

A. Section 32 12 16.13.

1.8 ACCEPTANCE

A. Section 32 12 16.13.

PART 2 PRODUCTS

2.1 MATERIAL

A. Recycle asphalt (RA), Section 32 12 03.
B. Tack coat, Section 32 12 13.13.
C. Paving geotextile, Section 31 05 19.
D. Paving geogrid, Section 31 05 21.
E. RAP OR ROSP: Free of detrimental quantities of deleterious materials. Graded (on a non-dried basis) as follows.

	Percent Passing
Sieve	**By Weight**
1 – 1/2"	100
1”	90

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Laydown Machine: Provide track equipment when operating on fabrics or geogrid, otherwise type of equipment is CONTRACTOR’s choice.

B. Compactors: Steel wheeled static or vibratory.

3.2 **PREPARATION**

A. General:
   1. Locate and preserve utilities, Section 31 23 16. **Contact utility companies and other agencies, for dangerous concentration of combustible, flammable, or explosive matter.**
   2. Lower Street Fixtures if pavement recycler machine is not capable of releasing pavement-cutting mechanism to protect fixtures.
   3. Remove plant materials from cracks, edges and joints. Sweep surface clean. Blow cracks clean.
   4. Stabilize concrete subgrade slabs.
   5. Apply tack coat, Section 32 12 13.13
   6. Verify surfaces are dry.

B. Trees, Plants, Ground Cover
   1. Protect trees, plants and other ground cover from damage.
   2. Prune trees, Section 32 01 93 to allow equipment passage underneath. Repair tree damage at no additional cost to OWNER.

C. Traffic Control:
   1. Control pedestrian and vehicular traffic, Section 01 55 26.
   2. Protect pavement from traffic until mixture has cooled enough not to become marked.
   3. Apply temporary lane marking tape or paint after layout has been verified by ENGINEER.

D. Milling, Section 32 01 16.71

3.3 **PLACING RAC**

A. Hot-laid RAC, Section 32 12 16.13
B. Cold-laid RAC, Section 32 12 16.19
C. Mix and blend milled aggregate, recycling asphalt, virgin asphalt and virgin aggregate per mix design.

3.4 **TOLERANCES**

A. Compaction, lift thickness, grade, cross slope, Section 32 12 16.19
B. Complete compaction of RAC within five (5) minutes of placing RAC and before its temperature drops below 200 deg F.

3.5 **PROTECTION AND REPAIR**

A. Section 32 12 16.19.

END OF SECTION

SECTION 32 12 16.19

COLD-MIX BITUMINOUS PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Construct a bituminous concrete pavement base course, leveling course, or surface course by placing a bitumen cement over an in-place aggregate and mixing and compacting the product in-place.

B. Bituminous concrete material is not specified in this section. Refer to Section 32 12 05.

1.2 REFERENCES

A. **ASTM Standards**

D1461 Moisture or Volatile Distillates in Bituminous Paving Mixtures.
D2041 Theoretical Maximum Specific Gravity of Bituminous Paving Mixtures.
D2170 Kinematic Viscosity of Asphalts (Bitumens).
D2399 Selection of Cutback Asphalts.
D3628 Selection and Use of Emulsified Asphalts.
D5581 Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus (6 inch-Diameter Specimen)

1.3 SUBMITTALS

A. Traffic control plan, Section 01 55 26.

B. Laboratory mix design, Section 32 12 05.

C. Batch Delivery Tickets: Submit ticket for each batch delivered to the work site. Include information specified in Section 32 12 16.13.

1.4 WEATHER

A. Section 32 12 16.13.

1.5 NOTICE

A. Section 32 12 16.13

1.6 ACCEPTANCE

A. Section 32 12 16.13.

PART 2 PRODUCTS

2.1 MATERIALS

A. Bituminous Binder: Emulsified asphalt or medium curing cutback asphalt, Section 32 12 03. If type is not indicated CONTRACTOR is to select the material recommended in the following ASTM standards.
   1. Emulsified asphalt, ASTM D3628.
   2. Cutback asphalt, ASTM D2399.

B. Aggregate, Section 32 12 05: Use an aggregate containing not more than two (2) percent moisture. If more, dry before applying bituminous product. An exception may be made for usually porous material, when laboratory tests indicate excess moisture will not produce an unstable mix.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Lay-down Machine: Use track equipment when operating on fabrics or geogrid.

B. Compactors: Steel wheeled static or vibratory. Use a pneumatic tire roller for intermediate rolling only.

3.2 PREPARATION

A. Trees, Plants, Ground Cover:
   1. Protect trees, plants, and other ground cover from damage.
   2. Prune trees, Section 32 01 93 to allow equipment passage underneath. Repair tree damage at no additional cost to the OWNER.

B. Traffic Control:
   1. Provide worker and public safety, Section 01 55 26.
   2. Apply temporary lane marking tape or paint after layout has been verified with ENGINEER.

3.3 **PREPARATION OF AGGREGATE**

A. On unpaved surfaces, prime coat whole roadway surface receiving cold-mix application, Section 32 12 13.19.
B. Place aggregate on the prepared base in a uniform windrow or windrows.
C. Notify ENGINEER 48 hours in advance of applying bituminous material to permit check of aggregate with respect to volume, moisture content, unit weight, and proper amount of bituminous material to be used.

3.4 **PROPORTIONING AND MIXING**

A. Unless specified otherwise, method of mixing may be traveling mixer method, stationary mixer method, or blade mixing method.
B. Traveling Mixer Method:
    1. Accomplish mixing by means of mixer that will thoroughly blend aggregate bitumen. Use metering devices that will accurately introduce required quantity of bitumen during the mix process. Produce a satisfactory mixture that is uniform in appearance, texture and bitumen content, free from pockets of segregated aggregates.
    2. When necessary, supplement travel plant mixing with blade mixing to obtain desired degree of aeration of mix. Continue mixing until not more than 50 percent of original volatiles present in the bituminous material remain in the mix, ASTM D1461.
C. Blade Mixing Method:
    1. Spread and windrow aggregate on the prepared base, after that, uniformly apply bituminous material over the aggregate.
    2. Apply bituminous material in two (2) or more applications over a section of definite limits. Limit amount of bitumen spread in any 1 application to 0.50 gallon per square yard. Exercise care to avoid overlapping of spreads onto adjoining sections. Immediately after each application, partially mix the bituminous material with the aggregate.
    3. After the last application of bituminous material and partial mixing, windrow the entire mass of bitumen and aggregate and mix by blading material from side to side of roadway. Blade to produce a satisfactory mixture that is uniform in appearance, texture, and bitumen content, and free from pockets of segregated aggregates and continue until not more than 50 percent of original volatiles present in the bitumen remain in the mix. ASTM D1461. While mixing, take care to avoid cutting into underlying base course or contaminating the bituminous mixture with earth or other foreign matter.
D. Stationary Mixing Method:
    1. Dry aggregate to optimum moisture content before mixing. Use same application of bituminous material and mixing as required for traveling mixer.

2. After mixing, haul and place mix on the roadway surface in windrows. All requirements as to uniformity, percent of volatiles, and textures are as required for traveling mixer that may require supplemental blade mixing.

3.5 **TEMPERATURE CONTROL**

A. Maintain temperature range of cold road mix material at time of application so viscosity will be between 50 and 200 centistokes, ASTM D2170.

3.6 **PLACING PAVEMENT MIXTURE**

A. When mixing has been completed, spread mixture in such a manner that the finished surface conforms to the elevations, grades, and cross-sections indicated.
B. At the end of each day's work or when the work is interrupted by adverse weather conditions, blade all loose material into a windrow, whether mixing is completed or not. Do not leave material spread on the roadbed overnight.

3.7 **TOLERANCES**

A. Section 32 12 16.13.

3.8 **TANK STERILIZATION**

A. Section 32 12 16.13.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete base course and concrete surface course.

B. Concrete product is not specified in this Section. Refer to Section 03 30 04.

1.2 REFERENCES

A. ACI 305: Hot Weather Concreting.

B. ACI 306: Cold Weather Concreting.

C. APWA Plan No. 261: Manual of Standard Plans for Concrete Pavement Joints.

D. ASTM A 307: Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

E. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

F. ASTM C 78: Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).

G. ASTM C 150: Standard Specification for Portland Cement.

H. ASTM C 172: Standard Method of Sampling Freshly Mixed Concrete.

I. ASTM D 3549: Standard Tet Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.

J. ASTM D 5249: Standard Specification for Backer Material for Use with Cold-and Hot-Applied Joint Sealants in Portland-Cement and Asphalt Joints.

L. ASTM E 950: Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference.

M. ASTM E 1274: Standard Test Method for Measuring Pavement Roughness Using a Profilograph.

1.3 SUBMITTALS

A. Before delivery.

1. Traffic control plan, Section 01 55 26.
2. Joint layout plan.
3. Curing plan. Describe method to prevent excessive concrete temperatures and water evaporation that could impair strength or serviceability of the concrete. Refer to ACI 305.
4. Proof of finisher's ACI certification.

5. Make and model name of paving machine.
6. Concrete mix design and number, Section 03 30 04.
7. Proof of profilograph calibration and profilograph operator certification.
8. Manufacturer's recommended installation procedures for joint sealing material which, when accepted by ENGINEER, will become the basis for accepting or rejecting actual installation procedures used in the Work.

B. At Delivery: Batch ticket, Section 03 30 10.

C. After delivery.

1. Profile deviation report.
2. Ride index report.
3. Upon ENGINEER's request, submit a written quality control inspections and testing report describing source and field quality control activities and test results performed by CONTRACTOR and CONTRACTOR's Supplier.

1.4 QUALITY ASSURANCE

A. Do not change concrete Supplier until ENGINEER accepts new source and new mix design.

B. Reject product that does not meet requirements of Section 03 30 04.

C. Remove product found defective after installation and install acceptable product at no additional cost to OWNER.

D. Foreman of paving crew has completed at least three (3) projects of similar size and nature.

1.5 WEATHER

A. Hot weather, ACI 305.

B. Cold weather, ACI 306.

1.6 NOTICE

A. Send written notice to residents and businesses within affected area at least 3 days before start of paving.

B. Indicate paving time and when new surface can be used.

C. Warn of potential vehicle tow away and other construction issues affecting neighborhood.

D. Should work not occur on specified day, send a new notice.

1.7 ACCEPTANCE

A. General:

1. Acceptance is by Lot. Lot size is specified below.

2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation.

Section 01 29 00.

3. Dispute resolution, Section 01 35 10 and Section 03 30 05.
4. Opening a paved surface to traffic does not constitute acceptance.

B Concrete Mix:

1. Testing Frequency: Section 03 30 05. Sample per ASTM C 172.
2. Temperature, Slump, Air: Lot size is 1 random batch. Reject noncomplying batches until 2 consecutive batches are compliant then continue in random batch testing for acceptance.
3. Strength: Lot is acceptable if strength test deviations are within pay factor 1.00 limits. At ENGINEER's discretion, a Lot with a sub-lot test deviation greater than Reject may stay in place at 50 percent cost.

a. Compression: ASTM C 39. Lot size is 500 square yards.

Pay	**PSI Below 28 day**
Factor	**Compressive Strength**
1.00	0
0.98	1 to 100
0.94	101 to 200
0.88	201 to 300
0.80	301 to 400
Reject	Greater than 400

b. Flexural: ASTM C 78. Lot size is 750 square yard.

Pay	**PSI Below 28 day**
Factor	**Flexure Strength**
1.00	0
0.95	1 to 29
0.85	30 to 60
Reject	Greater than 60

C. Installation:

1. Placement, finishing and protection, Section 03 30 10.

a. Verify grade, cross slope, finish and dimensions.
b. No standing water in curb and gutter.

2. Thickness. Lot size is 1,000 square yards.

a. Thickness will be determined on ASTM D 3549 cored or sawed specimens. Acceptance will be based on the average of all Lot thickness tests.

Pay Factors	Tolerance (inches less than specified thickness)
1.00	0.00 to 0.25
0.90	0.26 to 0.50
0.70	0.51 to 0.75
0.50	0.76 to 1.00

b. When any thickness measurement is less than specified by more than 1 inch, the actual thickness of the Pavement will be determined by taking additional cores at intervals less than 10 feet parallel to the centerline in each direction from the affected location, until in each direction a core is found which is not deficient by more than 1 inch. Exploratory cores for deficient thickness will not be used in averages for price

c. Payment may be made for areas deficient in thickness by more than 1 inch at 50 percent. If not, remove and replace.

d. Price adjustments and Pavement removal will be applied only to those areas showing the deficient thickness which is defined by an additional set of cores taken at the 100 percent pay point as determined in a straight line basis between the original cores. If the second set of cores is deficient, the area will be defined on a straight-line basis using all scores for the different pay factors.

3. Roughness: "Must grind" bumps are removed and tolerance for profile roughness index is not exceeded.

PART 2 PRODUCTS

2.1 CONCRETE

A. Compression Design:

1. Cast-in-place: Class 4000, Section 03 30 04.
2. Slump per accepted mix design.

B. Flexure Design.

1. Tensile Strength: 650 psi per ASTM C 78.
2. Cement Content: 6.5 bags.
3. Water Cement Ratio: 0.44 maximum by weight (prior to pozzolan exchange), ACI 318.
4. Entrained Air: 5 to 7 percent, ASTM C 231 (pressure).
5. Slump per accepted mix design

2.2 MISCELLANEOUS MATERIALS

A. Reinforcement: Grade 60 ksi galvanized or epoxy coated steel, Section 03 20 00.

B. Hook Bolts: Steel, ASTM A 307 Grade A nuts and bolts, internally and externally threaded.

C. Expansion Joint Filler: F1 sheet, Section 32 13 73.

D. Contraction Joint Filler (Backer Rod): Type 1 round, closed cell, ASTM D 5249.

E. Contraction Joint Sealant: HAS1, HAS4, or CAS6, Section 32 13 73.

F. Curing Compound: Liquid membrane, Section 03 39 00.

G. Bond Breaker: Wax based compound.

H. Grout: Epoxy adhesive, Section 03 61 00.

I. Evaporative Reducer: Water-based mono-molecular polymer liquid at application rates recommended by the manufacturer. Not to be used as a finishing aid.

PART 3 EXECUTION

3.1 PREPARATION

A. General:

1. Coordinate utility location, Section 01 31 13. Contact utility companies and other agencies, for dangerous concentration of combustible, flammable, or explosive matter.
2. Lower Street Fixtures if paving machine is not capable of passing over fixtures.
3. Coat surface of Street Fixtures with oil to prevent bond with concrete Pavement.
4. Remove sand, leaves and other objectionable materials prior to placing the paving course.
5. Notify ENGINEER minimum 24 hours prior to commencement of concreting operations.

B. Trees, Plants, Ground Cover:

1. Protect trees, plants and other ground cover from damage.
2. Prune trees, Section 32 01 93 to allow equipment passage underneath. Repair tree damage at no additional cost to the OWNER.

C. Traffic Control:

1. Provide worker and public safety, Section 01 55 26.
2. Apply temporary traffic and lane marking tape or paint after placement layout has been verified with ENGINEER.

D. Base Course:

1. Follow Section 31 25 00 for herbicide treatment.
2. Verify base course is placed to grade, compacted and dampened.
3. If indicated, apply prime coat, Section 32 12 13.

E. Cement Treated or Lean Concrete Base: Remove loose material from surface of cement treated or lean concrete base course immediately before placing concrete surface course. Moisten the surface but do not place concrete over puddled water. Apply a double coat of bond breaker prior to placing surface concrete.

3.2 FORM CONSTRUCTION

A. Section 03 11 00.

B. Check formwork for grade and alignment variance from the following tolerances:

1. Top of forms not more than 1/4 inch from true grade.
2. Vertical face on longitudinal axis not more than 1/4 inch from true line.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.3 REINFORCEMENT PLACEMENT

A. Section 03 20 00.

B. Interrupt reinforcement at expansion joints.

C. Use load transfer bars on longitudinal construction and transverse construction joints.

D. Use smooth dowel in expansion joints.

E. Keep load transfer bars and dowels in vertical center of concrete and perpendicular to the joint during concrete placement.

F. Position mats on bar chair supports and properly tie before any concrete is poured. Keep mats clean, free from rust, flat, and free of distortions. Straighten bends, kinks, and other irregularities or replace units before concrete placement. Provide a minimum of 2 inch overlap to adjacent mats.

3.4 JOINTS

A. General:

1. Review joint layout with ENGINEER.
2. Follow Section 32 13 73 requirements.
3. Follow joint requirements in APWA Plan No. 261.

B. Construction Joint: Construction joints (contact joints) (cold joints) are those made by placing concrete against cured concrete.

1. The contact joint between separately laid lanes cannot deviate from a true line by more than 1/4 inch in any direction at any point.
2. Tie both sides of longitudinal and transverse construction joints together with tie bars or key-way. Before placing concrete in adjoining slab, straighten tie bars to 0.1 feet of straight position.
3. Do not cause edge slump when placing tie-bars or by over-working edge of slab.

C. Contraction Joints: Contraction joints (crack control joints) are scorelines made to force crack joint locations in concrete. Keep a minimum of 3 working power saws on the Project when concrete operations are underway. Saw all joints before uncontrolled shrinkage cracking takes place. Do not tear or ravel concrete during sawing.

1. Joint spacing measured in feet = twice the slab thickness measured in inches or a

maximum of 15 feet.

2. Joint Depth = T/3.
3. Use of a mechanical control joint-void former in lieu of saw cutting or tooling is acceptable.
4. Longitudinal Joints: Make longitudinal joints the same dimension as transverse joints.
5. Make transverse joints across width of the Pavement full length and meet curb and gutter joints.
6. Leave forms in place until paving operations are resumed on the other side of the joint.

D. Volunteer Crack Joint:

1. If a volunteer crack joints falls within 5 feet of the location of proposed contraction joint, omit the contraction joint.
2. Rout volunteer crack joints to a 1-1/4 inch depth by 3/8 inch width. Clean and fill crack joint with backer rod and joint sealant.
3. When crack joints occur within 2 feet of expansion or construction joints, replace panel. Use saw cuts and tie-bars or dowels in cut planes.

E. Expansion Joints:

1. If a deformed rebar is used in an expansion joint, provide sleeve for movement.
2. Secure fillers to prevent movement. When butted together, do not leave voids or gaps between filler units.
3. Set joint fillers full depth if no joint sealant is specified.
4. Recess joint fillers if backer rods and joint sealant are specified or provide a plastic cap.

F Joint Sealing: Section 32 13 73.

G If CONTRACTOR chooses to open the roadway to construction or public traffic prior to final sawing and sealing, install backer rod in the initial (green) cut to prevent entrance of incompressibles.

3.5 CONCRETE PLACEMENT

A. Section 03 30 10.

B. At the beginning of concrete placement, test slump and air. If corrections are necessary, placement may proceed after 2 subsequent and consecutive batches pass testing.

C. **Any delay in excess of 15 minutes from placing to start of finishing operations is cause for stopping placement work**.

D. Do not place concrete until concrete sub base and surface course forms have been checked for line and grade. Moisten sub base if required to provide a uniform dampened condition at time of concrete placement. Do not place concrete around Manholes or other structures until they are at required finish elevation and cross-slope.

E. Prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and

consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

F. Do not place concrete in a longitudinal section until test specimens from the adjacent lane have attained an ASTM C 78 flexural strength (modulus of rupture) of 450 psi.

G. Deposit and spread concrete in a continuous operation between transverse joints. If interrupted for more than 1/2 hour, place a construction joint.

H. Place the concrete to the full width of the Pavement in a single construction operation unless indicated otherwise.

3.6 FINISHING

A. Section 03 35 00.

B. Any delay in excess of 30 minutes for completing the finishing operation is cause for stopping concrete placing to correct the difficulties.

C. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating.

D. After floating, test slab for trueness with a straight edge. Distribute concrete as required to remove surface irregularities. Refloat repaired areas to provide a continuous smooth finish.

E. Round edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool. Eliminate tool marks.

F. Surface Texture: After floating when excess moisture or surface sheen has disappeared.

1. For speed less than 45 mph: 1/16 inch deep burlap drag, turf drag, or broom.
2. For speed greater than 45 mph: 1/8 inch deep groove placed 80 degrees to center line and randomly spaced between 3/8 and 1-1/2 inches.

G. Do not remove forms for at least 24 hours after concrete has been placed. After form removal, clean ends of joints and patch any minor honeycombed areas. Remove and replace areas or sections with major defects.

3.7 CURING

A. Section 03 39 00.

B. Type II Class A or B (white pigmented) membrane forming compound applied in two directions for total white coverage on all exposed surfaces after texturing.

C. Eliminate thermal shock of concrete by keeping cure temperature close to ground and air temperature.

3.8 TOLERANCES

A. Grade: 1/8 inch in 10 feet parallel to centerline.

B. Cross Slope: 1/4 inch in 10 feet perpendicular to centerline except at cross section grade breaks.

C. Thickness: Not less than 1/4 inch deficient.
D. Roughness:

Table 1 - Roughness Tolerance

Speed and Traffic Class		Profile Roughness Index, (PRI) Inches/Mile				Profile Deviation Inches/25 feet Maximum
		IRI		PI		
		Min	Max	Min	Max	
0 to 29 mph	I or II	-	-	-	-	0.4
	III or IV	129	177	46	66	0.4
30 to 44 mph	I or II	90	115	35	50	0.4
	III or IV	70	90	21	35	0.4
45 mph +	All Classes	-	70	-	21	0.3

Notes
(a) Use a zero blanking band
(b) As a minimum, trace right wheel path in direction of travel
(c) Traffic class defined in Table 3, Article 32 12 05.
(d) IRI (International Roughness Index), ASTM E 950
(e) PI (Profile Index). ASTM E 1274.

1. Profile Deviation: Begin traces 50 feet before edge of new pavement and end traces 50 feet after edge of new pavement. Areas exceeding profile deviation tolerance are "must grind" areas.
2. Profile Roughness Index: (PRI)
   a. Lot is 0.1 lane mile (528 feet long one lane wide). Add segments shorter than 250 feet to preceding Lot. Treat partial segments longer than 250 feet as a Lot.
   b. Exclude from the Lot are turn lanes, parking lanes, medians, Street Fixtures, crowns of intersecting streets, bridge decks, grades greater than 8 percent, and vertical curves less than 1,000 feet radius (including super-elevation transitions).

3.9 OPENING TO TRAFFIC

A. Not less than 3,000 psi compressive or 400 psi flexure strength.

3.10 PROTECTION AND REPAIR

A. General: All expenses are at no cost to OWNER.

B. Protection: Section 03 30 10 and as follows.

1. Do not allow steel wheel rollers or steel wheel vehicles on the concrete Pavement. Keep traffic and construction equipment off at least 10 days after concrete placement or until 100 percent of the design strength has been achieved and verified by either
   a. Maturity meter.
   b. Concrete cylinders.
2. If construction traffic is permitted, keep Pavement clean. Remove surface stains and spillage of materials as they occur.
3. Remove saw-cut dust immediately. Protect neighborhood, storm drains and down-stream fish habitat.

C. Repair: Section 03 30 10.

1. Corrective Action for "Must Grinds": Grinding per Section 02 41 14 is acceptable after concrete cure.
2. Corrective Action for Profile Roughness Index: Grinding is acceptable. Re-profile corrected segments to verify ride index meets tolerance.
3. Corrective Action for Cracks: Consider repair options published in Guidelines by the American Concrete Pavement Association (ACPA). Do not begin corrective work until ENGINEER agrees with repair option. Drill test cores when necessary to determine magnitude. Fill holes with Portland cement concrete bonded to Pavement with epoxy adhesive.

END OF SECTION

SECTION 32 13 73

CONCRETE PAVING JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Joints and joint sealants in horizontal traffic surfaces for concrete sidewalks, curb, gutter and Pavement slabs.

1.2 REFERENCES

A. ASTM C 920: Standard Specification for Elastomeric Joint Sealants.

B. ASTM D 545: Standard Methods of Testing Preformed Expansion Joint Fillers for Concrete Construction (Nonextruding and Resilient Types).

C. ASTM D 994: Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

D. ASTM D 1190: Standard Specification for Concrete Joint Sealer, Hot-Poured Elastic Type.

E. ASTM D 1191: Standard Method for Testing Concrete Joint Sealers.

F. ASTM D 1751: Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

G. ASTM D 1752: Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

H. ASTM D 1850: Standard Specification for Concrete Joint Sealer, Cold-Application Type.

I. ASTM D 1851: Standard Methods of Testing Concrete Joint Sealers, Cold-Application Type.

J. ASTM D 2240: Standard Test Method for Rubber Property -Durometer Hardness.

K. ASTM D 2628: Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

L. ASTM D 3405: Standard Specification for Joint Sealants, Hot-Poured, For Concrete and Asphalt Pavements.

M. ASTM D 3406: Standard Specification for Joint Sealant, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements.

N. ASTM D 3407: Standard Methods of Testing Joint Sealants, Hot-Poured, For Concrete and Asphalt Pavements.

O. ASTM D 3408: Standard Methods of Testing Joint Sealants, Hot-Poured, Elastomeric-Type, for Portland Cement Concrete Pavements.

P. ASTM D 3542: Standard Specification for Preformed Polychloroprene Elastomeric Joint

Seals for Bridges.

Q. ASTM D 3569: Standard Specification for Joint Sealant, Hot-Applied, Elastomeric, Jet-Fuel-Resistant-Type for Portland Cement Concrete Pavements.

R. ASTM D 3575: Standard Test Method for Flexible Cellular Materials Made from Olefin Polymers.

S. ASTM D 3581: Standard Specification for Joint Sealant, Hot-Poured, Jet-Fuel-Resistant Type, for Portland Cement Concrete and Tar-Concrete Pavements.

T. ASTM D 3582: Standard Methods for Testing Joint Sealant, Hot-Poured, Jet-Fuel-Resistant Type, for Portland Cement Concrete and Tar-Concrete Pavements.

U. ASTM D 3583: Standard Methods of Testing Joint Sealant, Hot-Applied, Elastomeric-Type, for Portland Cement Concrete Pavements, or Joint Sealant, Hot-Applied, Elastomeric, Jet-Fuel-Resistant-Type, for Portland Cement Concrete Pavements.

V. ASTM D 5249: Standard Specification for Backer Material for Use with Cold-and Hot-Applied Joint Sealants in Portland-Cement and Asphalt Joints.

W. ASTM D 5893: Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

X. FS SS-S-200: Sealants, Joint, Two Component, Jet-Fuel Resistant, Cold-Applied, for Portland Cement Concrete Pavement.

1.3 SYSTEM PERFORMANCES

A. Pavement joints include longitudinal and transverse expansion joints, contraction joints, construction joints, and crack control joints.

B. Provide joint sealants that maintain watertight and airtight continuous seals.

1.4 SUBMITTALS

A. Manufacturer's certification that product was manufactured, tested and supplied per source quality control requirements specified herein, together with a report of the test results and the date each test was completed.

B. Manufacturer's instruction for joint preparation, type of cleaning and installation.

C. Manufacturer's Product Data and Samples for each joint sealant product required.

D. Safety data sheets.

1.5 QUALITY ASSURANCE

A. Installation of joint systems are to follow manufacturer's published directions.

B. For cold applied joint sealant installation, use installers approved by the joint sealant Supplier.

C. Obtain joint sealing materials from a single manufacturer for each different product

required.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original unopened containers or bundles with labels identifying manufacturer, product name and designation, color, expiration period for use, pot life, cure time, and mixing instructions for multi-component materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent deterioration; or damage due to moisture, high or low temperatures, contaminants, or other causes.

PART 2 PRODUCTS

2.1 GENERAL

A. Compatibility: Provide joint fillers, sealant backings, sealants, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2.2 JOINT VOID -FORMER

A. Plastic with a water stop.

B. 1/4 depth of concrete structural section

2.3 JOINT FILLER -SHEET TYPE

A. **F-1**: Bituminous (asphalt or tar) mastic, ASTM D 994. Formed and encased between 2 layers of bituminous saturated felt or 2 layers of glass-fiber felt.

B. **F-2**: Cane or other cellulosic fiber, ASTM D 1751. Saturated with asphalt.

C. **F-3**: Granulated cork, ASTM D 1751. In an asphalt binder; encased between 2 layers of asphalt saturated felt or 2 layers of glass-fiber felt.

D. **F-4**: Sponge rubber fully compressible, ASTM C 1752. With resiliency recovery rate of 90 percent minimum.

E. **F-5**: Cork, ASTM C 1752. Impregnated and bound with asphalt, compressible with resiliency recovery rate of 90 percent if not compressed more than 50 percent of original thickness.

F. **F-6**: Plastic foam (for cold-applied sealants only). Preformed, compressible, resilient, non-waxing, non-extruding strips of flexible, non-gassing plastic foam; non-absorbent to water and gas; 30 lb/ft^3 density maximum, And of size and shape to control sealant depth and performance.

2.4 JOINT FILLER -BACKER ROD, TAPE, POURED FILL TYPE

A. Backer material, ASTM D 5249 for cold-and hot-applied joint sealant in portland cement concrete or asphalt Pavements joints.

1. Type 1: Round rods.
2. Type 2: Sheets or strips, laminated or skived.
3. Type 3: Poured fills which completely fill Pavement joint.

2.5 JOINT SEALANT -GENERAL

A. Color of exposed joint sealant indicated, or if not, as selected from manufacturer's standard colors.

2.6 JOINT SEALANT -HOT-APPLIED

A. **HAS-1**: Asphalt base type, ASTM D 3405.

B. **HAS-2**: Thermoplastic type, ASTM D 3581. Jet-fuel resistant without rubber unless indicated otherwise.

C. **HAS-3**: Elastic type, ASTM D 1190.

D. **HAS-4**: Elastomeric type, ASTM D 3406. One component, for Portland cement concrete Pavements.

E. **HAS-5**: Elastomeric type, ASTM D 3569. One component, jet-fuel resistant, for Portland cement concrete Pavements.

2.7 JOINT SEALANT -COLD-APPLIED

A. **CAS-1**: Elastomeric type, ASTM C 920. Chemically curing, for vehicular or pedestrian use, and types of construction other than highway and airfield Pavements and bridges and joint substrates indicated; Type S or M; Grade P or NS; Class 25; Use T, NT, M and O.

1. Self leveling.
2. Shore A Hardness: 40 5 ASTM D 2240.
3. Final cure: 4 days maximum.
4. Service range: -10 to 150 deg. F.

B. **CAS-2**: Mastic type, ASTM D 1850. Single or multiple component; for joints having a minimum width of 1/2 inch.

C. **CAS-3**: Coal-tar modified urethane, FS SS-S-200. One part, jet fuel resistant; Type H.

D. **CAS-4**: Elastomeric preformed polychloroprene type with lubricant adhesive and indicated movement ratio.

1. For concrete Pavement seal, ASTM D 2628.
2. For concrete bridge seals, ASTM D 3542.

E **CAS-5**: Silicone type, ASTM D 5893. Single component, non-sag or self leveling, chemically curing sealant based on polymers of polysiloxane structure intended for use

in portland cement concrete Pavements.

F. **CAS-6**: Asphalt base meeting ASTM D 3405.

G. **CAS-7**: Olefin polymer, ASTM D 3575 as follows.

1. Tensile elongation 255 percent plus or minus 20 percent, Suffix T. 560
2. Tensile strength 115 psi minimum, Suffix T
3. Density 2.9 plus or minus 3 lbs/cf, Suffix W, Method A
4. Water Absorption 0.025 lbs/sf maximum, Suffix L.

2.8 SOURCE QUALITY CONTROL

A. Preformed Expansion Joint Fillers: Nonextruding and resilient types, ASTM D 545.

B. Hot-Applied Joint Sealants:

1. Elastic type used in concrete Pavements, bridges, other structures, ASTM D 1191.
2. Bituminous type for hydraulic and asphaltic concrete Pavements, ASTM D 3407.
3. Elastomeric type for hydraulic concrete Pavement, ASTM D 3408.

C. Jet-Fuel-Resistant Joint Sealant: Hot-applied, ASTM D 3582 and ASTM D 3583.

D. Cold-Applied Mastic Joint Sealant: Cold-applied, ASTM D 1851.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove oil, grease, wax, form-release-agents, curing compounds, bitumens, laitance and old chalking material by sandblast, or water blast as recommended by manufacturer of sealant. Maximum sand blast angle, 25 degrees plus or minus 5 degrees.

B. Clean and dry with air blast. Do not contaminate air blast with oils or lubricants.

C. Remove frost and moisture in concrete joint substrates before commencing sealing.

D. Install bond breaker tape where needed or required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.

3.2 JOINT SEALING

A. General:

1. Install sealants in uniform, continuous ribbons without gaps or air pockets, with complete bonding of joint surfaces on opposite sides.
2. Except as otherwise indicated, fill sealant rabbet flush with surface.
3. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove so that joint will not trap moisture and dirt.

B. Depths: Saw cut joints if necessary to provide the required sealant thickness and depth.

Install sealant to depths indicated or, if not indicated, as recommended by sealant manufacturer, but within the following general limitations measured at center (thin) section of bead:

1. For sidewalks, Pavements, and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75 percent of joint width, but not more than 5/8 inch deep nor less than 3/8 inch deep.
2. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2 inch deep nor less than 1/4 inch deep.
3. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints full depth.

C. Spillage: Do not allow poured sealant compound to overflow or spill onto adjoining surfaces or to migrate into voids of adjoining surfaces. Clean adjoining surfaces to eliminate evidence of spillage.

D. Heating: Do not use overheated hot-applied sealants.

E. Edges: Unless indicated otherwise, recess exposed edges of gasket and exposed joint fillers slightly behind adjoining surfaces so compressed units will not protrude from joints.

3.3 CURING AND CLEANING

A. Cure sealants and caulking compounds per manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability.

B. Clean off excess sealants or sealant smears adjacent to joints as work progresses. Use methods and cleaning materials approved by manufacturers of joint sealant and of products in which joints occur.

C. Remove protective coating and oil from metals with solvent recommended by the sealant manufacturer.

3.4 PROTECTION

A. Protect joint sealant during and after curing period from contact with contaminating substances or from damage resulting from deterioration or damage at time of Substantial Completion.

B. If damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealant immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work at no additional cost to OWNER.

END OF SECTION

SECTION 32 14 13

PRECAST CONCRETE UNIT PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Mortarless interlocking concrete pavers for sidewalks, roadways and similar pavings.

1.2 REFERENCES

A. ASTM C 33: Standard Specification for Concrete Aggregates.

B. ASTM C 67: Standard Method of Sampling and Testing Brick and Structural Clay Tile.

C. ASTM C 136: Standard Method for Sieve Analysis for Fine and Coarse Aggregates.

D. ASTM C 140: Standard Method of Sampling and Testing Concrete Masonry Units.

E. ASTM C 144: Standard Specification for Aggregate for Masonry Mortar.

F. ASTM C 150: Standard Specification for Portland Cement.

G. ASTM C 936: Standard Specification for Solid Interlocking Concrete Paving Units.

H. ASTM C 979: Coloring Agents for Concrete.

I. ASTM D 1557: Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using a 10 lb (4.54-kg) Rammer and an 19-In. (457-mm) Drop.

J. ASTM D 3786: Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics Diaphragm Bursting Strength Tester Method.

K. ASTM D 4751: Standard Test Method for Determining Apparent Opening Size for a Geotextile.

L. ICPI: Interlocking Concrete Paver Institute.

1.3 SUBMITTALS

A. Data sheets for

1. Bedding sand gradation.
2. Joint sand gradation.
3. Joint sand stabilizer.
4. Paver strength and absorption. Test results not older than 365 days.

B. Certification that paver unit complies with ASTM C 936.

1.4 QUALITY ASSURANCE

A. Installer must have successfully completed at least 3 unit paver applications of similar size and scope and will assign mechanics from these earlier applications to the Project, of which one will serve as lead mechanic.

B. Installer will have on site during the course of paving personnel who is knowledgeable of ICPI technical bulletins.

1.5 PRODUCT HANDLING

A. Protect unit pavers against soilage. Protect sand against intermixture with earth or other types of materials.

B. Do not build on frozen Subgrade or setting beds.

C. Remove damaged pavers.

PART 2 PRODUCTS

2.1 CONCRETE PAVERS

A. Solid interlocking units per ASTM C 936 with spacer bars.

1. Cement: ASTM C 150 hydraulic cement.
2. Aggregates: ASTM C 33 sand and natural aggregates (washed and graded with no expanded shale or light weight aggregates).
3. Average Compressive Strength: Greater than 8,000 psi with no individual unit test less than 7,200 psi.
4. Average Absorption: Less than 5 percent with no individual unit greater than 7 percent, ASTM C 140.
5. Freeze-Thaw: Resistance to 50 cycles, ASTM C 67.
6. Efflorescence Prevention: Admixture per recommendation of manufacturer.

B. Shape: 200 mm x 100 mm unless specified elsewhere.

C. Thickness:

1. Sidewalks: 60 mm.
2. Roadways: 80 mm.
3. Crosswalks: 80 mm.
4. Driveway Approaches: 80 mm.

D. Color: Reddish brown using an inorganic mineral oxide.

2.2 BEDDING AND JOINT SAND

A. Clean, non-plastic, naturally occurring silica sand conforming to ASTM C 33 or ASTM C 144, with no more than 5 percent acid soluble material.

B. Gradation must not vary from the high limit on one sieve to the low limit on the next. Graded by dry weight to pass sieves per ASTM C 136 as follows.

Sieve	Bedding Sand ASTM C33	Joint Sand ASTM C 144
3/8 inch	100	-- --
No. 4	95 to 100	100
No. 8	85 to 100	95 to 100
No.16	50 to 85	50 to 100
No.30	25 to 60	40 to 100
No. 50	5 to 30	20 to 40
No. 100	2 to 10	10 to 25
No. 200	0 to 1	0 to 10

2.3 JOINT SAND STABILIZER

A. Water based polymer sealer capable of penetrating the joint sand to a depth of 1/2 inch prior to polymerization.

B. No significant discoloration.

C. No significant static coefficient of friction reduction.

2.4 GEOTEXTILE FILTER FABRIC

A. Non-woven with the following properties.

1. Apparent Opening Size (OAS): ASTM D 4751, 70 sieve.
2. Puncture: ASTM D 3786, 65 lbs minimum.
3. Thickness: 60 mils average.

B. Consult fabric manufacturer if,

1. Subgrade CBR less than 2, or
2. Surfaces are subject to highway or industrial loads.

2.5 SOURCE QUALITY CONTROL

A. ICPI member manufacturer.

B. Concrete masonry units, ASTM C 140.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify Subgrade is compacted, ready to receive substrate materials, and is sloped to drain.

3.2 PREPARATION

A. Layout: Check final elevations and patterns for conformance to Drawings.

B. Installation over soil base.
   1. Place specified base course over compacted Subgrade at specified thickness.
   2. Compact to greater than 95 percent ASTM D 1557.
   3. Soil base surface tolerance is 3/8 inch in 10 feet.

C. Installation over concrete base.
   1. Fill drainage holes in concrete base with bedding sand.
   2. Cover filled drainage holes with geotextile.

3.3 INSTALLATION

A. Bedding Sand:
   1. Place and screed allowing for paver height and compaction.
   2. After screeding, do not disturb or compact. Fill screed rails voids with loose sand.
   3. Remove all compressions in the bedding sand.
   4. Remove from bedding sand any concrete dust or waste from the paver cutting operation

B. Cutting Pavers:
   1. Point up joints to provide a neat, uniform appearance.
   2. Minimum cut length is 3/4 paver, or 1/2 paver providing adjacent paver is also reduced no more than 1/2 its original length.
   3. Cut vertical faces with masonry saw.
   4. No chipping or breaking for shaping.
   5. No modification of top or bottom face of paver.

C. Pavers:
   1. Do not install paver over saturated or dry sand. Sand should be damp.
   2. Paver surface to be 1/8 to 3/16 inch above grade or edge restraints after compaction.
   3. Keep paver lines straight, true, and square.
   4. Use a low amplitude, high frequency plate vibrator capable of at least 5,000 lbf at a frequency of 75 hz to 10 hz.
   5. Do not vibrate within 6 feet of an unrestrained edge of pavers.

D. Joint Width:
   1. 1.5mm–4mm.
   2. Maximum 50 percent between 2mm–3mm and 10 percent between 3mm–4mm in any 3 feet square area.

E. Joint Sand and Stabilizer:
   1. After setting pavers, sweep joint sand into joints and vibrate again until joints are full.
   2. Bedding sand may be used for joint sand, however, extra effort in sweeping and compacting the pavers may be required in order to completely fill the joints.
   3. After final vibration remove excess sand and debris.
   4. Apply joint sand stabilizer within 1 week of installing joint sand.

3.4 TOLERANCES

A. Lippage: 1/16 inch maximum elevation difference unit to unit.

B. Cross Slope: 1/8 inch in 10 feet.

C. Longitudinal:.

1. Sidewalks: 1/8 inch in 10 feet.
2. Roadway:
   a. 1/8 inch in 10 feet parallel to centerline.
   b. 1/4 inch in 10 feet perpendicular to centerline except at cross section grade breaks.

3.5 PROTECTION AND REPAIR

A. Provide final protection and maintain conditions in a manner acceptable to installer.

B. Repair:

1. Remove and replace non-matching pavers or pavers which are chipped, broken, stained or otherwise damaged. Fill joints with joint sand and compact with plate compactor.
2. Remove excess sand.

END OF SECTION

SECTION 32 14 16

BRICK UNIT PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Handling and installation procedures for paving brick.
B. Material requirements and tolerances.

1.2 REFERENCES

A. ANSI: American National Standards Institute.
B. ASTM C 33: Standard Specification for Concrete Aggregates.
C. ASTM C 144: Standard Specification for Aggregate for Masonry Mortar.
D. ASTM C 150: Standard Specification for Portland Cement.
E. ASTM C 207: Standard Specification for Hydrated Lime for Masonry Purposes.
F. ASTM C 902: Standard Specification for Pedestrian and Light Traffic Paving Brick.
G. BIA: Brick Institute of America.

1.3 SUBMITTALS

A. Test Reports: Submit control testing reports as requested verifying compliance with specified standards.
B. Brick Samples: Prior to commencing work, obtain approval of representative Samples of the brick specified.

1.4 PRODUCT HANDLING

A. Handle and store paving brick in a manner to avoid chipping, breakage, intrusion of foreign matter, and staining.
B. Handle, store, mix and apply proprietary setting and grouting materials in strict compliance with the manufacturer's instructions.
C. Take precautions to protect the mortar and grout admixtures from freezing or from excessive heat.

PART 2 PRODUCTS

2.1 PAVING BRICK

A. ASTM C 902 classification Type SX (freeze resistant), Traffic Type 1 (extensive abrasion), application PX (without mortar joints) unless indicated otherwise.

1. Nominal Size: 3-5/8 inches x 7-5/8 inches x 2 inches for roadway or Driveway areas, 3-5/8 inches x 7-5/8 inches x 1 inch for sidewalk areas.
2. Color: Reddish brown if not elsewhere specified.
3. Friction Test: 0.5 minimum for wet leather and wet brick.

2.2 MORTAR AND GROUT

A. Mixture of water, ASTM C 150 type I Portland cement, ASTM C 207 type S lime, ASTM C 144 mason's sand, ASTM C 33 concrete sand to provide the following.

1. Compressive Strength: Thick bed mortar, 3,000 psi minimum.
2. Compressive Strength: Thin bed, bonding, grouting mortars, 5,000 psi minimum.
3. Tensile Strength: Thin bed, bonding, grouting mortars, 500 psi minimum.
4. Bond Strength: Thin bed, bonding, grouting mortars, 500 psi minimum.
5. Water Absorption: 4.0 percent maximum.
6. Ozone Resistance: 200 hours at 200 ppm. No loss of strength.
7. Smoke Contribution Factor: 0
8. Flame Contribution Factor: 0

B. Resistant to urine, dilute acid, dilute alkali, sugar, brine, and food waste products.

C. Additives compatible from one manufacturer, non-toxic, non-flammable, and non-hazardous during storage, mixing, application, and when cured.
The addition of water or other materials to dilute the mortar additive on the job site will not be permitted.

2.3 REINFORCING MESH

A. 6 x 6 x 10 gage galvanized welded wire mesh, Section 03 20 00.

2.4 WATER REPELLANT

A. Penetrating compound, Section 07 19 00.

2.5 JOINT SEALING COMPOUND

A. CAS1 polyurethane, Section 32 13 73 unless indicated otherwise.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect surfaces scheduled to receive brick paving for:

1. Defects that will affect the execution and quality of the Work.
2. Deviations beyond allowable tolerances over the substrate.

B. Correct unsatisfactory conditions.

3.2 PREPARATION

A. Clean surfaces as required to remove materials which will affect installation.

B. Place concrete base to nominal finish grade, minus paving brick thickness and setting bed mortar.

C. Wet cure concrete base. Remove curing compounds by sandblast prior to placing setting bed mortar.

3.3 INSTALLATION

A. Install per ANSI and BIA recommendations.

B. Cut units with powered masonry saw.

C. Lay units out so that fields or patterns center in areas.

D. Lay units out to minimize pieces smaller than 1/2 brick.

E. Set units into setting bed while mortar is still plastic or set in thin set mortar over prepared setting bed.

F. Tap each unit firmly into place to assure full adhesion.

G. Set units with nominal 3/8 inch joints between units.

H. Force grout between units to fill joints completely.

I. Remove surplus grout and leave faces clean.

J. Flood brick paving to determine any areas of standing water. Remove and replace any area where ponding is found to stand more than 3/8 inch deep.

K. Provide sealant joints where brick abuts vertical surfaces, around penetrations, and over expansion or control joints where indicated.

L. Apply surface sealer per manufacturer's recommendation.

3.4 TOLERANCES

A. For finish surface of paving, do not exceed 1/16 inch unit to unit offset to flush, and a tolerance of 1/8 inch in 2 feet and 1/4 inch in 10 feet from level or slope indicated.

3.5 PROTECTION

A. Protect installed pavers from damage.

B. Do not allow vehicular traffic on brick paving for 14 days or until the mortar and underlying concrete has reached a strength of 3,000 psi.

C. Provide alternate access to adjacent properties.

3.6 CLEANING

A. Remove protective coverings.

B. Clean entire surface with cleaning compound.

C. Protect adjacent surfaces from damage due to cleaning operations.

D. Additional brick masonry cleaning requirements, refer to Section 04 21 00 requirements.

END OF SECTION

SECTION 32 16 13

DRIVEWAY, SIDEWALK, CURB, GUTTER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete flatwork such as but not limited to waterways, waterway transition structures, sidewalks, curbs, gutters, Driveway Approaches.

1.2 REFERENCES

A. American Public Works Association (Utah Chapter).

1. Plan 205: Curb and Gutter.
2. Plan 209: Curbs.
3. Plan 211: Waterway.
4. Plan 213: Waterway Transition Structure.
5. Plan 215: Dip Driveway Approach.
6. Plan 216: Mountable curb driveway approach.
7. Plan 221: Flare Driveway Approach.
8. Plan 225: Open Driveway Approach.
9. Plan 229: Pipe Driveway Approach.
10. Plan 231: Concrete Sidewalk.

B. ASTM A 36: Standard Specifications for Structural Steel.

C. ASTM C 39. Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

D. ASTM C 172: Standard Method of Sampling Freshly Mixed Concrete.

1.3 DEFINITIONS

A. Driveway: A paved or unpaved vehicular thoroughfare outside of, but connected to a public road right-of-way or highway right-of-way.

B. Driveway Approach: (1) A vehicular thoroughfare connecting a public road or highway to a driveway. (2) A concrete structure composed of sidewalk, apron and any curb and gutter abutting the apron. When an apron is built as a bridge over curb and gutter, the bridge is included in this definition.

1.4 SUBMITTALS

A. Traffic control plan, Section 01 55 26.

B. Concrete mix design, Section 03 30 04.

C. Batch ticket, Section 03 30 10.

D. Quality Control Inspections and Testing Report: Upon ENGINEER's request, submit a

report describing source and field quality control activities and test results performed by CONTRACTOR and CONTRACTOR's Suppliers.

1.5 NOTICE

A. Send written notice to residents and businesses within affected area at least 3 days before work starts.

B. Indicate when concrete work will take place and when driveway approach can be used.

C. Warn of potential vehicle tow away and other construction issues affecting neighborhood.

D. Should work not occur on specified day, send a new notice.

1.6 ACCEPTANCE

A. General:

1. Acceptance is by Lot. One Lot is one day's production.
2. If non-complying material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation. Section 01 29 00.
3. Dispute resolution, Section 01 35 10 and Section 03 30 05.

B. Concrete Mix:

1. Testing Frequency: Section 03 30 05. Sample per ASTM C 172.
2. Temperature, Slump, Air: Lot size is 1 random batch. Reject noncomplying batches until 2 consecutive batches are compliant then proceed in random batch testing for acceptance.
3. Strength: ASTM C 39. Lot size is 50 cubic yards. At ENGINEER's discretion, a Lot with sub-lot test deviations greater than Reject may stay in place at 50 percent cost.

Pay Factor	**PSI Below 28 day Compressive Strength**
0.98	1 to 100
0.94	101 to 200
0.88	201 to 300
0.80	301 to 400
Reject	Greater than 400

C. Placement, finishing and protection, Section 03 30 10

1. Verify line, grade, cross slope and finish.
2. No standing water in curb and gutter.

PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete Mix.:

1 Cast-in-place: Class 4000, Section 03 30 04.
2. Maximum slump per mix design.

B. Reinforcement: Grade 60 ksi galvanized or epoxy coated steel per Section 03 20 00.

C. Expansion Joint Filler: F1 sheet 1/2 inch thick per Section 32 13 73.

D. Contraction Joint Filler (Backer Rod): Closed cell, Type 1 round Section 32 13 73.

E. Contraction Joint Sealer: HAS1 or HAS4 hot applied per Section 32 13 73.

F. Curing Compound: Membrane forming compound per Section 03 39 00.

G. Plate Steel: ASTM A 36 galvanized per Section 05 05 10.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Slip Form Machines.

1. Placement must produce required cross-section, lines, grades, finish, and jointing as specified for formed concrete.
2. If results are not acceptable, remove and replace work with formed concrete.

3.2 PREPARATION

A. Control pedestrian and vehicular traffic, Section 01 55 26.

B. Examine surfaces scheduled to receive concrete formwork for defects.

C. Do not start work until defects are corrected.

D. Check slopes on each side of the work to ensure drainage. Failure to check and verify will result in CONTRACTOR repairing any drainage deficiencies at no additional cost to OWNER.

3.3 LAYOUT

A. Curb, Gutter, Curb and Gutter: Plan 205, 209, 211, 213.

1. Line: Less than 1/2 inch variance in 10 feet and not more than 1 inch from true line at any location.
2. Grade: Not more than 1/4 inch variance in 10 feet. Flood curb and gutter with water after final cure has been reached. Remove and replace any area where ponding is found.

B. Sidewalk: Plan 231.

1. Cross slope 2 percent.

2. Landing slope 2 percent maximum in any direction.
3. Ramp slope, Section 32 16 14.

C. Driveway Approaches: Plan 215, 216, 221, 225, 229.

3.4 CONCRETE PLACEMENT

A. Section 03 30 10.

B. Make sure base course is uniformly damp at time of concrete placement.

C. Obtain ENGINEER's review of base course and forms before placing concrete.

D. Do not use methods that segregate the mix.

E. Place concrete so time between end of placement and beginning of finishing is less than 15 minutes.

F. Consolidate concrete with vibrator or other acceptable method. Do not use mechanical vibrators. Prevent dislocation of inserts.

3.5 CONTRACTION JOINTS

A. Geometrics:

1. Tooled Joints (Score Lines):
   - Depth = T/4. T is the depth of the concrete slab in inches.
   - Top radius = 1/2 inch.
2. Saw Cut Joints: Saw joints before uncontrolled shrinkage cracking occurs. Do not tear or ravel concrete during sawing.
3. Template Joints: 1/8 to 3/16 inch wide 1/4-depth of slab.

B. Sidewalks.

1. At intervals equal to the width of the sidewalk and transverse to the line of walk.
2. Radial at curbs and walk returns.
3. Place longitudinal joints in walks when width of walk in feet is greater than 2 times the walk thickness in inches. (e.g. maximum width of a 4 inch thick walk before placement of a longitudinal contraction joint is 8 feet). Make longitudinal joints parallel to, or concentric with, the lines of the walk.
4. In walk returns make 1 joint radially midway between the beginning of curb returns (BCR) and end of curb returns (ECR). Match longitudinal and traverse joints with the adjacent walks.

C. Curb, Gutter, Waterway.

1. Place joints at intervals not exceeding 12 feet.
2. At curb radius and walk returns make the joints radial.
3. Where integral curb and gutter is adjacent to concrete Pavement, align the joints with the Pavement joints where practical.

D. Additional Contraction Joint Requirements: Section 32 13 73.

3.6 EXPANSION JOINTS

A. Geometrics: 1/2 inch wide full depth filler that is flush with concrete surface. Do not place seal over top of filler

B. Sidewalks, Sidewalk Ramps.

1. Place expansion joints to separate sidewalk from utility poles, hydrants, Manhole frames, buildings and abutting sidewalks.
2. Place expansion joints between the sidewalk and the back of curb returns and between the sidewalk and sidewalk ramps.
3. Do not place expansion joints in sidewalk ramp surfaces.
4. Expansion joints are not required when using slip form method to place concrete except where sidewalk changes direction or where it joins foundation walls or structures.

C. Curb, Gutter, Waterway.

1. Do not place longitudinal joints in drain gutter flow-lines.
2. Where drain gutter transitions extend beyond the curb return, place expansion joints at the ends of the drain gutter transition.
3. Place expansion joints at beginning of curb radius (BCR) and end of curb radius (ECR).

D. Slip Form Work: Expansion joints are not required except at BCR or ECR.

E. Driveway Approach: Do not place expansion joints in curb returns.

F. Street Intersection Corner: Place expansion joints at BCR and ECR.

G. Additional Expansion Joint Requirements: Section 32 13 73.

3.7 FINISH

A. Section 03 35 00.

B. Round edges exposed to public view to a 1/2 inch radius.

C. Apply broom finish longitudinal to curb and gutter flowline.

D. Apply broom finish transverse to sidewalk centerline as follows.

1. Fine hair finish where grades are less than 6 percent.
2. Rough hair finish where grades exceed 6 percent.

E. Remove form marks or irregularities from finish surfaces.

3.8 CURING

A. Section 03 39 00.

B. Type ID Class A (clear with fugitive dye) membrane forming compound. Apply total coverage in 2 directions after texturing.

C. Eliminate thermal shock of concrete by keeping cure temperature even throughout extent and depth of concrete slab.

3.9 PROTECTION AND REPAIRS

A. General: All expenses are at no cost to OWNER.

B. Protection: Section 03 30 10.

1. Protect concrete work from deicing chemicals during the 28 day cure period.
2. Immediately after placement, protect concrete from graffiti or other types of mechanical injury.

C. Repair: Section 03 30 10.

1. Correct all humps or depressions.
2. Secure ENGINEER's acceptance of method of correction.

END OF SECTION

SECTION 32 16 14

CURB CUT ASSEMBLY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete flatwork for curb cut assemblies.

1.2 REFERENCES

A. American Public Works Association (Utah Chapter).
   1. Plan 235: Corner Curb Cut Assembly.
   2. Plan 236: Tangent Curb Cut Assembly.
   3. Plan 237: Islands and Median.
   4. Plan 238: Detectable Warning Surface.

B. Work Zone Traffic Control Guide: Publication of the Utah LTAP Center.

1.3 DEFINITIONS

A. Clear Space: A 4 feet minimum by 4 feet minimum surface located within the width of the crosswalk and adjacent to a curb cut.

B. Cross Slope: Grade perpendicular to the direction of pedestrian travel usually expressed in percent.

C. Running Slope: Grade parallel to the direction of pedestrian travel usually expressed in percent.

D. Ramp: A flat surface with a maximum Running Slope of 1:12 (8.33 percent) and a maximum Cross Slope of 1:48 (2 percent) with sides perpendicular to its ends and ends parallel to each other.

E. Curb Ramp: A Ramp that cuts through a curb.

F. Detectable Warning Surface: A surface of truncated domes aligned in a square or radial grid pattern.

G. Cross Width: Distance perpendicular to the direction of pedestrian travel usually expressed in lineal measure.

H. Running Width: Distance parallel to the direction of pedestrian travel usually expressed in lineal measure.

1.4 SUBMITTALS

A. Traffic control plan, Section 01 55 26.

B. Concrete mix design, Section 03 30 04.

C. Batch ticket, Section 03 30 10.

D. Detectable Warning Surface product data sheet.

1.5 **ACCEPTANCE**

A. Clear Space: Running Slope.
B. Flow-line: No standing water, no trip hazard.
C. Detectable Warning Surface:
   1. Color contrast, dome geometry, joints between units.
   2. Cross Width, Running Width.
D. Curb Cut: Cross Width (appropriate to number of crosswalks served).
E. Landing: Running Slope, Cross Slope, dimensions.
F. Ramp: Running Slope, Cross Slope, Cross Width, transition ends.

PART 2 PRODUCTS

2.1 **MATERIALS**

A. Cast-in-place Concrete: Class 4000, Section 03 30 04.
B. Pavers:
   1. Concrete, Section 32 14 13.
   2. Brick, Section 32 14 16.
C. Other Materials: CONTRACTOR's choice.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Refer to Work Zone Traffic Control Guide.
B. Refer to Plan 235, 236, 237, and 238.

3.2 **TRAFFIC CONTROL**

A. Provide safe passage for pedestrians and vehicles.
B. Assist visually impaired and wheel chair users.
C. Provide continuous access to fire hydrants.
D. Keep passage ways free of construction materials, trash and debris.
E. Remove graffiti immediately.

3.3 **LAYOUT**

A. Curb Cut excluding flare or curb radius measurement):
   1. Cross Width at Curb Ramp.
      a. 4 feet minimum serving one crosswalk.
      b. 8 feet minimum serving two or more crosswalks.

   2. Cross Slope at Curb Ramp: 2 percent maximum.
B. Detectable Warning Surface:

1. Running Length: 2 feet minimum.
2. Cross Width:
   a. 4 feet minimum serving one crosswalk.
   b. 8 feet minimum serving two or more crosswalk.
3. Joint Between Units: 3/16 inch maximum or manufacturer's recommendation

C. Landing: Determine landing position and elevation so ramps that slope to and from the landing meet ramp slope requirements.

D. Ramp:

1. Do not exceed maximum slope or 15 feet length.
2. It may be necessary to include a transition zone between a curb cut and ramp.

E. Curb Wall: Set top of curb wall equal to elevation of extended lateral lines of sidewalk.

3.4 **INSTALLATION**

A. Pour concrete, Section 03 30 10.

B. Install Detectable Warning Surface full length and full width across the pedestrian access route.

END OF SECTION

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Paints for Pavement striping.
B. Words and other markings in paint or plastic film.
C. One or two-way prismatic reflectors for Pavement marking.

1.2 REFERENCES

A. AASHTO M 237: Standard Specification and Recommended Practice for Epoxy Resin Adhesive for Bonding Traffic Markers to Hardened Concrete.
B. AASHTO M 247: Standard Specification for Glass Beads Used in Traffic Paint.
C. AASHTO M 248: Standard Specification for Ready-Mixed White and Yellow Traffic Paints.
D. AASHTO M 249: Standard Specification for White and Yellow Reflective Thermoplastic Striping Material (Solid Form).
E. ASTM D 638: Standard Test Method for Tensile Properties of Plastics.
F. ASTM E 303: Standard Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
G. FS L-S-300: Sheeting and Tape, Reflective: Nonexposed Lens.
H. Federal Standard 141: Paint, Varnish, Lacquer and Related Materials, Methods of Inspection, Sampling, and Testing.
I. Federal Standard 370: Instrumental Photometric Measurements of Retroflective Materials and Retroreflective Devices.
J. MUTCD: Manual on Uniform Traffic Control Devices for Streets and Highways.

1.3 SUBMITTALS

A. Specifications of primer to be used for tape applications.
B. Manufacturer's affidavit certifying paint products meet or exceed material requirements of this section.
C. Sample of prismatic reflector to be used along with manufacturer's statement of the reflector's minimum reflective area and specific intensity at the 0.2 degree observation angle.
D. Manufacturer's recommendation for type of epoxy to be used when installing prismatic reflectors and markers.
E. Samples of each thermoplastic or preformed plastic Pavement markings along with a

statement of how the materials will be applied.

PART 2 PRODUCTS

2.1 ALKYD RESIN PAINT

A. White or yellow Type F (Fast dry) ready-mixed, AASHTO M 248.

2.2 THERMOPLASTIC PAINT

A. White or yellow, AASHTO M 249.

2.3 GLASS BEADS

A. Type 1, AASHTO M 247.

2.4 REFLECTIVE TAPE

A. Type II white or yellow with a Class 1 (pressure-sensitive) adhesive, FS L-S-300.

2.5 PREFORMED PLASTIC FILM MATERIALS

A. Film: A retroflective pliant polymer with white or yellow pigments selected and blended to conform to standard highway colors throughout the expected life of the film and glass beads distributed throughout its base cross-sectional area, with a reflective layer of beads bonded to the top surface and composed of the following materials.

	Minimum Percent
Materials	**By Weight**
Resin and Plasticizers	20
Pigments and Extenders	30
Graded Glass Beads	33

1. Type 1: Subjected to high traffic volume and severe wear conditions such as repeated shear action from crossover, encroachment on edge and channelization lines, and stop, start, or turn movements.
   a. Class 1: Without precoated adhesive, for application with epoxy cement.
   b. Class 2: With precoated pressure sensitive adhesive.
2. Type 2: Subjected to lower traffic volumes and less severe wear action such as most highway edge lines, markings on rural highways, lane lines in well-channelized areas and transverse and word/symbols subjected primarily to free rolling traffic.
   a. Class 1: Without precoated adhesive, for application with epoxy cement.
   b. Class 2: With precoated pressure sensitive adhesive

B. Tensile Strength: Sample 6 x 1 x 0.06 inches at a temperature between 70 deg. F. and 80

deg. F. using a jaw speed of 10 inches to 12 inches per minute tested per ASTM D 638 requirements.

1. Type 1: 150 pounds per square inch of cross-section.
2. Type 2: 40 pounds per square inch of cross-section.

C. Elongation: 75 percent minimum at break when tested per ASTM D 638 requirements using a Sample 6 x 1 x 0.06 inches at a jaw speed of 10 inches to 12 inches per minute.

D. Skid Resistance: Initial minimum skid resistance values are 35 BPN as measured by the British Portable Skid Test, ASTM E 303 requirements.

E. Reflectance: Minimum reflectance values at 0.2 degrees and 0.5 degrees observation angles and 86.0 degrees entrance angle as measured per the testing procedures of Federal Standard 370.

Film Type	Observation Angles			
	White		Yellow	
	0.2°	0.5°	0.2°	0.5°
Type 1: SL (mcd/sf/fc)	550	380	410	250
Type 2: SL (mcd/sf/fc)	960	760	680	510

1. The photometric quantity is measured in specific luminance (SL), and expressed as millicandelas per square foot per footcandle (mcd/sf/fc).
2. Use a test distance 50 feet and a Sample size of 2. x 2.5 feet.
3. Use an angular aperture of both the photoreceptor and light projector of 6 minutes of arc.
4. The reference center is the geometric center of the Sample, and the reference axis is taken perpendicular to the test Sample.

F. Film Reflectivity Retention: Not more than 15 percent of the beads lost due to popout and the predominate mode of Failure is "wear down" of the beads, when subjected to 200 cycles of a Taber Abraser Simulation test using an H-18 wheel and 125 gram load.

G. Thickness: 0.06 inch without adhesive.

H. Effective Performance Life: The film, when applied according to the recommendations of the manufacturer, will provide a neat, durable marking that will not flow or distort due to temperature if the Pavement surface remains stable. Although reflectivity is apply wear, the pliant polymer will provide a cushioned, resilient substrate that reduces bead crushing and loss. Use a film that shows no appreciable fading, lifting, or shrinkage throughout the useful life of the marking, and shows no significant tearing, roll back, or other signs of poor adhesion.

I. Abrasion Resistance: Use a material that when tested will not wear through to the conformable backing surface in less than 5,000 cycles when tested per Federal Standard 141, Method 6192, using a CS-17 wheel and a 1,000 gram load.

J. Acid Resistance: Use a material that will show resistance to etching, hazing, or delamination of bead surface after exposure to a 1 percent solution of sulfuric acid.

2.6 PRISMATIC REFLECTORS

A. Unless indicated otherwise, provide single lens snowplow resistant reflectors of the color indicated.

1. With a cast iron housing and acrylic prismatic reflector.
2. With an overall size not less than 9 inches long, 5 inches wide, and 1-3/4 inch thick with a 7/16 inch maximum projection above the roadway.
3. With a minimum reflective area of 1.6 square inches per face.

B. Reflector Specific Intensity:

Color	Intensity at 0.2 Degree Observation Angle	
	0 Degree Entrance Angle	20 Degree Entrance Angle
White	3.0	1.2
Yellow	1.8	0.72

2.7 EPOXY ADHESIVE

A. Epoxy, AASHTO M 237 requirements and as recommended by the manufacturer of the reflector. Provide a minimum adhesion value of 1.1 pounds per inch width.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT

A. Use equipment manufactured for Pavement marking. Use workers experienced in operating such equipment.

B. Use equipment capable of applying a strip, or strips with a width tolerance of plus or minus 1/4 inch. Equip the machine with an automatic skip control giving a 10 feet long marked segment and a 30 feet long gap within a linear tolerance of 6 inches over that cycle.

C. If applying glass beads, locate bead applicator directly behind and synchronized with marking applicator.

D. For thermoplastic paint materials, use equipment that is designed to agitate the paint to prevent scorching, discoloration, or excessive high temperatures.

3.2 PREPARATION

A. Broom or flush the surface to remove dirt, loose stones, or other foreign material immediately prior to applying.

B. Prior to applying, mark roadway between control points established by ENGINEER. ENGINEER will establish points on tangent at least every 100 feet and at 25 feet long intervals on curves. Maintain the line within 1 inch of the established control points. ENGINEER may also designate other Pavement striping locations such as stop bars, crosswalks, zebra striping, etc.

C. Markings that adhere to asphalt concrete or Portland cement concrete by either a pressure sensitive precoated adhesive or an epoxy cement shall mold to the Pavement contours by traffic action at normal Pavement temperatures and shall be ready for traffic immediately after application.

D. Begin Pavement painting and marking operations not later than 24 hours after receipt of written order by ENGINEER.

E. Apply striping and markings per MUTCD requirements.

F. Apply all materials in accordance with manufacturer's and ENGINEER's directions.

3.3 APPLICATION

A. Apply Pavement paintings and markings only when Pavement surface is dry and air temperature is above 40 deg. F. during daylight hours.

B. Do not apply paints and markings when rain is anticipated within 12 hours.

3.4 ALKYD RESIN PAINT STRIPING

A. Adjust Pavement striping machine to apply paint at rate recommended by paint manufacturer.

B. Glass Bead Application Rate: 5.9 to 6.1 pounds per gallon of paint.

C. Protect the markings until dry by placing approved guarding or warning device wherever necessary. Remove any markings not authorized or smeared or otherwise damaged, or correct as approved by ENGINEER.

3.5 THERMOPLASTIC PAINT STRIPING

A. Clean off dirt, glaze, and grease before prestriping.

B. Prestripe the application area with a binder material that will form, when sprayed, a continuous film over the Pavement surface, and will dry rapidly and mechanically adhere to the Pavement surface. Install the material in varying widths if indicated.

C. Extrude the thermoplastic material at a temperature of 412 plus or minus 12 deg. F. from approved equipment to produce a line 1/8 inch to 3/16 inch thick, continuous and uniform in shape, and have clean and sharp dimensions.

D. Do not use material which produce fumes that are toxic, obnoxious, or injurious to persons or property.

E. Apply so that finished lines have well-defined edges free of waviness.

F. Glass Beads Application Rate: 6 pounds of glass beads to every 100 square feet of marking.

3.6 TAPE STRIPING

A. Apply Pavement marking tape as indicated or directed. ENGINEER will establish control points.

B. Apply the tape only on surfaces that are dry and free of oils, grease, dust and dirt, and primed at the rate of approximately 1 quart per 60 feet with an approved primer material.

C. Maintain the line on established control points. Apply intermittent Pavement marking tape 24 inches long, spaced approximately 100 feet on tangents, and approximately 25 feet on curves unless otherwise directed. The ENGINEER will designate other Pavement striping locations such as stop bars, crosswalks, zebra striping, etc.

D. Press down the tape immediately after application until it adheres and conforms to the surface of the Pavement.

E. Completely remove all tape on sections where tape conflicts with revised traffic lanes prior to opening new lanes to traffic.

3.7 PAVEMENT MARKING FILMS

A. Use Pavement marking films that are capable of being applied to new, dense, and open-graded asphalt concrete wearing courses during the paving operation in accordance manufacturer's instructions, and that are capable of conforming to Pavement contours through the action of traffic at normal Pavement temperatures.

B. Use a Pavement marking film that is capable of use for patching worn areas of the same type film.

C. Apply before traffic is allowed on the freshly paved surface.

D. Unless indicated otherwise, provide Type C, Class II, polymer film markings in specified widths and shapes. Provide and layout words and marking symbol configurations per MUTCD requirements and as indicated.

E. When indicated, inlay the markings in fresh asphalt surface by a compaction roller during the paving operation.

F. Apply all markings in accordance with manufacturer's recommendations.

3.8 PRISMATIC REFLECTOR INSTALLATION

A. Install reflectors by cutting Pavement and partially filling cut area with epoxy adhesive. Place reflector housing in the adhesive and apply pressure to properly seat. Allow epoxy to completely set before allowing traffic on markers.

B. Install marker so that housing edges are flush with Pavement and so that the angle formed by the longitudinal axis of the marker and the adjacent Pavement stripe does not

exceed 5 degrees.

3.9 WORDS AND OTHER MARKINGS

A. Wet sandblast existing or temporary Pavement markings that may be confusing. Removal of markings by high-pressure water may be used if approved by ENGINEER.

B. Apply word markings, letters, numerals and symbols with indicated stencils and templates. In the absence of such information all stencils and templates shall be identical to those currently used by OWNER.

3.10 TEMPORARY PAVEMENT MARKINGS

A. Renew when stripes and markings have lost 50 percent of their original visual effectiveness.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Chain link fabric, posts, braces, anchorage, gates, miscellaneous hardware and appurtenances.

1.2 REFERENCES

A. ASTM A 53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ASTM A 121: Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

C. ASTM A 392: Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.

D. ASTM A 491: Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.

E. ASTM A 585: Standard Specification for Aluminum-Coated Steel Barbed Wire.

F. ASTM A 641: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

G. ASTM F 567: Standard Practice for Installation of Chain-Link Fence.

H. ASTM F 573: Standard Specification for Residential Zinc-Coated Steel Chain-Link Fence Fabric.

I. ASTM F 626: Standard Specification for Fence Fittings.

J. ASTM F 654: Standard Specification for Residential Chain-Link Fence Gates.

K. ASTM F 668: Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Chain-Link Fence Fabric.

L. CLFMI: Chain Link Fence Manufactures Institute Product Manual for Chain Link Fence Installation.

1.3 SUBMITTALS

A. Drawings: Indicate plan layout, grid, size and spacing of components, accessories, fittings, anchorage, and post section.

B. Data: Submit manufacturer's installation instructions and procedures, including details of fence and gate installation.

C. Submit sample of fence fabric and typical accessories.

PART 2 PRODUCTS

2.1 GENERAL

A. Galvanizing: Class 3, ASTM A 121.

B. Aluminizing: Class 2, ASTM A 585.

C. Polyvinyl Chloride (PVC): With PVC coated materials, paint all posts, fittings, hardware and accessories as indicated to match PVC color. The fabric shall be hot dipped galvanized steel wire complying with ASTM A 392 and coated with a continuous PVC bonding process (minimum 15 mil thickness) in accordance with ASTM F 668. Color of PVC coating as indicated and applied free of voids, cracks, tears and to have a smooth and lustrous surface.

D. Steel: Schedule 40, ASTM A 53.

E. Cast-in-place Concrete: Class 3000 minimum, Section 03 30 04.

2.2 CHAIN LINK FABRIC

A. 11 gage steel wire fabric for all fences less than 60 inches in height and 9 gage for fences over 60 inches coated as follows.

1. Zinc coating, ASTM A 392.
2. Aluminum coating, ASTM A 491.
3. Polyvinyl chloride coating, ASTM F 668.

B. For residential fabric, provide zinc coated fabric, ASTM F 573 requirements.

C. Unless indicated otherwise use chain link fabric that has approximately 2 inches square mesh and coated after fabrication.

D. Knuckle finish top edge and twist and barb bottom edge on fabric less than 60 inches wide. For fabric 60 inches or greater in width, twist and barb finish on both edges. Provide fabric that barbing has been done by cutting the wire on the bias.

E. If indicated, insert slats in fabric.

2.3 BARBED WIRE

A. Two strand, 12-1/2 gage wire with 14 gage, 4 point round barbs spaced approximately 5 inches on center.

2.4 TENSION WIRES AND FABRIC TIES

A. Tension Wires: 7 gage galvanized coil spring steel wire, ASTM A 641.

B. Fabric Fasteners: 9 gage galvanized or 6 gage aluminum wire, or approved non-corrosive metal bands, for ties to fasten fabric to posts, rails, and gate frames. Fasten fabric to bottom tension wire spaced 24 inches on center.

2.5 **TRUSS OR TENSION BARS**

A. Galvanized steel rod 3/8 inch diameter for truss or tension bars used in trussing gate frames and line posts adjacent in end, corner, slope, or gate posts. When used in trussing line posts, provide adjustment by means of galvanized turnbuckles or other suitable tightening devices.

B. Tension Bars:

1. Galvanized high carbon steel bars not smaller than 3/16 inch x 3/4 inch for tensions bars to fasten fabric to end and corner posts and gate frames. Provide 1 tension bar for each end post and 2 for each corner and pull post per section of fabric.
2. Use tension bar bands made from heavy pressed galvanized steel spaced on 15 inch centers to secure tension bars to posts.

2.6 **POSTS, CAPS, RAILS, COUPLINGS**

A. Posts, Frames, Stiffeners, Rails:

Table 1 – Posts, Frames, Stiffeners, Rails

Proposed Use	Nominal Type and Size
End, corner, slope and gate posts for single gates 6 feet or less in width and double gate 12 feet or less in width for 1. Fence less than 72 in. high 2. Fence 72 inches or higher	2" pipe 2-1/2" pipe
Gate posts for single swing gates over 6 feet, but not over 13 feet in width and double swing gates over 12 feet, but not over 26 feet in width or for all slide gates with leaves larger than 6 feet	3-1/2" pipe
Gate posts for single swing gates over 13 feet, but not over 18 feet in width and double swing gates over 26 feet, but not over 36 feet in width	6" pipe
Gate posts for single swing gates over 18 feet in width and double swing gates over 36 feet in width	8" pipe
Frame for gates	1-1/2" pipe
Stiffeners for gates	1-1/4" pipe
Line posts for fence 72 in. or higher	2" pipe
Line posts for fences less than 72 in. high	1-1/2" pipe, or 1-1/8" x 1-5/8" H
Top rail	1-1/4" pipe, or 1-1/2" x 1-1/4" H
Bottom rail	6-gage, coiled spring steel tension wire

B. Posts: Galvanized steel, at the indicated length.

C. Caps: Pressed galvanized steel or malleable iron designed to fit securely over post ends forming a weather tight closure. Where top rail is used, provide cap to permit passage of top rail. "H" section posts do not require caps.

D. Top, Intermediate and Bottom Rails: Galvanized steel, in lengths as required. Provide joint couplings to connect rails securely. Provide means for attaching top rail securely to each end, corner, line, slope and gate posts.

E. Joint Coupling: Galvanized steel, 6 inches long minimum for each joint. 1 coupling in 5 shall have expansion spring. Couplings shall be outside sleeve type with bore of sleeve true to maintain adjacent lengths of rail in alignment.

2.7 **FITTINGS AND HARDWARE**

A. Unless indicated otherwise, galvanize fittings and hardware.

B. Rivets: Make all hardware attachments with galvanized steel rivets.

2.8 **SUPPORT OR EXTENSION ARM**

A. Use support or extension arms for barbed wire that are of a type that can be attached to the tops of the posts and carry the number of wires indicated.

B. Use only support arms on the fence for barbed wire that are capable of supporting a 250 pound vertical load at the end of the arm without causing permanent deflection.

C. Single support arms are to be integral with a top post weather cap and have a hole for passage of the top rail when required.

2.9 **GATES**

A. Residential gates: Refer to ASTM F 654 requirements.

B. Provide additional horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories.

C. Assemble gate frames and attach hardware by welding or by using fittings and rivets to make rigid connections. Use same fabric as for fence. Install fabric with stretcher bars to gate frame at not more than 15 inch on center.

D. Provide diagonal cross-bracing consisting of 3/8 inch diameter adjustable length truss rods on gates where necessary to prevent frame from sagging or twisting.

2.10 **GATE HARDWARE**

A. Hinges: Pressed steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180 degree gate opening. Provide minimum of one pair of hinges for each leaf.

B. Latch: Forked steel type or plunger-bar steel type to permit operation from either side of gate. Provide locking device and padlock eye as integral part of latch.

C. Keeper: Provide keeper for all vehicle gates which automatically engages the gate leaf and holds it in the open position until manually released.

D. Gate Stops: Mushroom type or flush plate with anchors set in concrete to engage the center drop rod or plunger bar.

E. Sliding Gates: Manufacturer's standard heavy-duty track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, steel wheel or rubber wheel, and accessories as required.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify utility location, Section 01 31 13.

B. Excavation, Section 31 23 16.

C. Refer to ASTM F 567 and CLFMI products manual for chain link fence installation.

D. Protect roots and branches of trees and plants to remain.

E. Limit the amount of clearing and grading along the fence line to permit proper installation.

3.2 LAYOUT OF WORK

A. Accurately locate and stake locations and points necessary for installation of fence and gates.

B. General arrangements and location of fence and gates are indicated. Install except for minor changes required by unforeseen conflicts with work of other trades.

3.3 INSTALLATION OF POSTS

A. Space line posts as follows:

1. Tangent sections to 500 feet radius: 10 feet maximum.
2. 200 feet radius to under 500 feet radius: 8 feet maximum.
3. 100 feet radius to under 200 feet radius: 6 feet maximum.
4. Under 100 feet radius: 5 feet maximum.

B. Provide pull posts at 500 feet maximum intervals. Changes in line of 30 degrees or more are considered corners.

C. Set all posts to true line and grade in concrete bases or in approved pipe sleeves or sockets. Check for vertical and horizontal alignment.

D. Construct concrete bases for posts at least 10 inches in diameter. Place a minimum of 6 inches concrete below each post. Depth of post in concrete as follows.

1. Line Posts: 18 inches.

2. End, Pull, Corner and Gate Posts Less Than 6 inches Diameter: 24 inches
3. Gate Posts: 30 inches.

E. Where posts are required to be set in concrete walls or masonry, set sockets for the posts to a depth of at least 18 inches. Use sockets that consist of lengths of 0.048 inch galvanized metal pipe sleeves, with an inside diameter sufficient to allow the posts to fit loosely therein. Coat the inside of the socket and outside of the posts with an approved bituminous paint. Caulk the posts securely in place with lead wool.

3.4 INSTALLATION OF BRACE ASSEMBLIES

A. Attached brace rail from end, pull, corner or gate posts to first ensuing line post. Install braces so posts are plumb when diagonal truss rod is under proper tension.

3.5 INSTALLATION OF RAILS

A. Install rails level and plumb with grade between posts and attached to posts before stretching fabric. Top rails shall form continuous brace from end-to-end of each run of fence.

3.6 INSTALLATION OF FENCE FABRIC

A. Place fence fabric on security side of posts unless otherwise specified. Place fabric approximately 1 inch above the ground. Maintain a straight grade between posts by excavating high points of the ground. Filling depressions with soil will be permitted only upon approval of ENGINEER.

B. Stretch the fabric taut and securely fasten to posts. Fasten to end, gate, corner, and pull posts. Secure stretcher bars with metal bands spaced at 15 inch intervals. Cut the fabric and fasten each span independently at all pull and corner posts. Fasten to line posts with tie wire, metal bands, or other approved methods at 15 inches intervals. Attach the top edge of fabric to the top rail or tension cable at approximately 24 inches intervals. Attach bottom tension wire to fabric with tie wires at 24 inches intervals and secure to the end of pull posts with brace bands.

C. Draw barbed wire to assure minimum sag at high temperature and no breakage at low temperature. Connect the wires and arms by means of 0.142 gauge galvanized wire stays.

3.7 INSTALLATION OF GATES

A. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation.

3.8 REPAIR DAMAGED COATING

A. Grind smooth and wire brush all welds made after galvanizing to remove loose or burned zinc coating, after which neatly coat the areas with 50-50 solder or as otherwise directed by ENGINEER. Make repairs to abraded or otherwise damaged zinc coating in a similar manner. Replace PVC coating.

END OF SECTION

SECTION 32 31 16

WELDED WIRE FENCES AND GATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wire fences and gates for roadway right-of-way lines.

1.2 REFERENCES

A. AASHTO M 133: Standard Specification for Preservatives and Pressure Treatment Process for Timber.

B. ASTM A 53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A 116: Standard Specification for Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.

D. ASTM A 121: Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

E. ASTM A 585: Standard Specification for Aluminum-Coated Steel Barbed Wire.

F. ASTM A 641: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

G. ASTM A 702: Standard Specification for Steel Fence Posts and Assemblies, Hot-Wrought.

H. NFPA 70: National Electric Code.

1.3 SUBMITTALS

A. Drawings: Indicate plan layout, grid, spacing of components, accessories, fittings, and anchorage.

B. Data: Submit manufacturer's installation instructions and procedures, including details of fence and gate installation.

PART 2 PRODUCTS

2.1 GENERAL

A. Galvanizing: Class 3, ASTM A 121.

B. Aluminizing: Class 2, ASTM A 585.

C. Polyvinyl Chloride (PVC): With PVC coated materials, paint all posts, fittings, hardware and accessories as indicated to match PVC color. The fabric shall be hot dipped

galvanized steel wire complying with ASTM A 392 and coated with a continuous PVC bonding process (minimum 15 mil thickness) in accordance with ASTM F 668. Color of PVC coating as indicated and applied free of voids, cracks, tears and to have a smooth and lustrous surface.

D. Steel Pipe: Schedule 40, ASTM A 53.

E. Cast-in-place Concrete: Class 3000 minimum, Section 03 30 04.

2.2 WIRE MESH FENCING

A. Class II, ASTM A 116, nominal 0.099 inch Farm Grade with a 6 inch vertical wire spacing with wire mesh and spiral stays having a Class 1 zinc coating.

2.3 BARBED WIRE

A. Two strand, 12-1/2 gage wire with 14 gage, 4 point round barbs spaced approximately 5 inches on center.

2.4 UNTREATED WOOD POSTS FOR LINES, GATES, ENDS AND CORNERS

A. Line posts: 10 inches minimum circumference Juniper or acceptable alternate approved by ENGINEER.

B. Gate, Brace, and Corner Posts: 12 inches minimum circumference minimum Juniper or acceptable alternate approved by ENGINEER.

C. Use only sound straight posts that are free from decay or defects.

2.5 TREATED WOOD POSTS AND WOOD BRACE RAILS

A. Douglas Fir, Hemlock, or Pine as follows.

1. Line Posts: 10 inches minimum circumference.
2. Gate, Brace, and Corner Posts: 12 inches minimum circumference.
3. Rectangular Posts: 12 square inches minimum normal cross-section area. Square members may be rough sawn or finished.

B. Treat timber according to AASHTO M 133. Pressure treat wood members prior to fabrication.

C. Prior to painting, treat lumber per AASHTO M 133 requirements using pentachloro-phenol solution.

D. Sawing or field drilling of holes is allowable if all exposed untreated surfaces of members are field treated with 2 coats of the same material originally treated.

2.6 METAL POSTS AND BRACES

A. Steel posts, ASTM A 702.

B. The anchor plate may be omitted provided posts are set in a concrete footing with a

minimum cross-sectional dimension of 6 inches and a depth equal to full penetration of the post plus 6 inches.

C. Galvanized posts may be used in the place of the painted posts. Use posts galvanized by the hot-dipped process.

2.7 TUBULAR STEEL FRAME GATE WITH WIRE FABRIC

A. Gate frames manufactured with steel pipe 1 inch nominal diameter steel pipe minimum.

B. Place steel pipe braces vertically in each drive gate to provide uniform size panels. Provide one vertical support for 10 and 12 feet wide gates and 2 vertical supports for 14 to 16 feet wide gates.

C. Gate dimensions are the minimum clear openings between gate posts. Provide a gate with fittings to fill the opening.

D. Provide galvanized woven wire fabric of the same type and quality as indicated for the fence and space the horizontal wires corresponding to that of the fence. Provide an adjustable steel truss rod of 3/8 inch minimum diameter to prevent sagging on gates 10 feet or more in length.

E. Galvanize steel fitting and hardware, Section 05 05 10.

F. For 10 feet wide and wider gates use pintles not less than 5/8 inch diameter.

G. For fasteners for single gates furnish an 18 inches length of galvanized chain secured to the gate at one end and fitted with a snap fastener on the loose end. For all double drive gates use a center latch in lieu of a chain fastener with a pin that fits in a socket embedded in concrete.

H. For sliding gates use a frame made from 1-1/4 inch steel tubing with fence fabric equal to the adjoining fence. Support the opening end on a set of 6 inches minimum diameter wheels. Provide a 1-1/2 inch minimum schedule 40 pipe to support the other end with a steel wheel that rides on the support pipe. On gates wider than 12 feet use 2 support pipes. If a pre-manufactured gate is to be used, submit details for review.

2.8 STAPLES

A. Galvanized steel No. 9 wire 1-1/2 inches long minimum with an ASTM A 641, Class I coating.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify utility location, Section 01 31 13.

B. Excavation, Section 31 23 16.

C. Limit the amount of the clearing and grading along the fence line to permit proper

installation.

3.2 INSTALLATION

A. Install permanent end braced posts for existing cross fences which are intersected by the new fence alignment. Place all end braced posts in position in existing cross fence to serve as line posts for connection to the new fence. Space fence posts at intervals and depth indicated. Install all posts in a vertical position.

B. After wood post has been set, cut off top to height indicated at an angle of approximately 30 degrees from horizontal.

C. Brace corner and end post in two directions.

D. Set metal corner, end, gate, and brace posts in concrete footings that are 12 inches larger in diameter than the post and at least 24 inches deep. Crown top to shed water. Install no materials on posts or place strain on guys until 7 days after placing concrete.

E. Draw wire mesh fabric tight to remove all sag.

F. Excavate high points along the ground surface that interferes with placing of wire mesh. Provide a minimum clearance of 1 inch and 4 inches maximum.

G. Draw barbed wire to assure minimum sag at high temperatures and no breakage at low temperatures. Connect the lateral wires between the posts by means of 0.142 inch diameter galvanized wire stays of the length indicated.

H. Fasten the top and bottom wires and every alternate lateral wire in the mesh fabric and each strand of barbed wire to each post by means of the staple or clamp.

I. Connect wood braces to adjacent posts with 3/8 inch x 4 inch galvanized steel dowels and tension the brace wires until the installation is rigid.

J. Fasten metal braces to the metal post by the use of a securely bolted assembly or butt welding.

K. Provide double diagonal wire bracing at each timber bracing consisting of two 0.192 inch diameter galvanized wires securely fastened to wood posts.

L. Construct gates to operate freely without sag. Provide fittings and locks.

M. At each location where an electric transmission distribution or secondary line crosses any fence with wood posts, install an electric ground conforming to NFPA 70 requirements.

END OF SECTION

SECTION 32 32 26

CRIB WALLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fabrication and installation requirements for modular concrete crib or steel crib retaining walls.

1.2 REFERENCES

A. AASHTO M 36: Standard Specification for Metallic (Zinc or Aluminum) Coated Corrugated Steel Culverts and Underdrains.

B. AASHTO M 243: Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches.

1.3 SUBMITTALS

A. Shop Drawings or manufacturer's specifications showing the components to be used, erection and component tolerances, overall layout, typical construction details, and construction procedures.

B. Specific engineered design calculations for the particular wall.

PART 2 PRODUCTS

2.1 GENERAL

A. Concrete crib retaining walls consist of cribs composed of headers, stretchers, closers, and false headers. These components are held together principally by friction and are filled with crushed Rock or soil. The cribs can be interlocked to increase base width and wall mass.

B. Metal bin retaining walls consist of a plurality of pairs of columns, one column of each pair is in the plane of the front wall and the other column is in the plane of the rear of the wall. The pairs of columns are spaced longitudinally with overlapping S-shaped facing and rear members (stringer). They are shaped transversely with overlapping U-shaped tie members (spacers).

C. Hot dip galvanize all metal materials, including bolts, appurtenances, and connections. Refer to metal galvanizing requirements in Section 05 05 10.

2.2 MANUFACTURE OF CONCRETE CRIBWALL COMPONENTS

A. Concrete and Steel for Manufacture of Components:

1. Cast-in-place Concrete: Class 4000, Section 03 30 04.
2. Reinforcement: Steel, Section 03 20 00.

B. Lengths and widths of component surfaces in contact with the molds during manufacture shall not depart from nominal approved design values by more than plus or minus 1/8 inch.

C. Distances between bearing surfaces shall not depart from the nominal design value by more than plus or minus 1/16 inch.

D. Bearing surfaces shall be parallel to within plus or minus 1/32 inch in the width of the units.

E. All components except false headers shall contain reinforcing steel that extends to within 1-1/2 inches of the end of the unit. In no case shall the diameter of the reinforcing steel be less than 3/8 inch.

F. All reinforcing steel shall be covered by a minimum of 1/2 inch of concrete at the time of manufacture.

2.3 FABRICATION OF METAL BINS

A. Steel bin materials of the shapes and dimensions indicated.

B. Gage or thickness of wall construction members: Not less than 0.06 inch nominal.

C. When forming units, maintain a minimum-forming radius of 1 inch, or if units are formed with less than 1 inch radius, hot-dip galvanize after forming.

D. Assemble units into a continuous closed faced wall of connected bins.

E. Fabricate all units of the same nominal size so they are fully interchangeable. No drilling, punching, or drifting to correct defects in manufacturing will be permitted. Any units having holes improperly punched or galvanized shall be rejected.

F. Field coat all buried portions and the back side of metal bin retaining wall units with asphalt mastic in accordance with AASHTO M 243.

2.4 ACCESSORIES

A. Fill: Use only crushed Rock with a maximum diameter of 3 inches or an approved soil fill which is free from organic matter and conforms to the gradation limits of 100 percent passing a 3 inches sieve and not more than 15 percent passing a number 200 sieve.

B. Geotextile: Woven or nonwoven fabric, Section 31 05 19.

PART 3 EXECUTION

3.1 PREPARATION

A. Excavation, Section 31 23 16.

B. Excavate for wall construction to 18 inches below finish ground line at the toe of the wall and slope the Excavation to the heel of the wall at the appropriate counter-batter as indicated in CONTRACTOR's submitted design calculations.

C. The material under the base of the wall shall be either undisturbed native soil free from organic matter or an approved crushed aggregate base that is compacted equal to or greater than 90 percent of maximum dry density.

D. Install required geotextile, Section 31 05 19.

3.2 BACKFILLING AND COMPACTION

A. Place fill carefully in lifts not exceeding 12 inches uncompacted depth and work between parallel crib wall components.

B. If soil is used for wall fill, compact the fill equal to or greater than 90 percent of maximum dry density within the rear 2/3 of the face crib and in all multiple cribs.

C. Place and compact the backfill behind the cribs concurrently with the filling of the cribs.

3.3 ERECTION -GENERAL

A. Obtain site review by ENGINEER after wall and base cuts are completed and prior to start of wall construction.

B. Up to 2 inches of sand or fine gravel may be used on top of the prepared base to adjust the exact elevation of the base course of closers.

C. Handle component units carefully. Repair or replace damaged units.

D. Maintain all field tolerances to within plus or minus 1/2 inch in 10 feet of the nominal design tolerances.

E. Do not exceed the maximum height shown in the engineered wall calculations for each crib width shown.

F. In the construction of a wall on a curve, obtain the proper curvature for the face by the use of shorter stringers in the front or rear panels of retaining walls.

3.4 ERECTION -CONCRETE CRIB WALL

A. If cutting of the units requires the exposure of the ends of the reinforcing steel, coat the exposed steel with an epoxy or an asphaltic cement.

B. If shims are required to maintain tolerances in wall, only shims made from asphaltic felt or fiberglass roofing material shall be permitted.

3.5 ERECTION -STEEL CRIB WALL

A. Bolt the ends of steel stringers to corner columns by means of connecting channels.

B. Coat field cut of steel ends in accordance with AASHTO M 36.

C. The wall height and depth may be varied. Do not exceed the maximum dimensions shown for the design selected. Two or more retaining walls may be incorporated in the same wall by the use of standard split columns to make the connection on the step-back.

END OF SECTION

SECTION 32 84 23

UNDERGROUND IRRIGATION SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Underground Irrigation System complete with heads, valves, controls, and accessories.

1.2 REFERENCES

A. NFPA 70: National Electric Code.

1.3 DEFINITIONS

A. Lateral Pipe: That system of pipes downstream of a pressure valve. Lateral pipe feeds water to sprinklers and emitters.

B. Irrigation System: The arrangement of valves, controls, heads and accessories including lateral and mainline pipe systems.

C. Mainline Pipe: That system of pipes upstream of a pressure pipe valve.

1.4 PERFORMANCE REQUIREMENTS

A. Design Pressure: As indicated from connection to supply system to last head in circuit.

B. Location of Heads: Design location is approximate. Make adjustments as necessary to avoid plantings and other obstructions.

C. Water Coverage: Turf and other planting areas, 100 percent. Modify layout to obtain coverage and rate of application and to suit manufacturer's standard heads. Do not decrease number of heads indicated unless acceptable to ENGINEER.

D. Pipe Testing Schedule: Section 33 08 00.

E. Leave system dry if Work is Substantially Completed after October 15 unless directed otherwise by ENGINEER.

1.5 SUBMITTALS

A. Product Data: Manufacturer's technical data and installation instructions.

B. Layout Drawings: Plan layout and details illustrating piping layout to water supply location and type and coverage of heads, valves, piping circuits, controls, landscaping features, list of fittings and accessories.

C. Pipeline Test Report: Section 33 08 00.

D. Operation and Maintenance Data: Section 01 78 23.

1. Submit instructions covering full operation, care, and maintenance of system (and controls) and manufacturers parts catalog.
2. Include year-to-year schedule showing length of time each valve is to be open to provide determined amount of water, drain procedures, cleanout features, etc.
3. Instruct OWNER's maintenance personnel how to operate controller and adjust sprinkler heads.

E. Manual Valve Key Operator: Furnish 3 valve keys, 3 feet long with tee handle and key end to fit each type of valve assembly.

PART 2 PRODUCTS

2.1 PIPE, FITTINGS, OTHER

A. Material: PVC, Section 33 05 07.

B. Pressure Pipe: Schedule 40.

1. Solvent weld smaller than 3 inches.
2. Mechanical joint 3 inches and larger

C. Lateral Pipe: Schedule 40 through 1-1/4" then Class 200, solvent welded.

D. Fittings: Schedule 40, solvent welded or threaded.

E. Risers: Schedule 80, threaded.

F. Water Valve Assemblies: Schedule 80, threaded.

2.2 VALVES

A. Manual Valve: Gate type with cast bonze body, resilient integral taper seat, non-rising stem, and fitted for key operation.

B. Automatic Valve: Globe type operated by low-power replaceable solenoid, normally closed, and fitted for manual flow adjustment

C. Automatic Drain Valve: Designed to open for drainage when line pressure drops below 3 psi. (NOT for use on mainline pipe.)

2.3 DRAIN SUMP

A. Sewer rock or pea gravel, Section 31 05 13.

2.4 BACKFLOW PREVENTER

A. Manufacturer's standard, to suit sprinkler system and the following.

1. Double check valve.
2. When underground Irrigation System is designed for liquid fertilizer, provide a reduced pressure backflow prevention device. The drain to daylight must be a minimum of 12 inches below the bottom of the release valve for devices 4 inches in

diameter and 4 inches in smaller, or 12 inches plus the nominal diameter of the devices over diameter.

2.5 **SPRINKLER HEADS**

A. Manufacturer's standard unit designed to provide uniform coverage over entire area of spray indicated at available water pressure, as follows:

1. Flush Surface: Fixed pattern, with screw-type flow adjustment.
2. Bubbler: Fixed pattern, with screw-type flow adjustment.
3. Shrubbery: Fixed pattern, with screw-type flow adjustment.
4. Pop-Up Spray: Fixed pattern, with screw-type flow adjustment and stainless steel retraction spring.
5. Pop-Up Rotary Spray: Gear driven, full circle and adjustable part circle type.
6. Pop-Up Rotary Impact: Impact driven, full circle and part circle as indicated.
7. Above-Ground Rotary Impact: Impact driven, full circle and part circle as indicated.

2.6 **VALVE BOX**

A. Precast concrete or plastic with adequate hand room to operate small tools and provisions for locking cover to frame.

B. For drain pockets, No. 2 gravel (2-1/2 inch) Section 31 05 13.

2.7 **AUTOMATIC CONTROL SYSTEM**

A. General: Furnish low voltage system manufactured expressly for control of automatic circuit valves of underground Irrigation Systems. Provide unit of capacity to suit number of circuits.

B. Control Enclosure -External Applications: Manufacturer's standard weatherproof enclosure with locking cover, complying with NFPA 70.

C. Control Enclosure -Internal Applications: Manufacturer's standard with locking cover, complying with NFPA 70.

D. Transformer: To convert service voltage to control voltage and in accordance with manufacturer's recommendations.

E. Circuit Control: Each circuit variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each circuit.

F. Timing Device: Adjustable, 24 hour and 14 day clocks to operate any time of day and skip any day in a 14 day period. Allow for manual or semiautomatic operation without disturbing preset mechanical operation.

G. Wire:

1. Provide wire for connecting remote control valves to the automatic controllers that is Type "UF", 600 volt, stranded or solid copper, single conductor wire with PVC insulation and bearing UL approval for direct underground burial feeder cable. Make all connections with UL approved type seal to make a waterproof connection. Bury

wires in the same Trench as the pipe where possible.

2. Provide wire with 4/64 inch insulation, minimum covering of ICC-100 compound for positive weatherproofing protection. For wire sizes 14, 12, 10, and 8 use a single conductor solid copper wire, and for sizes 6 and 4 use stranded copper wire. Make control or "hot" wires red and all common or "ground" wires white.
3. Verify wire types and installation procedures conform to local codes.

Table 1 – Valve Wire Sizing Chart					
Voltage at Controller	Wire Control Common	Maximum Allowable Length in Feet from Controller to Valves			
		No. of Valves (Solenoids)			
		1	2	3	4
14	14	2765	1309	846	549
14	12	3393	1608	1039	673
14	10	3962	1877	1213	783
12	12	4394	2082	1346	6872
12	10	5397	2557	1652	1071
12	8	6364	3018	1949	1263
10	10	6986	3311	2140	1387

PART 3 EXECUTION

3.1 EXCAVATION

A. Section 31 23 16.

B. Excavate Trenches for sprinkler system pipe to provide 18 inches of cover over main lines and 10 inches over lateral lines. Before excavating, establish the location of all underground utilities and obstructions.

C. Trench for sprinkler system to ensure proper grades and slopes to drain points.

3.2 INSTALLATION

A. General: Plans are diagrammatic. Proceed with installation in accordance with the following:

1. Run all circuit and pressure lines as indicated. Within planting areas avoid conflict with trees. Where Trenching is required in proximity to trees which are to remain, do not damage roots.
2. Install stop and waste valves, isolation valves, vacuum breakers, pressure reduction valves, and other equipment required by local authorities according to Laws and Regulations in order to make system complete.
3. Slope Circuit Pipe to drain.
4. After completion of grading, seeding or sodding, and rolling of grass areas, adjust heads to be flush with finished grades.

B. Piping:
1. Assemble all circuit and pressure pipe in accordance with manu-facturer's recommendations and assure positive drainage.
2. At wall penetrations, pack the opening around the pipe with Section 03 61 00 non-shrink grout. At exterior face, fill perimeter slot with backer rod and sealant. Repair below grade waterproofing and make penetration watertight.
3. Install PVC pipe in dry weather above 40 deg. F. Allow joint to cure a minimum of 8 hours before testing.

C. Sleeves:
1. Install sleeves before concrete work.
2. Under roadway, install PVC sleeve if cover over sleeve exceeds 2 feet, otherwise use cast iron or ductile iron sleeve.

D. Control Valves:
1. Install remote control valves to manufacturer's recommendation.
2. Use Schedule 80 PVC pipe for nipples on valve header, length as necessary. Install valves one per each plastic valve box and provide 12 inches of expansion loop slack wire at all connections inside valve box.

E. Automatic Drains: Install in accordance with manufacturer's recommendations at the low point of circuit lines. Do not use this valve on pressure pipe systems.

F. Manual Drains:
1. Install per manufacturer's recommendations on upstream and downstream side of backflow preventers and at lowest point along main pressure pipe.
2. Install by teeing down to 3/4 inch drain valve. Provide a drainage sump sized to receive volume of drain water.
3. Make manual drain valves accessible by installing an adjustable pipe sleeve to meet finished grade with locking valve marker lid flush with finish grade.

G. Quick-Coupling Valves:
1. Install using 3/4 inch flexible lateral with galvanized elbow and riser. Locations as indicated.

H. Backflow Preventers:
1. Install assembly complete for sprinkler systems with 2 drain valves and 2 shut off valves per local Laws and Regulations, and manufacturer's specifications.
2. In below grade installations install assemblies with drain valves. Provide open box floor with gravel drain sump.

I. Valve Access Boxes:
1. Install over all remote control valves, manual control valves, zone shutoff valves, gate valves or globe valves. Valves to be installed using valve markers will not require access boxes.
2. Install boxes on level Subgrade to proper grade and proper drainage.
3. Provide boxes with proper length and size extensions.

J. Automatic Controller:
1. Mount the panel enclosure so adjustments can be conveniently made by the operator.
2. Ground controller per local Laws and Regulations.
3. Make all control wire connections to automatic controllers.

4. Coordinate controller installation with electrical work.

K. Wire and Electrical Work:
   1. Use electrical control and ground wire suitable for sprinkler control cable of size indicated.

L. Sprinkler Heads, Emitters, Bubblers, Small Rotators (less than 10 gallons per minute). .
   1. Install with flexible lateral and spiral barged PVC elbows and riser (length as required).
   2. Install shrub spray heads a minimum of 12 inches above finished grade of plantings.
   3. Install tree bubblers 1/2 inch below crown of tree roots.
   4. Flush circuit lines thoroughly. Remove all foreign materials prior sprinkler head installation.

M. Large Rotator Heads (10 gallons per minute or more): Install pressurized swings joints with O-ring seals.

N. Swivel Hose Elbows:
   1. Install brass swivel hose elbows, accurately machined pipe with hose threads and "O" ring seals.

3.3 BACKFILLING OPERATION

A. Section 33 05 20.

B. Backfill to 6 inches above pipe with soil free of rocks over 1 inch diameter, debris, or organic matter. Backfill final 4 inches with soil of like quality to adjacent areas.

C. Compact backfilled Trenches thoroughly to prevent settling damage to grades or plant materials. Repair at no additional cost to OWNER.

D. Piping may be tested in sections to expedite backfilling.

3.4 SURFACE RESTORATIONS

A. Protect existing landscaping.

B. Refer to Sections 32 92 00 and 32 93 13. Replace damaged plants and lawn areas with new to match existing.

END OF SECTION

SECTION 32 91 13

STRUCTURAL SOIL MIX

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Soil mix under urban sidewalk to enhance plant root growth and minimize flat work lifting or settlement from root growth.

1.2 REFERENCES

A. **ASTM Standards**

C136 Sieve Analysis of Fine and Coarse Aggregates
D1883 CBR (California Bearing Ratio) of Laboratory Compacted Soils.
F1647 Organic Matter Content of Putting Green the Sports Turf Root Zone Mixes.

1.3 SUBMITTALS

A. Mix design. Identify:
   1. Target proportions of mix ingredients.
   2. Target CBR (California Bearing Ratio)
B. Source Sample: Submit gradation, CBR and pH test results.

PART 2 PRODUCTS

2.1 CRUSHED STONE

A. Material: Granite, sandstone, or lightweight borrow (limestone not allowed). River or pit run gravel not allowed.
B. Gradation: ASTM C136.

Sieve	Percent Passing
1-1/2	90 to100
1	20 to 55
3/4	10 minimum

2.2 CLAY LOAM

A. Composition:

Material	Composition Percentage
Gravel	Less than 5
Sand	20 – 45
Silt	20 – 50
Clay	20 – 40
Humus	2 – 5

B. Humus determined by ASTM F1647.

C. Peat may be used as an organic amendment to meet the humus requirements.

2.3 SOIL BINDER

A. Potassium propenoate-propenamide copolymer hydrogel.

2.4 MIX DESIGN

A. The following is provided as a guide in the development of a mix design.

Crushed Stone	100 parts.
Clay Loam	20 parts.
Soil Binder	0.03 parts.
Water	Moisture content 10 percent.
pH	Between 5.5 and 6.0
CBR	Target is greater than 50, ATM D1883

PART 3 EXECUTION

3.1 INSTALLATION

A. Mixing may be done on site provided a uniform blend is produced, before placement.

B. Excavation and limits as shown or identified by ENGINEER.

C. Layout and grading, Section 32 91 19.

D. Install in eight (8) inch thick lifts before compaction.

E. Compact to 95 percent relative to a standard proctor density, Section 31 23 26.

END OF SECTION

SECTION 32 91 19

LANDSCAPE GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Landscaping grading requirements.
B. Backfill materials.

1.2 SUBMITTALS

A. Submit maximum laboratory dry density and optimum laboratory moisture content for:
   1. Subgrade material, and
   2. Each type of fill to be used.
B. Upon ENGINEER's request, submit a written quality control Inspections and testing report describing source and field quality control activities performed by CONTRACTOR and its Suppliers.

1.3 QUALITY ASSURANCE

A. Do not change material sources, or aggregate without ENGINEER's knowledge.
B. Reject backfill material that does not comply with requirements specified in this section.
C. Landscape grading is aesthetic by nature and subject to continual monitoring and modification during the backfilling process. Work closely with ENGINEER particularly when grading and construction berms, channels, or other aesthetic considerations.

1.4 STORAGE

A. Safely stockpile backfill materials.
B. Separate differing materials, prevent mixing, and maintain optimum moisture content of backfill materials.
C. Avoid displacement of and injury to Work while compacting or operating equipment.
D. Movement of construction machinery over Work at any stage of construction is solely at CONTRACTOR's risk.

1.5 SITE CONDITIONS

A. Do not place, spread, or roll any backfill material over material that is damaged by water. Remove and replace damaged material at no additional cost to OWNER.

B. Control traffic and erosion. Keep area free of trash and debris. Repair settled, eroded, and rutted areas.

C. Reshape and compact damaged structural section to required density.

1.6 **ACCEPTANCE**

A. Native material may be wasted if there is no additional cost to substitute material acceptable to ENGINEER.

B. For material acceptance refer to.

1. Common fill, Section 31 05 13.
2. Crushed aggregate base, Section 32 11 23.
3. Cement treated fill, Section 31 05 15.

1.7 **WARRANTY**

A. Any settlement noted in landscaped surfaces will be considered to be caused by improper compaction methods and shall be corrected at no cost to the OWNER.

B. Restore incidentals damaged by settlement at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 **BACKFILL MATERIALS**

A. Common fill, Section 31 05 13.

B. Crushed aggregate base, Section 32 11 23.

C. Cement treated fill, Section 31 05 15.

2.2 **ACCESSORIES**

A. Water: Make arrangements for sources of water during construction and make arrangements for delivery of water to site. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Identify required line, levels, contours, and datum.

B. Stake and flag locations of underground utilities.

C. Upon discovery of unknown utility or concealed conditions, notify ENGINEER.

D. Verify stockpiled fill meets gradation requirements, areas to be backfilled are free of debris, snow, ice or water, and ground surface is not frozen.

E. If subgrade is not readily compactable secure written authorization for extra excavation and backfill. Refer to Section 31 23 16.

3.2 **PROTECTION**

A. Protect existing trees, shrubs, lawns, existing structures, fences, roads, sidewalks, paving, curb and gutter and other features.

B. Protect above or below grade utilities. Contact utility companies to repair damage to utilities. Pay all cost of repairs.

C. Protect Subgrade from desiccation, flooding and freezing.

D. Do not fill adjacent to structures until Excavation is checked by ENGINEER.

E. Do not use compaction equipment adjacent to walls or retaining walls that may cause wall to become over-stressed or moved from alignment.

F. Do not disturb or damage foundation perimeter drainage, foundation, damp-proofing, foundation waterproofing and protective cover, or utilities in Trenches.

G. Restore any damaged structure to its original strength and condition.

3.3 **LAYOUT**

A. Maintain all benchmarks, control monuments and stakes, whether newly established by surveyor or previously existing. Protect from damage and dislocation.

B. If discrepancy is found between Contract Documents and site, ENGINEER shall make such minor adjustments in the Work as necessary to accomplish the intent of Contract Documents without increasing the Cost of the Work to CONTRACTOR or OWNER.

3.4 **GRADING**

A. Grading Intent: Spot elevations and contours indicated are based on the best available data. The intent is to maintain constant slopes between spot elevations. If a spot elevation is determined to be in error, or the difference in elevation between points change, then the minimum percentage of slope as a result of field adjustment of specific spot elevations is as follows:

1. Pavement Areas: 1 percent.
2. Concrete or Brick Areas: 0.30 percent.
3. Lawn or Planted Area: 0.75 percent.

B. Conduct Work in an orderly manner. Do not create a nuisance. Do not permit soil accumulation on streets or sidewalks. Do not allow soil to be washed into sewers and storm drains.

C. Grade slopes to provide adequate drainage after compaction. Do not create water pockets or ridges. Use all means necessary to prevent erosion of freshly graded areas during construction until surfaces have been constructed and landscaping areas have taken hold.

D. Remove surface stones greater than 1 inch from finished grading.

E. In planting areas, provide a finished grade that conforms to Section 32 92 00 and Section 32 93 13.

3.6 MODIFIED BACKFILL LAYER METHOD

A. Refer to Section 33 05 20.

3.7 COMPACTION

A. Compact backfill, Section 33 05 05

3.8 SURFACE RESTORATION

A. Restore paved surfaces, Section 33 05 25.

B. Finish landscaped surfaces with grass, Section 32 92 00 or with other ground cover, Section 32 93 13.

1. Backfill areas to contours and elevations indicated. Do not use frozen materials.
2. Make smooth changes in grade. Blend slopes into level areas.
3. Remove surplus backfill materials from site.
4. Leave stockpile areas completely free of excess fill materials.
5. Slope grade away from building at a minimum of 3 inches in 10 feet unless specified otherwise.

3.9 CLEANING

A. Remove stockpiles from the site. Grade site surface to prevent free standing surface water.

B. Leave borrow areas clean and neat.

END OF SECTION

SECTION 32 92 00

TURF AND GRASSES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Seed and sod requirements.
B. Soil preparation and fertilizers.

1.2 REFERENCES

A. FS O-F-241: Fertilizers, Mixed, Commercial.
B. ASPA: Guideline Specifications for Sodding.

1.3 SUBMITTALS

A. Submit name of sod Supplier or location.
B. Submit laboratory analysis of top soil, if requested by ENGINEER.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date and location of packaging. Damaged packages are not acceptable.
B. Strip sod no more than 24 hours prior to laying.
C. Deliver fertilizer in containers showing weight, chemical analysis, and name of manufacturer. Store fertilizer in a weatherproof location.

PART 2 PRODUCTS

2.1 SEED

A. Furnish grass seed that is fresh, clean, and new crop composed of varieties indicated and tested to have minimum of 90 percent purity and minimum of 80 percent germination.
B. Use seed that conforms to applicable Laws and Regulations.
C. Do not use wet, moldy or otherwise damaged seed.

2.2 SOD

A. Obtain all shipments of sod from approved sources.
B. Mowed regularly and carefully maintained from planting to harvest to assure reasonable quality and uniformity.
C. Free of grassy and broadleaf weeds, and bare or burned spots.

D. Clean, strongly rooted sod of variety indicated.

E. Cut sod in pieces not exceeding 1 square yard. Limit depth of cut to 1/2 inch minimum and 1 inch maximum.

2.3 **TOP SOIL**

A. Section 31 05 13.

2.4 **ACCESSORIES**

A. Fertilizer: Uniform in composition, dry and free flowing. Comply with FS O-F-241. Provide nutrients required by soil analysis.

B. Mulching Material: Wood or wood cellulose fiber free of growth or germination inhibiting ingredients.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Protect existing underground improvements from damage.

B. Do not place turf and grasses until existing weeds have been removed and soil has been prepared.

C. Do not sow immediately following rain, when ground is too dry, too hard, or during windy periods without first loosening the surface.

3.2 **GRADING**

A. Establish finished grades after settling to provide adequate drainage so no water pockets or ridges will be created.

B. Till soil to a depth of 4 inches and remove rocks and debris over 2 inches diameter and any vegetation and weeds. Fine grade entire site to a smooth, loose, and uniform surface. Use native or approved imported topsoil and plant after proper preparation.

C. When Subgrade has been established, roll areas to remove ridges and depressions so surface is parallel with finished grade. Limit weight of rolling equipment to 110 pounds minimum or 250 pounds maximum per square foot.

D. Site tolerances.

1. Total topsoil depth for lawns or grasses: 5 inches.
2. Elevation of topsoil relative to walks, hard surfaces or edges.
   a. Seed Areas: 1/2 inch below.
   b. Sod Areas: 1-1/2 inch below.
3. Slope away from building 5 percent for 10 feet minimum. Fill low spots and pockets. High point of finish grade shall be at least 6 inches below finish floor level.

3.3 **FERTILIZING**

A. Apply fertilizer in formulation and quantity required by soil analysis.

B. Apply after fine grading and mix thoroughly into upper 2 inches of topsoil.

C. Do not apply grass seed and fertilizer at same time in same machine unless one step hydro seeding is used.

D. Lightly water to aid breakdown of fertilizer and to provide moist soil for seed.

3.4 **SEEDING**

A. Unless indicated otherwise, apply seed at a rate of 5 pounds per 1,000 square feet evenly in 2 intersecting directions. Rake in lightly.

B. Apply fine spray water immediately after each area has been sown.

3.5 **ONE STEP HYDRO SEEDING**

A. Unless indicated otherwise, on lawn areas apply seed at the rate of 5 pounds per 1,000 square feet and fertilizer at the rate of 15 pounds per 1,000 square feet of area.

B. Mix the seed and fertilizer with a specially prepared dyed wood cellulose fiber and water to form a slurry.

C. Mix the slurry in tanks having continuous agitation so that a homogenous mixture is discharged hydraulically on the area to be seeded.

D. Apply the wood fiber mulch in suspension at a rate of 2,000 pounds per acre or as indicated otherwise.

3.6 **TWO STEP HYDRO SEEDING**

A. Make soil surface smooth, loose and of uniformly fine texture prior to seeding. Do not prepare more ground than can be seeded in a work day period.

B. Mix fertilizer at a rate of 15 pounds per 1,000 square feet, with wood fiber mulch and water to form a slurry.

C. Maintain a well mixed fertilizer slurry in the mix tank.

D. Spray the fertilizer mixture at the rate of 2,000 pounds per acre.

E. Sow seed on fertilized areas at the rate of 5 pounds per 1,000 square feet of area, in 2 directions with a cyclone seeder or other approved mechanical seeder.

3.7 **SEED PROTECTION ON SLOPES**

A. Blankets: Section 31 25 00.

3.8 **LAYING SOD**

A. Maintain the sod moist, live, and in good condition to encourage immediate growth.

B. Comply with ASPA guidelines for sodding.

C. Lay the sod on smooth, moist topsoil, working off planks if required. Rake topsoil to loosen and level prior to placing each course of sod. Ensure that sod is not stretched or overlapped and that all joints are butted tight. Place sod to break joints on ends. Keep length seams in a straight line.

D. Roll sod immediately after placing. Thoroughly water with a fine spray to a depth sufficient that the underside of the new sod and soil immediately below the sod are thoroughly wet.

E. On slopes 2 horizontal to 1 vertical and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at 2 feet maximum on center. Drive pegs flush with soil portion of sod.

3.9 **RESTORATION**

A. Restore Pavement, concrete, grassed areas, planted areas, and other improvements damaged during execution of work of this section to a condition equal to original conditions.

3.10 **MAINTENANCE**

A. Section 32 01 90.

B. Remove from site foreign materials collected during cultivation.

C. Dispose of cleanings.

END OF SECTION

SECTION 32 93 13

GROUND COVER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Plants, and ground cover requirements.
B. Bedding, topsoil, and temporary support.

1.2 REFERENCES

A. AAN: American Associations of Nurserymen, Inc.
B. ANSI Z60.1: American Standard for Nursery Stock.
C. FS O-F-241: Fertilizers, Mixed Commercial.

1.3 QUALITY ASSURANCE

A. Perform work in conformity with applicable requirements of AAN.
B. Obtain nursery stock and other plant materials from acceptable sources prior to order and delivery.
C. Provide plants free of disease and insects.

1.4 SUBMITTALS

A. Prior to planting submit samples of fertilizers and a complete listing of all plantings, origins and sizes.
B. All necessary inspection certificates for each shipment of plants as required by Laws and Regulations.
C. Schedule of planting times.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Exercise care in digging, transporting, handling, and packing of all plants.
B. Handle plants so roots are protected at all times. If delivery is in open vehicles, cover entire load without causing over heating.
C. Deliver plant materials immediately prior to placement. Keep plant materials moist.
D. Protect balls from sun and wind by covering with soil or other suitable material if not planted immediately on delivery.
E. Store fertilizer in a weatherproof location such that its effectiveness will not be impaired.

1.6 ACCEPTANCE

A. Ball of earth surrounding roots has not been cracked or broken.

B. Burlap, staves, and ropes required in connection with transplanting are installed.

C. Heeled in stock from cold storage not accepted.

1.7 **WARRANTY**

A. Warrant plantings through one year plus one continuous growing season. Replace any unsatisfactory or dead plantings within 10 days of written notice. Make corrections at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 **GENERAL**

A. Provide plants of normal growth and uniform height, according to species, with straight canes and well developed leaders, roots, and tops.

B. Provide plants of sizes indicated, Size stated in each case being interpreted to mean dimensions of plant as to stands in its natural position in nursery without straightening of any branches or leaders.

C. Provide legible labels attached to all plants, specimens, bundles, boxes, bales, or other containers indicating botanical genus, species, and size of each.

D. Plants cut back from larger sizes to meet Specifications shall be rejected.

E. Container growth deciduous shrubs will be acceptable in lieu of bailed and burlapped deciduous shrubs subject to limitations for container grown stock.

2.2 **NATIVE GRASSES AND WILDFLOWERS**

A. Mixture: 77 percent Festuca ovina duriuscula (Hard Fescue) and 23% Wildflower seeds of equal proportioned quantities of the following, Aster alpinus (Alpine Aster), Campanual carpatica 'Jacqueline' (Bluebells), Coreopsis grandiflora 'Sunray' (Dwarf Coreopsis), Eschschlzia californica (California Poppy), linum Lewisii (Blue Flax), Primula (While Primrose), Tagetes (Marigold), Viguiera Multiflora (Showy golden eye).

B. Purity of all seed types: 90 percent.

C. Germination of all seed types: 90 percent.

2.3 **ORGANIC MULCH**

A. Horticultural grade Class A decomposed plant material, elastic and homogeneous, free of decomposed colloidal residue, wood sulphur, and iron.

B. pH value of 5.5 to 7.5.

C. 60 percent organic matter by weight, moisture content not exceeding 15 percent, and water absorption capacity of not less than 300 percent by weight on oven dry basis.

2.4 ACCESSORIES

A. Fertilizer: Comply with FS O-F-241. Provide nutrients required by soil analysis. The fertilizer will be uniform in composition, dry and free flowing.

B. Wrapping Materials: Quality burlap tightly tied around plant root system.

PART 3 EXECUTION

3.1 PREPARATION

A. Plan to install materials during normal planting seasons for each type of landscape work required. Correlate planting time with specified maintenance periods and guarantee.

B. Verify area to receive plants is to grade, all work is completed in the area, and that topsoil has been placed. Follow Section 31 23 23 grading requirements.

C. Do not proceed with work until unsatisfactory conditions have been corrected.

D. Examine grade, verify elevations, observe conditions under which work is to be performed, and notify ENGINEER of unsatisfactory conditions.

3.2 GRADING

A. Site tolerances.

1. 12 inches minimum total topsoil depth.
2. 2 inches below walks, hard surfaces or edges.

B. Do not expose or damage existing shrub or tree roots.

C. Slope landscape away from building for 12 feet minimum at 1/2 inch per foot minimum. Fill low spots and pockets. High point of finish grade shall be at least 6 inches below finish floor level.

3.3 INSTALLATION

A. Place plant materials for orientation approval by ENGINEER prior to installation.

B. Set all shrubs slightly lower than finished grade. Use plant mix consisting of 3 parts topsoil and 1 part organic mulch. Do not fill around stems. Carefully place and tamp plant mix soil to fill all voids.

C. Spread excess soil from excavated plant pits in surrounding planting beds.

D. Sow seed at the rate of 78 pounds per acre. Rake seed into soil and top-dress all seeded areas with 1/4 inch topsoil. Do not let seed installation be subject to damage by climatic conditions.

E. Restore Pavements, grassed areas, planted areas, and other improvements damaged to a condition equal to original conditions.

3.4 FERTILIZING SEEDED AREAS

A. Apply fertilizer in formulation and quantity required by soil analysis.

B. Apply after fine grading and mix thoroughly into upper 2 inches of topsoil.

C. Do not apply seed and fertilizer at same time in same machine unless one step hydro seeding is used.

D. Lightly water to aid breakdown of fertilizer and to provide moist soil for seed.

3.5 CLEANING AND MAINTENANCE

A. Section 32 01 90.

B. Remove from site foreign materials collected during cultivation.

C. Dispose of cleanings.

END OF SECTION

SECTION 32 93 43

TREE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Supply and install tree.

B. Site preparation and backfill requirements.

1.2 REFERENCES

A. American Public Works Associations (Utah Chapter).

1. Plan 681: Tree

B. American National Standards Institute.

1. A300: Tree, Shrub and Other Woody Plant Maintenance Practices.
2. Z60.1: American Standard for Nursery Stock.

C. International Society of Arboriculture. (ISA).

1.3 SUBMITTALS

A. Copy of CONTRACTOR's notice to property owner. Format to be substantially as follows:

NOTICE TO PROPERTY OWNER

Your new tree is a: (*Name of tree*) How to take care of your new tree.

- Water thoroughly once ever seven to ten days during the spring, summer and fall for at least 2 years. Put your hose by the base of the tree and run water gently for about 20 minutes. Then as tree matures, water at the drip line (straight down under the tips of the branches) every 3 to 4 weeks.
- Do not fertilize until second year and only then if needed.
- Do not use weed killer near new trees.
- Protect new tree from damage by cars, lawn mowers, grass trimmers, bikes, vandals, etc.
- Maintain a mulch cover at the base of the new tree.

1.4 QUALITY ASSURANCE

A. Provide an ISA certified arborist to observe tree planting. Upon ENGINEER's request, provide a copy of the arborist's ISA certificate and registration number on file with the State Division of Commercial Code.

B. Nursery: Use a company specializing in growing and cultivating trees with minimum 3 years experience.

C. Installer: Use a company specializing in installing and planting tree.

D. Planting Plan: Correlate planting time with specified maintenance periods and

guarantee.

E. Rejection: Reject any tree upon the following basis.

1. Tree has cracked or broken ball of earth surrounding roots preparatory to or during process of planting.
2. Tree was cut back from a larger plant to meet Specifications.
3. Tree is not the specified size.
4. Tree has been pruned improperly.
5. Tree has disease or insect infestations.
6. Tree was damaged during transplant.

1.5 ACCEPTANCE

A. Tree will be accepted not less than 60 days after planting, watering and successful growth.

1.6 WARRANTY

A. Warrant tree planting through one year plus one continuous growing season. Include coverage of trees from death, unhealthy conditions, or if tree dies from poor planting practice. Replace any unsatisfactory or dead tree within 10 days of written notice.

B. Replacements: Provide tree of same size and species, planted in the next growing season, with a new warranty commencing on date of planting.

C. Additional Cost: All corrective work will be at no additional cost to OWNER.

1.7 MAINTENANCE

A. Period is until acceptance.

B. Maintain tree health immediately after placement.

C. Notify property owner of tree watering practice.

D. Trim off dead or broken branches. Remove clippings and dead branches from the site.

E. Control disease.

PART 2 PRODUCTS

2.1 TREE MATERIALS

A. Species and size specified, grown in climatic conditions similar to those in locality of the Work with branching configuration and cane requirements indicated in ANSI Z60.1.

B. Provide tree of normal growth and uniform height, according to species, with straight trunk and well developed leaders, laterals and roots. Heeled in stock from cold storage not accepted.

C. Provide tree size indicated, Size being interpreted to mean dimension of tree as its stand

in its natural position in nursery without straightening of any branches or leaders.

D. Provide legible labels attached to tree indicating botanical genus, species, and size.

2.2 SOILS

A. Backfill of Root Ball Pit: Native soil if not excessively rocky, compactable or clayey; otherwise amend at a rate of 2 parts native soil to 1 part topsoil. Mix together thoroughly.

B. Topsoil: Section 31 05 13.

2.3 ORGANIC MULCH

A. Horticultural grade class A decomposed plant material, elastic and monogenous, free of decomposed colloidal residue, wood sulphur, and iron.

B. pH value of 5.5 to 7.5.

C. 60 percent organic matter by weight, moisture content not exceeding 15 percent, and water absorption capacity of not less than 300 percent by weight on oven dry basis.

PART 3 EXECUTION

3.1 PREPARATION

A. Plan to install materials during normal planting season.

B. Notify ENGINEER of unsatisfactory conditions.

3.2 EXCAVATION

A. Excavate only for depth of root ball.

B. In park strips adjacent to paved thoroughfares, the traditional round hole barely big enough to accommodate the root ball is not permitted. Excavate the site in the shape of a rectangle. Make excavated area width at least twice the diameter of the tree root ball and the length at least 3 times the diameter.

1. Compact both sides of the planting site that are parallel to the street.
2. Loosen the sides of the planting site that are perpendicular to the street.

C. In other landscaped areas, excavated area for tree planting at least 3 times the diameter of the root ball.

D. Place plant materials for final orientation review by ENGINEER prior to backfilling the root ball.

3.3 INSTALLATION

A. Plan No. 681.

B. Remove wire baskets and twine from around root ball. If possible, remove all burlap material, or remove top 1/3 from root ball.

C. Maintain plant in vertical position. Eliminate voids and air pockets.

D. Remove all cardboard and twine from tree trunks.

E. Follow arborist's instructions.

3.4 **PRUNING**

A. Comply with ANSI A300 and directions of arborist.

3.5 **PROTECTION**

A. Do not touch directly or indirectly any overhead wire, cable, or power line.

B. Shelter the root ball. Do not let the root ball dry out.

C. Do not damage any irrigation line or emitter system.

D. Do not lift or maneuver the tree by the trunk.

E. Do no add gravel to the bottom of the hole.

F. Do not stake the tree unless carefully monitored by ENGINEER.

G. Do not compact the backfill.

H. Do not use grass clippings as mulch.

I. Do not over water, under water, over prune, paint or wrap the trunk, or fertilize during planting.

J. Do not forget to watch for people using the street or sidewalk while planting.

K. Do not over prune.

L. Do not allow grass, flowers, or vines to grow next to the trunk.

M. Protect roots and branches of existing trees.

N. Do not permit heavy equipment or stockpiling of materials or debris within the drip line. Do not permit earth surface within the drip line to be changed in any way except as specified.

O. Replace existing trees damaged by construction operations at no additional cost to OWNER

END OF SECTION

SECTION 32 98 00

VEGETATION ESTABLISHMENT PERIOD

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Establish and care for plantings requiring watering.
B. Length of time CONTRACTOR is responsible to care for and establish plant materials.

1.2 ACCEPTANCE

A. At ENGINEER's discretion conduct one or more inspections to determine condition of planting.
B. Acceptance occurs at end of establishment period or in ENGINEER accepts plantings in writing.

1.3 WARRANTY

A. Begins after irrigation system and plant installation inspections and acceptance have been completed and continues for one (1) calendar year or indicated otherwise in the Contract Documents.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 INSTALLATION

A. Establish healthy trees, shrubs, groundcovers, and turf.
B. Replace defective plant materials at no additional cost to OWNER.
C. CONTRACTOR will not be held responsible for damage due to acts of nature, vandalism, errant vehicles. Notify ENGINEER immediately if such event occurs.

3.2 PLANTS

A. Watering: As necessary to establish and maintain growth.
B. Keep weed-free plant basins and areas where mulch has been placed.

C. Prune broken or dead branches. Replace sub-standard sized plants that require excessive pruning to American Nurseryman Standards.
D. Repair non-functional water basins.

3.3 **LAWNS**

A. Apply 16-0-0 fertilizer (NPK ratio) in fall season following manufacturer's recommendation.
B. Control broadleaf weeds using selective herbicide.
C. Repair reseed or resod areas showing rodent damage, erosion damage and other damage.

3.4 **LAWN MOWING AND TRIMMING**

A. Times are 7:00 to 10:00 a.m. or 5:00 to 8:00 p.m.
B. Height three (3) inches.
C. Clean cut with sharp blade.

3.5 **IRRIGATION SYSTEMS**

A. Repair installed pressurized irrigation systems to operate properly.
B. Repair erosion, settlement around Street Fixtures and irrigation system components.
C. Winterize system after October 15. Use compressed air at 100 psi only in pressurized systems. Do not put 100 psi air through drip circuits. Coordinate with ENGINEER.
D. Repair irrigation system components broken by CONTRACTOR.

END OF SECTION

SECTION 33 01 30.73

RELINING PIPE CULVERTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of a pipe within an existing pipe with or without restrained ends.

1.2 REFERENCES

A. **ASTM Standards**

F585 Insertion of Flexible Polyethylene Pipe into Existing Sewers.

1.3 SUBMITTALS

A. Traffic control plan, Section 01 55 26.
B. Structural Data: Identify:
   1. Specific lateral or main line liner (by trade name).
   2. Nominal and true inside and outside liner diameters.
   3. Net wall area of liner in square inches per linear foot of pipe liner.
   4. Liner structure must be capable of supporting the maximum fill height at the subject location.
   5. Maximum ovality will be assumed at five percent.
C. Insertion Plan – Clarify the following:
   1. Method of liner insertion (pulled or pushed).
   2. Clearly identify manufacturer's recommended method if pushing will be done.
   3. Clearly identify the attachment method or pulling head being used to guide and ease the liner into place if pulling will be done.
   4. Identify manufacturer's recommended method if pushing will be done.
   5. Proposed length, access, and termination points for each run.
D. Manufacturer's recommendations. Identify:
   1. Maximum external grouting pressure.
   2. Maximum, minimum and ideal installation temperature.
E. Manufacturer Certification. Show:
   1. The liner materials furnished are compatible for the intended installation method, service conditions, and hose pipe material.
   2. Copy of manufacturer's installation procedure guidelines.
   3. Liner joint assembly recommendations.
F. Restrained Ends: Identify connections at each end of liner pipe that are designed to stop liner pipe shrinkage.

PART 2 PRODUCTS

2.1 MATERIAL

A. Liner Pipe: Smooth wall HDPE having fused or manufactured commercial interlocking joints in each end of a pipe section, Section 33 05 06.
B. Grout: Hydraulic cement, pozzolans, sand, and water. Compressive strength of 250 psi at 28 days.

PART 3 EXECUTION

3.1 PREPARATION

A. Implement traffic control plan requirements, Section 01 55 26.
B. Before placing pipe liner, verify liner will fit the host pipe. Use of a test head or "PIG" is recommended. Inform ENGINEER if host pipe has collapsed or is otherwise impassable.

3.2 LINER INSTALLATION

A. Host Pipe:
    1. Clean host pipe before insertion.
    2. Prevent sediment transport into waters of the state.
    3. Host pipe may contain flowing water throughout the year. Dewater the pipe to facilitate liner insertion.
B. Liner:
    1. Follow ASTM F585 and manufacturer's recommendations.
    2. Minimize time insertion excavation area is open and exposed.
    3. Remove sections of the inlet and outlet ends of the host pipe, fence, and other items not otherwise specified for removal to provide room for construction of an insertion area. Replace and install new items of the same size, shape, and material as those removed.
    4. Where ends of liner pipe are to be restrained, install restraint devices.
C. Grout Annular Space:
    1. Wait for temperature of host pipe and pipe liner to equalize before grouting.
    2. Do not exceed manufacturer's rated collapse pressure of pipe liner.
    3. Grout entire annular space along full length of the liner.
    4. Prevent excess grout from entering downstream water courses.
    5. Prevent movement from excessive buoyant forces on liner.
    6. Trim grout flush and smooth with headwall.

3.3 **RESTORE EXCAVATED AREA**

A. Restore excavated or disturbed area to previous condition.

END OF SECTION

SECTION 33 05 01

ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. ABS Pipe, fittings and joint materials.
B. Related work includes but is not limited to,
   1. Excavation, Section 31 23 16.
   2. Trench backfill, Section 33 05 20 .
   3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
   4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ASTM C 443: Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
B. ASTM D 1527: Standard Specification for Acrylonitrile-Buta-diene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80.
C. ASTM D 1788: Standard Specification for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Plastics.
D. ASTM D 2235: Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Stryene (ABS) Plastic Pipe and Fittings.
E. ASTM D 2321: Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
F. ASTM D 2412: Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
G. ASTM D 2468: Standard Specification for Acrylonitrile-Butadiene-Stryene (ABS) Plastic Pipe Fittings, Schedule 40.
H. ASTM D 2469: Standard Specifications for Acrylonitrile-Butadiene-Stryene (ABS) Plastic Pipe Fittings, Schedule 80.
I. ASTM D 2680: Standard Specification for Acrylonitrile-Butadi-ene-Stryene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping.
J. ASTM D 2751: Standard Specification for Acrylonitrile-Butadi-ene-Styrene (ABS) Sewer Pipe and Fittings.
K. ASTM D 2774: Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.

PART 2 PRODUCTS

2.1 GRAVITY PIPE SYSTEMS

A. Material: Rigid ABS plastic conforming to ASTM D 1788 and based on short term tests.
   1. Type I, Grade 1, cell (322).
   2. Type IV, Grade 1, cell (133).

B. Pipe: ASTM D 2751 for 2 inches to 12 inches ABS pipe and ASTM D 2680 for 8 inches to 15 inches ABS composite sewer pipe.

C. Fittings, ASTM D 2751.

D. Joints: Bell and spigot with solvent cement which complies with ASTM D 2235 or mechanical-seal joint with gasket complying to ASTM C 443.

E. Flattening: No evidence of splitting, cracking, or breaking, ASTM D 2412.

2.2 PRESSURE PIPE SYSTEMS

A. Material: Rigid ABS, ASTM D 1788 and based on short-term tests.
   1. Type I, Grade 2, cell (522).
   2. Type I, Grade 3, cell (355).
   3. Type II, Grade 1, cell (445).

B. Pipe: ASTM D 1527 for 1/8 inch to 12 inch pipe for schedule 40 or 80 sizes and pressure rating as indicated.

C. Joints:
   1. Socket type with Iron Pipe Size (IPS) outside diameter, ASTM D 2468 for Schedule 40 pipe and ASTM D 2469 for Schedule 80 pipe.
   2. Bell and spigot with solvent cement, ASTM D 2235 or mechanical-seal joint with gasket, ASTM C 443.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe per manufacturer's instructions, ASTM D 2321 for gravity pipe systems, ASTM D 2774 for pressure pipe systems.

B. Water distribution and transmission, Section 33 12 19.

C. Gravity water systems, Section 33 31 00 or Section 33 41 00.

D. Irrigation System, Section 32 84 23.

END OF SECTION

SECTION 33 05 02

CONCRETE PIPE AND CULVERT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforced and non-reinforced concrete pipe and culvert, fittings and joint materials.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ASTM C 14: Standard Specification for Concrete Sewer, Storm Drain, Culvert Pipe.

B. ASTM C 76: Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

C. ASTM C 118: Standard Specification for Concrete Pipe for Irrigation or Drainage.

D. ASTM C 150: Standard Specification for Portland Cement.

E. ASTM C 361: Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.

F. ASTM C 412: Standard Specification for Concrete Drain Tile.

G. ASTM C 443: Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

H. ASTM C 444: Standard Specification for Perforated Concrete Pipe.

I. ASTM C 497: Standard Methods of Testing Concrete Pipe, Sections, or Tile.

J. ASTM C 505: Standard Specification for Non-Reinforced Concrete Irrigation Pipe with Rubber Gasket Joints.

K. ASTM C 507: Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.

L. ASTM C 654: Standard Specification for Porous Concrete Pipe.

M. ASTM C 655: Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe.

N. ASTM C 985: Standard Specification for Non-reinforced Concrete Specified Strength Culvert, Storm Drain, and Sewer Pipe.

O. ASTM C 1433: Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers.

P. ASTM C 1479: Standard Practice for Installation of Precast Concrete Sewer, Storm Drain,

and Culvert Pipe Using Standard Installations.

Q. ASTM C 1504: Standard Specification for Manufacture of Precast Reinforced Concrete 3 Sided Structures for Culverts and Storm Drains.

R. AWWA C302: AWWA Standard for Reinforced Concrete Pressure Pipe, Non-cylinder Type, for Water and Other Liquids.

1.3 SUBMITTALS

A. Precast box culvert design summary.

B. Manufacturer's proof of certification.

1.4 QUALITY ASSURANCE

A. Manufacture: Certified per Section 03 34 00.

B. Transporter: Acceptable to manufacturer.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. Provide type, class, strength and size of pipe and fittings indicated.

B. Concrete:

1. Use ASTM C 150 or C 1157 cement unless specified otherwise.
2. Admixtures and pozzolans may be used only with approval.

C. Gravity Pipe System:

1. Reinforced Concrete Pipe: ASTM C 76 or ASTM C 655.
2. Non-reinforced Pipe: ASTM C 14 in sizes up to 36" diameter and ASTM C 985 for pipe up to 60" diameter.
3. Irrigation or Drainage Pipe: ASTM C 118 or ASTM C 505.
4. Drainage Tile: ASTM C 412.
5. Perforated Pipe: ASTM C 14 Type 1 Class 2 or ASTM C 444.
6. Elliptical Pipe: ASTM C 507.
7. Porous Concrete Pipe: ASTM C 654.
8. Perforated Concrete Pipe: ASTM C 444.
9. Precast Box Section: ASTM C 1433.
10. Three Sided Culvert: ASTM C 1504.

D. Low Head Pressure Pipe Systems: ASTM C 361 or AWWA C302.

2.2 JOINTS

A. Use ASTM C 443 rubber gasket bell and spigot type joints.

B. For box sections use tongue and groove joints with bituminous mastic joint sealant.

C. For elliptical sections use tongue and groove joints with bituminous mastic joint sealant.

D. Mortar: Portland cement, Section 04 05 16.

2.3 SOURCE QUALITY CONTROL

A. Pipe and tile, ASTM C 497.

B. Box sections, ASTM C 1433.

C. Three sided culverts, ASTM C 1504.

PART 3 EXECUTION

3.1 FACTORY FITTINGS

A. Fit all service tees and other miscellaneous fittings with an expanding plug.

B. Grout all fittings to provide a smooth interior and exterior surface.

C. When providing pipe or box sections specifically manufactured with branch connections, carefully shape and fit adjoining pieces to facilitate grouting. Grout all fittings to provide a smooth interior and exterior surface. Lateral pipe or sections shall not project beyond the inner surface of pipe.

D. Use Section 03 61 00 epoxy bonding compound as interface between new and existing concrete and piping materials.

3.2 INSTALLATION -PIPE AND FITTINGS

A. Install per ASTM C 1479 and manufacturer's instructions.

B. Place circular concrete pipe that contains elliptical reinforcing so that the reference lines designating the top of the pipes will not be more than 5 degrees from the vertical plane through the longitudinal axis of the pipe.

C. Water distribution and transmission, Section 33 12 19.

D. Gravity water systems, Section 33 31 00 or Section 33 41 00.

E. Irrigation System, Section 32 84 23.

3.3 INSTALLATION -BOX SECTIONS

A. Install per manufacturer's instructions.

B. Provide a leveling course under box section. Use Sewer Rock unless specified otherwise.

C. Pull sections together using internal winches or tugger. Do not push box section together. Pushing causes joint misalignment.

D. Limit joint gap to maximum specified by manufacturer. Remove excess bituminous mastic joint sealant from box wall, floor, and ceiling.

END OF SECTION

SECTION 33 05 03

COPPER PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Copper pipe, couplings, fittings, and joint materials for buried water utility applications.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ASTM B 88: Standard Specification for Seamless Copper Water Tube.

B. AWWA C800: AWWA Standard for Underground Service Line Valves and Fittings.

1.3 QUALITY ASSURANCE

A. Reject any pipe that does not conform to Contract Documents or is cracked, chipped, crushed, dented, kinked, or otherwise unacceptable.

PART 2 PRODUCTS

2.1 PIPE

A. Type K copper, ASTM B 88 Table 3, "Dimension, Weight and Tolerances," and capable of connecting to AWWA standard water service taps and fittings.

B. Outside diameter greater than 2 inches requires ENGINEER acceptance.

C. Smooth surface free from bumps, flexible enough to be coiled.

2.2 CONNECTIONS

A. Flared or compression.

B. Dielectric insulating unions for dissimilar connections.

C. Fittings, AWWA C800.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe per manufacturer's instructions.
B. Water distribution and transmission, Section 33 12 19.
C. Irrigation System, Section 32 84 23.

END OF SECTION

SECTION 33 05 04

CORRUGATED METAL PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Corrugated metal pipe, fittings, and joining materials.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. AASHTO M 36: Standard Specification for Metallic (Zinc or Aluminum) Coated Corrugated Steel Culverts and Underdrains.

B. AASHTO M 167: Standard Specification for Structural Plate for Pipe, Pipe-Arches, and Arches.

C. AASHTO M 190: Standard Specification for Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.

D. AASHTO M 196: Standard Specification for Corrugated Aluminum Alloy Culverts and Underdrains.

E. AASHTO M 197: Standard Specification for Clad Aluminum Alloy Sheets for Culverts and Underdrains.

F. AASHTO M 218: Standard Specification for Zinc Coated (Galvanized) Steel Sheets For Culverts and Underdrains.

G. AASHTO M 219: Standard Specification for Aluminum Alloy Structural Plate for Field Bolted Conduits.

H. AASHTO M 245: Standard Specification for Precoated, Galvanized Steel Culverts and Underdrains.

I. AASHTO M 246: Standard Specification for Precoated Galvanized Steel Sheet For Culverts And Underdrains.

J. AASHTO M 274: Standard Specification for Steel Sheet, Aluminum-Coated (Type 2) by the Hot-Dip Process For Sewer And Drainage Pipe.

K. AASHTO M 289: Specification for Aluminum-Zinc Alloy Coated Sheet Steel for Corrugated Steel Pipe.

L. ASTM D 1187: Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.

M. FS TT-P-636: Paint, Coating, Alkyd, Wood and Ferrous Metal.

1.3 **DEFINITIONS**

A. Nominal Diameter: Nominal diameter of metal pipe shall be from inside crest to inside crest of corrugations.

1.4 **QUALITY ASSURANCE**

A. Reject pipe and fittings that do not meet any of the requirements of this section including elliptical shaping; variation from a straight centerline; ragged edges; unevenly lined or spaced bolt holes; illegible brands, Abraided or scaled or broken spelter coatings; dents; bends in the metal; or uneven laps.

PART 2 PRODUCTS

2.1 **CORRUGATED PIPE**

A. Corrugated Steel Pipe: AASHTO M 36 steel with AASHTO M 218 annular or helical corrugations using lap joints with riveted or spot welded seams, or with helical corrugations using continuous helical lock seams or ultra high-frequency resistance butt-welded seams.
   1. Type I: Circular Section.
   2. Type II: Noncircular Section.
   3. Type III: Underdrain With or Without Perforations.

B. Corrugated Aluminum Pipe: AASHTO M 196 or AASHTO M 197 pipe as applicable. Select type of pipe corrugations, unless indicated.

C. Gage:
   1. Circular Section Pipe: 16 minimum.
   2. Arch Pipe: 14 minimum.

2.2 **STRUCTURAL PLATE PIPE**

A. Galvanized Steel: Thickness, AASHTO M 167.

B. Aluminum Alloy: Gage and tolerances, values in AASHTO M 219.

C. Pitch and Depth of Corrugations: AASHTO M 167 or AASHTO M 219. Select pitch and depth unless indicated.

2.3 **COUPLING BANDS**

A. Same base metal and coating as the pipe, AASHTO M 36.

B. Provide circumferential and longitudinal strength to preserve the pipe alignment, to prevent separation of pipe, to prevent infiltration of site fill material and to provide water tight joints.

2.4 **COATINGS AND LININGS**

A. Zinc Coating: AASHTO M 218.

B. Galvanized Coating: AASHTO M 245.

C. Bituminous Coating and Lining:
   1. AASHTO M 190. Coating thickness to be 0.05 inch measured on the crest of the corrugations. Linings, a minimum coating of 1/8 inch thickness above the crest of each corrugation.
      a. Coating A. Fully bituminous coating.
      b. Coating B. Half bituminous coating with paved-invert lining.
      c. Coating C. Fully bituminous coating and paved-invert lining.
      d. Coating D. Fully bituminous coating and 100 percent lining.
   2. When fiber bonded bituminous coating is specified, embed fiber in the molten galvanizing before bituminous coating.

D. Polymer Coating: 10 mils thick minimum, AASHTO M 245 or AASHTO M 246.
   1. Coating A. One side polymeric coating.
   2. Coating B. Two side polymeric coating.

E. Aluminum Coating: AASHTO M 274.

F. Aluminum-Zinc Coating: AASHTO M 289.

2.5 **FITTINGS AND ACCESSORIES**

A. All fittings and bolts shall meet applicable specifications of the pipe being joined. Use accessories and gaskets recommended by manufacturer.

B. When providing pipe specifically manufactured with branch connections, extend fittings to but not beyond inner surface of pipe.

PART 3 EXECUTION

3.1 **INSTALLATION**

A. Install pipe as per manufacturer's instructions.

B. Tighten joint bands evenly.

C. Install elliptical pipe so the major or minor axis coincides with the proposed pipe alignment.

D. Do not cut coated pipe with a welding torch.

E. Coat aluminum pipe to prevent direct contact with concrete with an ASTM D 1187 bituminous coating or an FS TT-P-636 zinc chromate primer.

3.2 **REPAIR**

A. Repair damaged coatings, Section 05 05 10.

END OF SECTION

SECTION 33 05 05

DUCTILE IRON PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Ductile iron pipe, couplings, fittings, and joint materials.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. AWWA C104: American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

B. AWWA C110: American National Standard for Ductile-Iron and Gray Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids.

C. AWWA C111: American National Standard For Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

D. AWWA C115: American National Standard for Flanged Ductile-Iron and Gray Iron Pipe with Threaded Flanges.

E. AWWA C151: American National Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

F. AWWA C600: AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. Buried Applications:

1. Class 52 or pressure class 350 psi ductile iron pipe, AWWA C151 with push-on joints, AWWA C111.
2. Cement lining for all pipe and fittings, AWWA C104.
3. Class 250 fittings, AWWA C110.
4. Coupler with mechanical joint fittings, AWWA C104, C110, and C111.
5. Rubber gasket slip-on pipe joints, AWWA C111 with gasket lubricant.
6. Bronze wedges with current capacity of 400 amps each for each joint as follows:

Pipe Diameter	No. of Wedges
less than 10"	2
10"	3
12"	4
greater than 12"	6

B. Above Ground Applications: As buried applications, except use bolted flanged fittings, AWWA C104, C110, and C115.

2.2 **COVERINGS**

A. Buried Mechanical Joints: Grease and 8 mil vinyl wrap plastic cover.

PART 3 EXECUTION

3.1 **INSTALLATION** A Install pipe per manufacturer's instructions and AWWA C600.

B. Water distribution and transmission, Section 33 12 19.

C. Gravity water systems, Section 33 31 00 or Section 33 41 00.

D. Irrigation Systems, Section 32 84 23.

END OF SECTION

SECTION 33 05 06

POLYETHYLENE PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Polyethylene pipe, couplings, fittings and joint materials.
B. Related work includes but is not limited to,
   1. Excavation, Section 31 23 16.
   2. Trench backfill, Section 33 05 20 .
   3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
   4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. AASHTO M 252: Standard Specification for Corrugated Polyethylene Drainage Pipe.
B. AASHTO M-294: Standard Specification for Corrugated Polyethylene Drainage Pipe 300-1200 mm Diameter.
C. AASHTO MP7-97: Standard specification for Corrugated Polyethylene Pipe – 1350 and 1500 mm Diameter.
D. ASME B1.1: Unified Inch Screw Threads (UN and UNR Thread Form), Supplement.
E. ASTM A 307: Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
F. ASTM D 2239: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter.
G. ASTM D 2321: Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
H. ASTM D 2657: Standard Recommended Practice for Heat Joining of Thermoplastic Pipe and Fittings.
I. ASTM D 2774: Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.
J. ASTM D 3261: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
K. ASTM D 3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
L. ASTM F 477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
M. ASTM F 1055: Standard Specification for Electofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

1.3 **DEFINITIONS**

A. Standard Dimension Ratio (SDR): Average diameter of pipe divided by the minimum wall thickness. The diameter may be either inside or outside measurement depending upon which standard is referenced.

B. Code Designation: A rating system by the Plastic Pipe Institute for smooth wall polyethylene pipe materials. The designation PE 3408 designates the type of plastic pipe (PE), the grade (34), and the hydrostatic design stress measured in units of 100 psi (08) at 23 deg C.

PART 2 PRODUCTS

2.1 **SMOOTH WALL PIPE SYSTEMS**

A. Material: PE 3408 per ASTM D 2239 with a minimum cell classification of 345434C per ASTM D 3350.

B. Pipe: Smooth wall inside and out with an SDR or working pressure rating indicated or accepted by ENGINEER. Exterior markings as follows.

1. ASTM Standard Number.
2. Pipe Size.
3. Class and profile number.
4. Production code.
5. Standard dimension ratio.

C. Fittings:

1. Resin same as pipe.
2. Working pressure same or greater than pipe.

D. Joints:

1. Thermally welded butt fusion, ASTM D 3261.
2. Flanged, ASTM D 2657.
3. Ultra high molecular weight electo-fusion tape with a polyethylene coupler meeting ASTM F 1055 requirements.

2.2 **CORRUGATED WALL PIPE SYSTEMS**

A. Material: Polyethylene, ASTM D 3350 with a cell class as required in AASHTO M 252, AASHTO M 294 or AASHTO MP7-97

B. Pipe: Type S or D unless specified otherwise. Corrugations may be either annular or helical.

Type	**Description**
C	Circular pipe with a corrugated surface inside and out.
CP	Type C pipe with perforations

S Circular pipe with an outer corrugated wall and a smooth inter wall

SP Type S pipe with perforations

D Circular pipe with a corrugated wall sandwiched between a smooth outer wall and a smooth inner wall.

C. Fittings:

1. Blow molded with cell class 335420C, ASTM D 3350.
2. Rotational molded with cell class 213320C, ASTM D 3350.
3. Shop or field remanufactured of the same material as the pipe

D. Joints:

1. Bell and spigot with gaskets, ASTM F 477. Foam type weather stripping not allowed.
2. Split corrugated couplings with plastic or stainless steel ties and leak resistant neoprene gasket.

2.3 **NUTS AND BOLTS**

A. Carbon steel machined heavy hex heads, Class 2 fit, ASTM A 307; Grade B, threads, ASME B1.1.

PART 3 EXECUTION

3.1 **INSTALLATION**

A. Install pipe as per manufacturer's instructions, ASTM D 2321 or ASTM D 2774.

B. Water distribution and transmission, Section 33 12 19.

C. Gravity water systems, Section 33 31 00 or Section 33 41 00.

D. Irrigation Systems, Section 32 84 23.

E. Tape wrap steel materials for protection against corrosion after piping installation.

END OF SECTION

SECTION 33 05 07

POLYVINYL CHLORIDE PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Polyvinyl chloride pipe, couplings, fittings and joint materials.
B. Related work includes but is not limited to,
   1. Excavation, Section 31 23 16.
   2. Trench backfill, Section 33 05 20 .
   3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
   4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ASTM D 1784: Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
B. ASTM D 2241: Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR -Series).
C. ASTM D 2321: Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
D. ASTM D 2412: Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
E. ASTM D 2564: Standard Specification for Solvent Cement for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
F. ASTM D 2729: Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
G. ASTM D 2774: Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.
H. ASTM D 2855: Standard Practice for Making Solvent Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
I. ASTM D 3034: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
J. ASTM D 3139: Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
K. ASTM D 3212: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
L. ASTM F 656: Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
M. ASTM F 679: Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter

Plastic Gravity Sewer Pipe and Fittings.

N. ASTM F 949: Standard Specification for Poly(vinyl Chloride) (PVC) Corrugated sewer Pipe with a Smooth Interior and Fittings.

O. AWWA C900: AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution.

1.3 DEFINITIONS

A. Standard Dimension Ratio (SDR): Outside diameter of pipe divided by wall thickness.

PART 2 PRODUCTS

2.1 GRAVITY PIPE SYSTEMS

A. Pipe:

1. Solid smooth wall, 4 to 15 inch diameter, ASTM D 3034.
2. 18 to 27 inch diameter, ASTM F 679.
3. 4 to 10 inches diameter corrugated wall with a smooth interior, ASTM F 949.

B. Fittings: ASTM D 1784.

C. Stiffness: 50 psi minimum when measured at 5 percent deflection, ASTM D 2412.

D. Additives and Fillers: Not to exceed 10 parts by weight; 100 parts of resin in the compound.

E. Joints: Bell and spigot with flexible elastomeric seals, ASTM D 3212.

F. Flattening: No visual evidence of splitting, cracking, or breaking when flattened to 60 percent deflection, ASTM D 2412.

2.2 PRESSURE PIPE SYSTEMS

A. Pipe: Conform to AWWA C900 except use outside diameters defined by ductile iron pipe sizes. Dimensions, class, SDR, and tolerances per ASTM D 2241.

B. Compounds: Type 1, Grade 1, Class 12454A, ASTM D 1784.

C. Joints:

1. Bell and spigot with flexible elastomeric seals, ASTM D 3139. Use non-toxic lubricant.
2. Solvent weld, ASTM D 2564.

2.3 PERFORATED PIPE SYSTEMS

A. Pipe: Refer to gravity pipe products above.

B. Perforations: ASTM D 2729.

C. Joints: Push-on, solvent weld or other.

2.4 SOLVENT WELDS

A. Primer, ASTM F 656.

B. Glue, ASTM D 2564.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe per manufacturer's instructions, ASTM D 2321 for gravity systems, AWWA C900 or ASTM D 2774 for pressure systems, And ASTM D 2855 for underground Irrigation Systems.

B. Water distribution and transmission, Section 33 12 19.

C. Gravity water systems, Section 33 31 00 or Section 33 41 00.

D. Irrigation System, Section 32 84 23.

END OF SECTION

SECTION 33 05 08

PRE-STRESSED CONCRETE PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete cylinder pipe in sizes 12 inches through 72 inches composed of the following.
   1. A welded steel cylinder.
   2. Steel joint rings welded to the cylinder.
   3. A centrifugally spun cement-mortar lining.
   4. A pretensioned rod wrapping helically wound around the steel cylinder under measured tension.
   5. An exterior cement-mortar coating.

B. Couplings, fittings, and joint materials.

C. Related work includes but is not limited to,
   1. Excavation, Section 31 23 16.
   2. Trench backfill, Section 33 05 20 .
   3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
   4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. AISI Steel Designation No. 1012: Standard Nonsilverized Carbon Steel.

B. ASTM A 283: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

C. ASTM A 370: Standard Test Methods and Definitions for Mechanical Testing of Steel Products.

D. ASTM A 569: Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality.

E. ASTM A 570: Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.

F. ASTM A 611: Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural Quality.

G. ASTM A 615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

H. ASTM C 33: Standard Specifications for Concrete Aggregates.

I. ASTM C 150: Standard Specification for Portland Cement.

J. AWWA C200: AWWA Standard for Steel Water Pipe 6 In. and Larger.

K. AWWA C208: AWWA Standard for Dimensions for Fabricated Steel Water Pipe Fittings.
L. AWWA C303: AWWA Standard for Reinforced Concrete Pressure Pipe, Steel Cylinder Type, Pretensioned, for Water and Other Liquids.

1.3 **SUBMITTALS**

A. Design Summary: Prior to any fabrication, submit a design summary for each size and class of pipe together with line layout drawings or line schedules that show the location of each section of pipe and each special fitting to be furnished.

1.4 **DELIVERY, STORAGE AND HANDLING**

A. Attach end covers to pipe stored either in the yard or in the field. Reject injurious drying out of concrete.

B. Stalls: Remain in place during storage.

C. Gaskets: Store in cool, well ventilated place and protect from direct sunlight.

PART 2 PRODUCTS

2.1 **STEEL CYLINDER**

A. Fabricated from either.

1. Hot-rolled carbon steel sheets: ASTM A 570, Grade C, or ASTM A 611, or ASTM A 569 except that the maximum carbon content may be 0.25 percent and a minimum yield strength of 33,000 psi.
2. Plates: ASTM A 283, Grade D.
3. Gauge of cylinder steel.

Pipe Size	Gauge
12" to 16"	16
18" to 21"	15
24" to 33"	14
36" to 51"	12
54" to 57"	11
60" to 63"	10
66" to 69"	9
72"	8

B. Seams: Fabricate sheets or plates into cylinders with longitudinal or helical seams. Where longitudinal seams are used, fabricate in courses, which may consist of two or more sheets or plates. Produce welds with a tensile strength at least equal to the specified minimum tensile strength of the sheet or plate. Cut test specimens from the cylinder and test per ASTM A 370 when indicated.

C. Specified Diameter: The inside diameter of the concrete section.

D. Circumference of Steel Cylinders: Not to deviate from the design value by more than +3/16 inch for pipe sizes 16 inches and smaller or more than +1/4 inch for larger sizes.

2.2 **STEEL CYLINDER AND ROD AREA**

A. Total Cross-Section Area (cylinder plus rod reinforcement): Computed on the basis of a maximum stress of 16,500 psi, in the steel at the design pressure with no allowance for tensile strength of the concrete.

B. Rod Wrap: Not less than 7/32 inch diameter.

C. Maximum Center to Center Spacing Between Rods: No greater than 1-1/2 inches with cylinder thickness less than 14 gage nor greater than 2 inches with cylinder thickness 14 gage and heavier.

D. Minimum Cross-Section Area of Rod Reinforcement per Lineal Foot of Pipe: Numerically equal to at least 1 percent of the nominal inside diameter of the pipe in inches.

E. Minimum Center to Center Spacing Between Rods: No closer than 2 rod diameters.

F. Cross-Sectional Area of the Rod Reinforcement: Not to exceed 60 percent of the total required area of steel.

2.3 **ROD WRAPPINGS**

A. Rod Reinforcement: ASTM A 615, Grade 40, except:

1. Bars: Plain round bars except the requirements of Sec. 6, 7 and 14.3 shall not apply.
2. Intermediate Diameter Bars: Meet the requirements for the next smaller bar number designation.
3. Bars of Diameter Less Than No. 3: Meet the requirements for No. 3 bar.

B. Helically wind rods and space equally along the length of the cylinder and continue over the cylindrical portion of the bell ring.

C. Use a suitable device for stressing, measuring, and visibly indicating the tension in the rod during the winding operation. Hold the tension within 110 to 125 percent of the difference between the specified minimum yield strengths of the cylinder and rod. Continue the rod wrapping from end to end of the cylinder and weld to the joint rings. Lap weld the welded splices in the rod for a distance of 4 rod diameters or butt weld in such a manner that the joint develops a tensile strength at least equal to the specified minimum strength of the rod. Test each butt welding to the stress of 25,000 psi tension.

2.4 **JOINTS**

A. Steel Joint Rings: Bell and spigot rubber gasket type, self-centering without the gasket supporting the weight of the pipe and the steel conforming to the requirements of AISI Steel Designation No. 1012.

B. Spigot Rings: Fabricated from a specially rolled section which includes a gasket groove. Proportion the groove that, upon proper closure of the joint, the gasket will be suitable

compressed and will effect a watertight seal which provides for expansion, contraction and deflection.

C. Bell Ring Thickness Plus Rod Reinforcement Over the Bell: Provide a total cross-sectional area not less than 1/3 greater than that furnished for an equivalent length along the barrel of the pipe.

D. Sizing: Size both the bell and spigot rings to the same design diameter by expanding the rings beyond the elastic limit of the steel.

E. Tolerances:

1. Minimum bell ring thickness: U.S. standard 10 gage for pipe sizes 12 inches through 16 inches and 3/16 inch for larger sizes.
2. Circumference of the inside bell ring contact surface: Not to exceed the circumference of the outside spigot ring contact surface by more than 3/16 inch.

2.5 **TESTING STEEL CYLINDERS**

A. After each cylinder is completed, but prior to lining or coating, test hydrostatically to a minimum hydrostatic pressure which develops a circumferential tensile stress of not less than 20,000 psi and not more than 25,000 psi. Reweld cylinders that show any Leakage under test at the points of Leakage and subject them to another hydrostatic test. Continue procedure until completely watertight under the required test pressure.

2.6 **RUBBER GASKETS**

A. Shape: Circular cross-section.

B. Gasket Compounds: Conform to the requirements of AWWA C200 consisting of first grade natural rubber, synthetic rubber, or a suitable combination thereof. Form and cure in such a manner as to be dense and homogenous with a smooth surface free from blisters, pits, and other imperfections.

2.7 **CEMENT**

A. Cement: Type II, ASTM C 150 unless indicated otherwise.

2.8 **AGGREGATES**

A. Sand for Cement-Mortar: "Fine Aggregate", ASTM C 33, except that the gradation may be modified to provide a lining of optimum density.

2.9 **CEMENT-MORTAR LINING**

A. Cement-Mortar: One part cement to not more than 3 parts fine aggregate by weight. Control water content to obtain dense, workable, durable mortar.

B. Spin the lining in the cylinder to obtain a nominal thickness of 1/2 inch for pipe sizes 12 inches through 16 inches and to a nominal thickness of 3/4 inch for pipe sizes 18 inches

and larger. Use gage rings at the ends of the pipe to control the thickness. Take adequate measures to limit the deviation from the mean diameter of the cylinder, at any section, to a maximum of 1/2 percent of the mean diameter. Where required, place external roundup rings around the cylinder prior to the spinning to ensure roundness of the cylinder and uniformity of lining thickness. After the mortar has been placed in the cylinder, revolve at a speed that will cause the cement-mortar to level out to a uniform thickness throughout the cylinder. Continue the spinning until the lining is thoroughly compacted and surplus water removed, and the finished lining is smooth and uniform throughout.

C. Moist cure the lining for a minimum period of 24 hours after spinning before wrapping the cylinder with rod. This may be accomplished by tightly sealing the ends of the cylinder with a waterproof membrane to retain the moisture in the mortar. Vapor curing may be used in lieu of or in combination with moist curing on a time ratio basis of one hour vapor curing to 4 hours moist curing. Transport, support, and cure in a manner to prevent damage to the lining.

D. Lining Thickness Tolerance: Not more than plus or minus 25 percent from the specified nominal thickness.

2.10 **EXTERIOR COATING**

A. Cement-Mortar for Coating: Ratio of 1 part of cement to not more than 3 parts of fine aggregate, by weight. Control the water content to obtain a dense, workable, durable mortar. Rebound may be reclaimed and used as aggregate.

B. Apply by mechanical means producing a dense, uniform finished coating adhering tightly to the pipe. Provide a minimum nominal coating applied over the cylinder of 3/4 inch over the rod wrap.

C. Cement Slurry Coating: One bag of cement to not more than 10 gallons of water applied concurrent with the coating application to coat the steel assembly surface under the rod and the mortar-coating leading edge.

D. Suitably support the pipe during handling and curing to prevent damage to the lining and coating.

2.11 **CURING COMPLETED PIPE**

A. Moist cure the lining for a minimum period of 6 days. Vapor curing may be used in lieu of or in combination with moist curing on a time ratio basis of one hour vapor curing to 4 hours moist curing.

B. Protect the mortar lining from temperatures below 40 deg. F. during the application.

2.12 **JOINT LENGTHS**

A. 40 feet except where shorter lengths are required for fittings, curves, or closures.

2.13 BENDS AND SPECIFIC FITTINGS

A. Fabricated short radius bends or special fittings such as wyes, tees and crosses from previously tested steel cylinders, AWWA C208. Fabricate bends or special fittings at least equal in strength to the abutting pipe sections and mortar line and coat after fabrication. Obtain approval of the design prior to fabrication.

B. Test all seams of bends or special fittings, except those seams previously tested as cylinders. Test seams by the air soap method or by the dye-check method. Repair any leaks by welding and retest the seam and recoat if required.

2.14 OUTLETS

A. Fabricate outlets into the wall of the pipe, prior to testing, for blow-offs, branches, air valves, and access manholes. Provide cast or fabricated steel fittings of suitable design and securely weld to the cylinder before being coated. Reinforce the pipe cylinder, as necessary, for the required opening. Obtain approval of the design of such outlets prior to fabrication.

2.15 WELDED JOINTS

A. Where welded joints are shown on the Drawings, the rubber gasketed joint may be welded by inserting a filler rod under the flare of the bell and welding in place to the bell ring and to the spigot ring, or special joints for field welding may be furnished.

2.16 BEVELED ENDS

A. Where curves are required which have a shorter radius than can be obtained by unsymmetrical closure of the joint, sections of pipe may be furnished with beveled ends. An end of beveled pipe may have a maximum bevel of 5 degrees measured from a plane perpendicular to the axis of the pipe. The long point of the bevel shall be so marked on the pipe.

2.17 SOURCE QUALITY CONTROL

A. Refer to AWWA C303.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe and fittings per manufacturer's recommendations and Section 33 12 19. Use slings or pipe manufacturer approved lifting devices.

B. Lay the pipe to curved alignment by means of unsymmetrical closure of the joints.

1. Use a joint deflection of up to 3/4 inch for pipe sizes 12 inches through 24 inches.

2. Use a joint deflection of up to 1 inch for pipe sizes 27 inches and larger.

C. Where curves are required which have shorter radius than can be obtained by unsymmetrical closure of the joint, furnish sections of pipe with beveled ends. The end of a beveled pipe may have a maximum bevel of 5 degrees measured from a plane perpendicular to the axis of the pipe. Mark the long point of the bevel on the pipe.

D. Joints to be grouted inside and outside as per manufacturer's recommendations.

END OF SECTION

SECTION 33 05 09

STEEL PIPE -LINED AND COATED

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cement mortar lined and coated steel pipe, couplings, fittings, and joint materials in sizes 4 inches through 120 inches.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ASTM A 82: Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

B. ASTM A 283: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

C. ASTM A 370: Standard Test Methods and Definitions for Mechanical Testing of Steel Products.

D. ASTM A 569: Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality.

E. ASTM A 570: Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.

F. ASTM C 33: Standard Specification for Concrete Aggregates.

G. ASTM C 150: Standard Specification for Portland Cement.

H. AWWA C200: AWWA Standard for Steel Water Pipe 6 In. and Larger.

I. AWWA C205: AWWA Standard for Cement-Mortar Protective Lining and Coating for Steel Water Pipe -4 In. and Larger -Shop Applied.

J. AWWA C208: AWWA Standard for Dimensions for Fabricated Steel Water Pipe Fittings.

K. AWWA C303: AWWA Standard for Reinforced Concrete Pressure Pipe, Steel Cylinder Type, Pre-Tensioned, for Water and Other Liquids.

1.3 SUBMITTALS

A. Design Summary: Prior to any fabrication, submit a design summary for each size and class of pipe and line layout drawings or line schedules that show the location of each

section of pipe and each special fitting to be furnished.

B. Shop Drawings of special fitting and outlets.

1.4 QUALITY ASSURANCE

A. Perform quality assurance tests required by AWWA C303.

1.5 DELIVERY, STORAGE AND HANDLING

A. Attach end covers to pipe stored either in the yard or in the field to prevent drying out of concrete.

B. Stalls: Remain in place during storage.

C. Gaskets: Store in a cool, well ventilated place and protect from direct sunlight.

PART 2 PRODUCTS

2.1 STEEL CYLINDERS

A. Fabricated from either:

1. Hot-rolled Carbon Steel Sheets: Conform to ASTM A 570, Grades B, C, D, or E, or ASTM A 569 except that the maximum carbon content may be 0.25 percent and a minimum yield strength of 33,000 psi.
2. Plates: Conform to ASTM A 283, Grade C or D.

B. Seams: Fabricate sheets or plates into cylinders with longitudinal seams. Produce welds with a tensile strength at least equal to the specified minimum tensile strength of the sheet or plate. Cut test specimens from the cylinder and test per ASTM A 370 when specified.

C. Specified Diameter: The inside diameter of the concrete section.

D. Circumference of Steel Cylinders: Not to deviate from the design value by more than +3/16 inch for pipe sizes 16 inches and smaller or more than +1/4 inch for larger sizes.

E. Test Steel Cylinders: Test hydrostatically to a minimum hydrostatic pressure which develops a fiber stress equal to 75 percent of the specified minimum yield strength of the steel. Reweld cylinders that show any Leakage under test at the points of Leakage and subject them to another hydrostatic test. Continue procedure until completely watertight under the required test pressure.

2.2 JOINTS

A. General: As indicated using one of the following procedures.

B. Bell and Spigot for Rubber Gasket: Fabricate the bell and spigot ends by either forming integrally with the steel cylinder or welding steel joint rings to the cylinder. Make the bell and spigot ends circular in shape and fabricated so that when the pipe is laid the joint will be self centering with a gasket of sufficient size and cross-section to seal the joint.

The difference in circumferential measurement between the outside circumference of the spigot and the inside circumference of the bell must not exceed 0.200 inch.

C. Belled Ends for Welding: Form a bell on the cylinder to accommodate the spigot. Make the spigot stub approximately 1-1/2 inches. Remove weld beads on the outside of the spigot and the inside of the bell to permit easy entry.

D. Plain Ends for Welding: Make both ends of pipe section plain and remove edge burrs.

E. Ends for Mechanical Couplings: Make ends of pipe section plain, grooved, or banded. Grind any weld beads on exterior of pipe flush with the pipe for a sufficient distance from the ends of the pipe to accommodate the coupling. Prepare grooved or banded ends to fit the type of mechanical coupling to be used.

2.3 **CEMENT MORTAR**

A. Cement: Type I or II, ASTM C 150.

B. Sand: "Fine aggregate", ASTM C 33, except the gradation may be modified to provide a lining of optimum density.

C. Cement-Mortar Mix: One part cement to not more that 3 parts of sand by weight. Control water content to obtain dense, workable, durable mortar. Rebound may be reclaimed and used as aggregate.

2.4 **RUBBER GASKETS**

A. Shape: Circular cross-section.

B. Gasket Compounds: Conform to the requirements of AWWA C200 consisting of first-grade natural rubber, synthetic rubber, or a suitable combination thereof. Form and cure to be dense and homogenous with a smooth surface free from blisters, pits, and other imperfections.

2.5 **INTERIOR LINING**

A. Use gage rings at the ends of the pipe to control the spinning thickness. Spin the lining in the cylinder to obtain nominal thickness as follows:

1. 5/16 inch for pipe sizes 4 inches through 12 inches.
2. 3/8 inch for pipe sizes 14 inches through 18 inches.
3. 1/2 inch for 20 inches and larger.
4. Other lining thickness, as specified in AWWA C205 or indicated.

B. After the mortar has been placed in the cylinder, revolve at a speed which will cause the cement-mortar to level out to a uniform thickness throughout the cylinder. Continue the spinning until the lining is thoroughly compacted and surplus water removed, and the finished lining is smooth and uniform throughout.

C. Lining Thickness Tolerance: Not more than 1 percent less or 25 percent more than the

specified nominal thickness.

2.6 EXTERIOR COATING

A. Apply cement mortar exterior coating by mechanical means producing a dense, uniform finished coating adhering tightly to the pipe. Additional coating thickness may be specified to resist excessive external loads. Provide a minimum nominal coating applied over the cylinder as follows.
   1. 1/2 inch for pipe sizes 4 inches through 12 inches.
   2. 5/8 inch for pipe sizes 14 inches pipe through 18 inches.
   3. 3/4 inch for pipe sizes 20 inches and over.

B. Cement Slurry Coating: One bag of cement to not more than 10 gallons of water applied concurrent with the coating application to coat the steel assembly surface and the mortar-coating leading edge.

C. Steel Reinforcement: 14 gage cold-drawn steel wire conforming to ASTM A 82, helically wound and embedded in middle third of the coating.

D. Suitably support the pipe during handing and curing to prevent damage to the lining coating.

2.7 CURING

A. Moist cure the lining for a minimum period of 24 hours after spinning. This may be accomplished by tightly sealing the ends of the cylinder with a waterproof membrane to retain the moisture in the mortar. Steam curing may be used in lieu of or in combination with moist curing on a time ratio basis of 1 hour steam curing to 4 hours moist curing.

B. Moist cure the completed pipe for 6 days minimum. Steam curing may be used in lieu of moist curing.

C. Protect the mortar lining from temperatures below 40 deg. F. during the application and curing.

2.8 PIPE LENGTHS

A. 40 feet except where shorter lengths are required for fittings, curves, or closures.

2.9 BENDS AND SPECIFIC FITTINGS

A. Fabricate short radius bends or special fittings such as wyes, tees and crosses from previously tested steel cylinders, AWWA C208. Fabricate bends or special fittings at least equal in strength to the abutting pipe sections and line and coat with the same material as the pipeline. Obtain approval of design prior to fabrication.

B. Test all seams of bends or special fittings, except those seams previously tested as cylinders. Test seams by the air soap method or by the dye-check method. Repair any leaks by welding and retest the seam and recoat if required.

2.10 OUTLETS

A. Build outlets into the wall of the pipe, prior to testing, for blow-offs, branches, air valves, access manholes, etc. Provide cast or fabricated steel fittings of suitable design and securely weld to the cylinder before being coated. Reinforce the pipe cylinder, as necessary, for the required opening. Obtain approval of the design of such outlets prior to fabrication.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe per manufacturer's instructions and Section 33 11 00.

B. Provide a maximum joint deflection on curved alignment by means of unsymmetrical closure of spigot into bell as per manufacturer's recommendation but not greater than the following:

1. 3/4 inch for pipes 12 inches through 24 inches.
2. 1 inch for pipes 27 inches through 72 inches.

C. Joints to be grouted inside and outside as per manufacturer's recommendations.

END OF SECTION

SECTION 33 05 10

VITRIFIED CLAY PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Vitrified clay pipe, fittings, and joint materials.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ASTM C 12: Standard Recommended Practice for Installing Vitrified Clay Pipe Lines.

B. ASTM C 301: Standard Methods of Testing Vitrified Clay Pipe.

C. ASTM C 425: Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.

D. ASTM C 700: Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.

PART 2 PRODUCTS

2.1 PIPE

A. Vitrified clay, extra strength, ASTM C 700.

B. Furnish branches with connections completed and fastened to the barrel of the pipe in the process of manufacture.

2.2 JOINTS

A. Bell and spigot type joints, ASTM C 425.

B. Compression couplings for plain end pipe

2.3 SOURCE QUALITY CONTROL

A. Loading tests and quantities tested, ASTM C 301. Pipe shall withstand the following minimum loads for a 3 edge bearing test.

Nominal Size in Inches	Load in lb. Per lineal foot	Nominal Size in Inches	Load in lb. Per lineal foot
4	2000	21	4200
6	2000	24	4800
8	2200	27	5200
10	2400	30	5500
12	2600	33	5800
15	3100	36	6300
18	3600	39	6600
		42	7000

PART 3 EXECUTION

3.1 INSTALLATION

A. Install pipe as per manufacturer's instructions.

B. Bedding: Class “B” encasement per ASTM C 12.

END OF SECTION

SECTION 33 05 11

POLYPROPYLENE PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Polypropylene (PP) pipe, fittings, joint requirements, and installation.

1.2 REFERENCES

A. **AASHTO Standards**:

M330 Polypropylene Pipe, 300 to 1500 mm (12 to 60 in.) Diameter.

NTPEP National Transportation Product Evaluation Program.

B. **ASTM Standards:**

D2321 Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow applications.

D2774 Underground installation of Thermoplastic pressure piping.

D3212 Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

F2389 Pressure-rated Polypropylene (PP) Piping Systems.

F2736 6 to 30 in. Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe.

F2764 30 to 60 in. Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.

F2881 12 to 60 in. Polypropylene Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications.

1.3 DEFINITIONS

A. Corrugated Wall PP Pipe Classification: Classified as Types C, Type S, and Type D. See Section 33 05 06.

B. Porous Corrugated Wall PP Pipe Classifications: Classified as follows.

1. Type CP – This is Type C pipe with perforations.
2. Type SP – This is Type S pipe with perforations.

1.4 SUBMITTALS

A. Certificate showing product compliance per AASHTO NTPEP.

PART 2 PRODUCTS

2.1 PIPE

A. **General**: Pressurized and non-pressurized pipe may be required in a PP pipe system. ENGINEER to select if not specified elsewhere.
B. **Sanitary Sewer Pipe**:
   1. Type S (corrugated single wall) per ASTM F 2736 (6-30") or
   2. Type D (corrugated double wall) per ASTM F 2764 (30-60").
C. **Storm Drain Pipe**: Type S per ASTM F 2881 (12-60").
D. **Under Drain Pipe**: Type C, S, CP, or SP. Type CP and SP have Class 1 or Class 2 perforations indicated in AASHTO M 330. Provide Class 2 intended to be used for under drains or combination under drain and storm drain. Class 2 perforations are for pipe intended to be used for under drains.
E. **Pressurized Pipe**:
   1. Solid smoot wall, ASTM F 2389.
   2. Working pressure rating indicated or accepted by ENGINEER.
   3. Minimum exterior markings as follows.
      a. ASTM Standard Number.
      b. Pipe Size.
      c. Production Code.

2.2 JOINTS

A. **General**: Provide joints with a working pressure at least equal to or greater than the pipe's working pressure and acceptable to ENGINEER.
B. **Storm Drain and Sanitary Sewer Joints**: Bell and spigot meeting ASTM D 3212 with gasket that complies with ASTM F477. Other joining methods such as external snap couplers, split couplers, solvent welding, etc. must meet performance requirements herein, manufacturer's recommendations, and ENGINEER's review.
   1. When using bell retaining bands, use corrosive resistant materials such as fiberglass or stainless steel.
   2. Foam type weather stripping not allowed.
C. **Under Drain Joints**: If not watertight, wrap with geotextile and tape to prevent detritus entry.
D. **Pressurized Joints**: ASTM F 2389.

2.3 **FITTINGS**

A. Supplied or recommended by pipe manufacturer.
B. Structural and pressure performance same as pipe or greater.
C. Vacuum test certified by manufacturer.

2.4 VALVES, MANIFOLDS, ETC.

A. ASTM F 2389.

PART 3 EXECUTION

3.1 **INSTALLATION**

A. **Assembly**: Abide by manufacturer's instructions and the following. Use the more stringent provisions if there are any conflicts.
   1. Pressurized Systems:
      a. Water distribution and transmissions, Section 33 11 00.
      b. Underground irrigation, Section 32 84 23.
   2. Gravity Systems:
      a. Sanitary sewers, Section 33 31 00.
      b. Under drains and storm drains, Section 33 41 00.
B. **Burial**: Comply with Section 33 05 20 and the following.
   1. ASTM D 2774 for pressure systems.
   2. ASTM D 2321 for gravity systems.

END OF SECTION

SECTION 33 05 14

UTILITY GRADE ADJUSTMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Raise, lower, or change slope of Street Fixtures.
B. Install Cover Collars.
C. This section is NOT APPLICABLE to raising and lowering Street Fixtures that withstand internal pressure.

1.2 DEFINITIONS

A. Box: A structure such as a valve box, meter box, monument box, fire hydrant box, electrical pull box, cleanout box or other like structure not intended for human entry.
B. Cover Collar: A concrete filled annular space between metal frames and the adjacent Pavement structural section.
C. Extension Ring: A concrete or metal ring used to adjust surface elevations and surface cross slopes of Street Fixture covers. Metal rings are used between metal frames and metal covers or grates. Concrete rings are used below metal frames or in the concrete structure below.
D. Manhole: A structure designed to permit human entry and working space inside and to confine and control the flow of pipe-conveyed fluids.
These structures are collectively referred to as manholes regardless of composition, design, type or depth.
E. Street Fixture: The top of existing structures such as but not limited to Manholes, catch basin, sumps, inlets, valve boxes, meter boxes, monument boxes, and similar structure in a thoroughfare surface.
F. Vault: A structure intended for human entry containing electrical/telephone facilities or other like utilities.

PART 2 PRODUCTS

2.1 PAVEMENT

A. Asphalt Concrete: AC-20-DM-1/2, Section 32 12 05.
B. Cast-in-place Concrete: Class 4000, Section 03 30 04.

2.2 GROUT

A. Hydraulic cement, Section 03 61 00.

2.3 **EXTENSION RINGS**

A. Metal: Cast iron or steel, Section 05 56 00.
B. Cast-in-place Concrete: Class 4000, Section 03 30 04.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Determine condition of existing incidental structure. Any item not reported damaged prior to construction shall be considered unbroken and must be replaced by CONTRACTOR at no additional cost to OWNER.
B. Provide invert cover over pipe in cleanout box to prevent gravel, concrete, or debris from entering pipeline.
C. Unless indicated otherwise, arrange for utility companies to adjust their own structures.
D. Coordinate all adjustments with requirements of affected utility company.

3.2 **ADJUST STRUCTURE TO GRADE**

A. Restrict excavation around the structure to a minimum area.
B. At the completion of the structure adjustment, backfill the void around the structure and compact before paving or landscaping.
C. Apply mortar to inside and outside of concrete grade rings used to make adjustments.
D. If the cone is cracked during construction, restack the Manhole with shorter Manhole sections and install a new cone at no additional cost to the OWNER.

3.3 **ADJUST COVER IN PAVEMENT SURFACE**

A. Method A -Metal Extension Rings:
    1. Use rings that lock together.
    2. Set frame at desired elevation and cross-slope.
    3. Seal joints between Pavement and ring, Section 32 01 17.
B. Method B – Concrete Extension Rings:
    1. Place concrete grade rings under frame or in structure riser shaft.
    2. Set frame at desired elevation and cross-slope.
    3. Provide 100 percent concrete support under frame. Do not use wood, bricks, concrete fragments, blocks or particles as support.
    4. Grout seams between concrete rings and between frame and concrete rings.
C. Method C – Place Concrete:
    1. Set frame at desired elevation and cross-slope.
    2. Place concrete and provide 100 percent concrete support under frame.

D. Method D – Concrete Deck:

1. Remove existing concrete deck.
2. Reset steel rebar.
3. Set frame to grade, set forms.
4. Pour concrete. Provide complete concrete support under Street Fixture.

3.4 INSTALLING COVER COLLAR

A. Open an annular space between pavement and Street Fixture cover. Unless indicated otherwise, provide 12 inches of annular space.

B. Set concrete collar to 1/4 inch minimum to 1/2 inch maximum below asphalt concrete pavement surface and 1/4 inch below portland cement concrete pavement surface.

C. Trowel finish, Section 03 35 00.

3.5 PAVEMENT SURFACE RESTORATION

A. In new streets or overlays, adjust Street Fixture cover after bituminous paving is complete.

B. Pavement restoration, Section 33 05 25.

END OF SECTION

SECTION 33 05 20

BACKFILLING TRENCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Trench backfill materials.
B. Trench backfilling requirements.
C. Surface restoration requirements.

1.2 DEFINITIONS

A. Bedding: That surface of the Excavation or portion of the Pipe Zone below the pipe.
B. Pipe Zone: That zone in a backfilling operation which supports, and surrounds the pipe barrel, and extends to 1 foot above the top of the pipe barrel.

1.3 SUBMITTALS

A. Submit maximum laboratory dry density and optimum laboratory moisture content for:
   1. Subgrade material, and
   2. Each type of fill to be used.
B. Upon ENGINEER's request, submit a written quality control Inspections and testing report describing source and field quality control activities performed by CONTRACTOR and its Suppliers.

1.4 QUALITY ASSURANCE

A. Do not change material sources, or aggregate without ENGINEER's knowledge.
B. Reject backfill material that does not comply with requirements specified in this section.

1.5 STORAGE AND PROTECTION

A. Storage:
   1. Safely stockpile backfill materials.
   2. Separate differing materials, prevent mixing, and maintain optimum moisture content of backfill materials.
B. Protection:
   1. During installation or repair, plug end of pipe or fitting except when installing next section of pipe or fitting.
   2. Avoid displacement of and injury to Work while compacting or operating equipment.
   3. Movement of construction machinery over Work at any stage of

construction is solely at CONTRACTOR's risk.

1.6 SITE CONDITIONS

A. Do not place, spread, or roll any backfill material over material that is damaged by water. Remove and replace damaged material at no additional cost to OWNER.

B. Control traffic and erosion. Keep area free of trash and debris. Repair settled, eroded, and rutted areas.

C. Reshape and compact damaged structural section to required density.

D. Restore any damaged structure to its original strength and condition.

E. Replace contaminated backfill at no additional cost to OWNER.

1.7 SEQUENCING

A. Coordinate backfilling operation with pipeline commissioning requirements in Section 33 08 00.

1.8 ACCEPTANCE

A. General:

1. Native material may be wasted if there is no additional cost to substitute material acceptable to ENGINEER.
2. For material acceptance refer to.
   a. Common fill, Section 31 05 13.
   b. Crushed aggregate base, Section 32 11 23.
   c. Cement treated fill, Section 31 05 15.

B. Trench Backfilling: One test per Lot.

Table 1: Lot Size for Trench Backfilling Operation

Material	Test Criteria	Lot size
Subgrade	Standard (a)	200 lineal feet
Common Fill	Standard (a)	200 lineal feet per lift 25 square feet of footing area per lift
Crushed Aggregate Base	Modified (a)	200 lineal feet per lift 25 square feet of footing area per lift
Flowable Fill	Strength (b)	50 cubic yards

NOTES
(a) Proctor density, Section 33 05 05
(b) Compressive strength, Section 31 05 15
(c) Lift thickness above the pipe zone before compaction, 8 inches.

1.9 WARRANTY

A. Any settlement noted in Trench backfill or in structures built over the Trench backfill will be considered to be caused by improper compaction methods and shall be corrected at no

cost to the OWNER.

B. Restore structures damaged by settlement at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 BACKFILL MATERIALS

A. Common fill, Section 31 05 13.

B. Crushed aggregate base, Section 32 11 23.

C. Cement treated fill, Section 31 05 15.

D. Slag or asphalt bearing material not allowed.

2.2 ACCESSORIES

A. Water: Make arrangements for sources of water during construction and make arrangements for delivery of water to site. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

B. Geotextile Fabric: Section 31 05 19.

C. Identification Tape: Permanent, bright-colored, continuous-printed magnetic plastic tape, intended for direct-burial service; not less than 6 inches wide by 4 mils thick. The tape shall read "**CAUTION: BURIED INSTALLATION BELOW**". Color of tape as follows.

1. Red: Electric power lines, cables, conduit and lighting cables
2. Yellow: Gas, oil, steam, Petroleum or gaseous materials
3. Orange: Communications, alarm, signal, cables or conduits
4. Blue: Potable water
5. Purple: Reclaimed Water, irrigation and slurry lines
6. Green: Sewer and storm drain lines

PART 3 EXECUTION

3.1 PREPARATION

A. Verify backfill material meets gradation requirements, foundation walls are braced to support surcharge forces imposed by backfilling operations, areas to be backfilled are free of debris, snow, ice or water, and Trench bottom is not frozen.

B. If Subgrade is not readily compactable secure written authorization for extra excavation and backfill; Section 31 23 16.

C. Avoid injuring and displacement of pipe and structures while compacting soil or operating equipment next to pipeline.

D. Place geotextile fabrics; Section 31 05 19.

3.2 GENERAL BACKFILLING REQUIREMENTS

A. Protect Subgrade from desiccation, flooding and freezing.

B. Do not damage corrosion protection on pipe.
C. Repair or replace damaged pipe at no additional cost to OWNER.
D. Withdraw sheathing, Shoring, piles, and similar supports as backfilling progresses. Backfill and compact all holes left by removals.
E. Provide sufficient water quality facilities to protect downstream fish and wildlife, and to meet State water quality requirements.
F. Water settling of Trench backfill is not permitted. "Jetting" of Trench backfill is prohibited.

3.3 **PIPE ZONE**

A. Maintain uniform foundation along barrel of pipe with sufficient relief for joint connections.
B. Use backfill materials meeting pipe manufacturer's recommendations. Maximum backfill particle size is 3/4 inch for plastic pipe.
C. Do not permit free fall of backfill material which may damage pipe, pipe finish, or pipe alignment.
D. Except where piping must remain exposed for tests, fill Pipe Zone as soon as possible.

3.4 **TRENCH ABOVE PIPE ZONE.**

A. Maximum lift thickness before compaction is 8 inches.
B. Fill unauthorized Excavations with material acceptable to ENGINEER at no additional cost to OWNER.
C. Do not damage adjacent structures or service lines.
D. Install continuous plastic line marker directly over buried lines 18 inches below finished grade.

3.5 **MODIFIED BACKFILL LAYER METHOD**

A. At discretion of CONTRACTOR, backfill may be placed in thicker layers than indicated above subject to the following provisions.
   1. CONTRACTOR proves the ability of proposed method to achieve specified average compaction density.
   2. ENGINEER, on the basis of test results, approves the system in writing.
B. Should CONTRACTOR find it necessary to change the method or any part of it, including the source of material, or the rate of placing the material, obtain approval of ENGINEER, who may require a further trial area.
C. If testing shows a previously approved system is no longer producing the required degree of compaction, make changes to comply.
D. Where vibration effects are creating environmental problems, make changes to eliminate problems.

3.6 **COMPACTION**

A. Compact backfill, Section 33 05 05.
   1. A-1 soils: 95 percent or greater of a Modified Proctor Density.
   2. Other soils: 95 percent or greater of a Standard Proctor Density.

3.7 **COMPRESSIVE STRENGTH**

A. Where a flowable fill is used, provide compressive strength indicated in Section 31 05 15. Use fill which flows easily and vibration is not required.

3.8 **SURFACE RESTORATION**

A. Provide temporary paved surfaces where Trenches pass through roadways, Driveways or sidewalks.

B. Restore paved surfaces; Section 33 05 25.

C. Finish landscaped surfaces with grass, Section 32 92 00 or with other ground cover, Section 32 93 13.

3.9 **CLEANING**

A. Remove stockpiles from the site. Grade site surface to prevent free standing surface water.

B. Leave borrow areas clean and neat.

END OF SECTION

SECTION 33 05 23.35

TRENCHLESS UTILITY INSTALLATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Boring or jacking pipe or box culvert.

1.2 REFERENCES

A. **ASTM Standards**

A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

1.3 SUBMITTALS

A. Details of jacking pit bracing, casing or conduit, and jacking head to be used.
B. Dimensions and support of pilot tunnel (if used).
C. Details of steel rails in pilot tunnel (if used), including true line and grade.
D. Copy of applicable permits from agency having jurisdiction.

1.4 PERFORMANCE REQUIREMENTS

A. Jack conduit to line and grade indicated. Modify jacking operation to correct any deviation. Correct misalignment in line or grade at no additional cost to OWNER.
B. Methods and equipment used in jacking casing or conduit are CONTRACTOR's choice.
C. Use workers experienced in jacking operations.

PART 2 PRODUCTS

2.1 STEEL CASING

A. ASTM A53, Grade B steel pipe for jacking operations, minimum wall thickness of 0.375-inch, minimum yield stress of 42,000 psi. Use a casing with a diameter equal to the outside bell diameter of the pipe plus four (4) inches minimum.
B. Fillet weld joints continuous around casing and reinforce joints to withstand jacking operations.

2.2 CONCRETE PIPE

A. Section 33 05 02. When concrete pipe is to be jacked, use a pipe section designed to support the superimposed loads and the loads that may be placed upon the pipe during jacking operations. Use pipe sections that have a watertight joint.

2.3 SOIL CEMENT

A. Cement treated fill, Section 31 05 15.
B. Grout: Portland cement type, Section 03 61 00.

PART 3 EXECUTION

3.1 PREPARATION

A. Locate and preserve utilities, Section 31 23 16.

3.2 JACKING PROCEDURE

A. When casing to be jacked through a plastic clay, continue uninterrupted operations until casing has been jacked between specified limits.
B. Equip leading section of casing with a jacking head securely attached to prevent any wobble or variation in alignment during jacking operation.
C. Protect driving end against spalling or other damage and install sufficient bearing shims to intermediate joints to properly distribute jacking stresses. Remove and replace any section showing signs of failure.
D. No excavation in excess of outer dimensions of conduit being jacked will be allowed unless approved. Avoid any loss of earth outside jacking head.
E. Upon completion of jacking operations, pressure grout voids around outside face of the conduit. Grouting around jacked conduit must be started immediately after jacking operations have finished.
F. During the jacking operation, backpack with soil cement any annular space occurring outside of conduit that could affect any surface structure of facility.

3.3 PILOT TUNNEL

A. Construct tunnel where casing 60 inches or greater inside diameter is to be jacked for a distance greater than 32 feet.

B. Remove supports for tunnels as jacking progresses.

3.4 PIPE SUPPORT IN CASING TUNNEL

A. Unless indicated otherwise, use redwood skids throughout the length of the pipe tied at every pipe diameter length to brace pipe installed in casing to prevent shifting or flotation during backfilling of annular ring between the casing and carrier pipe.
B. Backfill annular ring with Portland cement grout, Section 03 61 00 unless indicated otherwise.
C. Install pipe barrels to rest upon support blocks with the pipe bells clearing the casing invert by at least 1/2 inch.
D. Whenever clay pipe is installed in a casing, use mechanical compression joints.

END OF SECTION

SECTION 33 05 23.40

CURED-IN-PLACE PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Installation of a flexible resin filled pipe liner in an existing gravity pipeline. After installation, the liner is cured with steam or hot water. The pipeline and the cured pipe liner become a continuous rigid composite pipe.

1.2 REFERENCES

A. **ASTM Standards**

D790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

D5813 Cured-in-Place Thermosetting Resin Sewer Pipe.

F1216 Rehabilitation of Existing Pipelines and Conduits by Inversion and Curing of Resin-Impregnated Tube.

F1743 Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of a Cured-in-Place Thermosetting Resin Pipe.

1.3 PERFORMANCE REQUIREMENTS

A. **General**:
   1. All portions of existing pipe are to be provided with a new composite pipe.
   2. After installation there shall be completely watertight seals at and through each manhole.
   3. All service connections shall be re-established with a watertight seal that eliminates infiltration and is acceptable to the OWNER.

B. **Measurements**: CONTRACTOR will take field measurements and make video observation of the host pipe to properly size the liner and verify the condition and length of the host pipe prior to ordering the liner.

1.4 SUBMITTALS

A. Tube and resin manufacturer's product data, equipment and material specifications.

B. Design calculations report by a licensed design professional showing conformance to the appendix of ASTM F1216 for each length of liner installed. Include in the report.
   1. Thickness of each proposed cured-in-place segment.
   2. Allowance for creep.

3. Stretch allowance during installation.
4. Comparison of strength of liner to requirements for H-20 and E-80 loading.

C. Bypass pumping plan for host pipe flow diversion. Indicate sequence of diversion operations, temporary plugs, silenced bypass pumping systems, temporary vehicle and pedestrian bypass, and site reinstatement after diversion.
D. Copy of written notice to neighborhood.
E. Traffic control plan, Section 01 55 26.
F. Pre- and post-installation video.

1.5 **QUALITY ASSURANCE**

A. CONTRACTOR has successfully installed over 30,000 linear feet of cured-in-place pipe.
B. Foreman has at least three (3) years of cured-in-place pipe installation experience with two (2) years' experience as an on-sight foreman and has directly supervised installation of at least 10,000 linear feet of cured-in-place pipe installations.
C. Foreman's crew has at least two (2) years' experience with main line setup, bypass pumping, materials installation, curing, connecting, and re-establishing lateral connections.

1.6 **NOTICE**

A. Provide seven (7) days initial notification and 24 hours secondary notification before commencing work.
B. Distribute written notification to property owners, business owners and the like within the project area and areas affected by the project. Provide (1) a description of the work, (2) beginning date and time of the work, (3) work duration, (4) expected, pipeline use restrictions, etc. In the case of sanitary sewer work, inform of potential odors and smells.
C. Provide all residents and businesses 24 hours emergency contact names and phone numbers of onsite superintendent and foreman.

PART 2 PRODUCTS

2.1 **RESIN**

A. Composed of (1) polyester resin and catalyst, (2) epoxy resin and hardener, or (3) vinyl ester resin and catalyst. When properly cured meet the requirements of ASTM D5813, ASTM F1216, or ASTM F1743.

2.2 **TUBE**

A. Flexible, absorbent woven or non-woven felt fabric with the outer layer (before inversion) coated with a translucent, impermeable, flexible plastic membrane. The membrane shall not be subject to delamination after curing of the composite pipe. The tube shall be sewn or spotwelded, have sufficient strength to bridge missing segments in the host pipe, stretch to fit irregular host pipe cross-sections and have measurement marks at regular intervals (not to exceed 5 feet) along the flexible plastic membrane.

2.3 **STRUCTURAL DESIGN**

A. Minimum physical properties of the cured composite pipe are as follows.

Table 1 – Structural Standards

Property	Standard	Cured Composite per ASTM F1216	Resin Properties
Flexural Modulus of Elasticity (Short Term)	D790	400,000 psi	400,000 psi
Flexural Strength (Short Term)	D790	4,500 psi	4,500 psi

The manufacturer must have performed long-term testing for flexural creep of the composite pipe materials installed in other work. Such testing results are to be used to determine the long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (tube and resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value was used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Retention values exceeding 50 percent of the short-term test results shall not be applied. The materials utilized for the work shall be of a quality equal to, or better than, the materials used in the long-term test with respect to the initial flexural modulus used in the pipe design.

B. The wall thickness of the cured composite pipe shall be based upon the following design parameters and design conditions.

Table 2 – Wall Thickness Design

Design Parameter	Criteria
Safety Factor	2.0
Ovality 2 percent to 5 percent 5 percent to 10 percent Greater than 10 percent	ASTM F1216 Design for 5 percent Design for 10 percent Excavate and repair host pipe

Soil Modulus	1,000 psi
Groundwater Depth (above invert of existing pipe)	Ground surface
Soil Depth	As measured in the field
Live Load	E-80 and H-20 highway
Soil Load	120 lbs. per cubic foot
Minimum service life	50 years
Retention Factor for Long-Term Flexural Modulus (Creep Retention)	50 percent
Host Pipe Condition	Fully Deteriorated
Design Conditions	
No structural support for hydrostatic, live, or earth loading comes from the host pipe. Loading for areas away from railroad, H20; for areas under railroad, E80. Assume a fully deteriorated pipe condition having groundwater loading condition measured form the pipe flowline to the ground surface. Pipe deflections are based upon actual pipe deflection and pipe damage observed in pipe inspection videos (by CONTRACTOR) but in no case less than two (2) percent. Any existing noticeable pipe deflection, structural damage, pipe ovality or pipe deterioration will require the CONTRACTOR to prove the adequacy of submitted liner thickness.	

C. The cured composite pipe shall be homogenous across the entire wall thickness. No dry or unsaturated layers shall be evident. The layers shall be uniformly bonded. It shall not be possible to separate any two (2)layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between layers.

PART 3 EXECUTION

3.1 PREPARATION

A. Obtain required excavation and noise permits.
B. Implement traffic control plan requirements, Section 01 55 26.
C. Provide for bypassing host pipe flows and lateral flows received by the host pipe. Standby pumping capacity for 125 percent flow is required at all times.
D. Control groundwater.
E. Contain overflows and spills.

3.2 CLEANING, INSPECTIONS, REPAIRS

A. Clean host pipe of obstructions, solids or dropped joints, debris and gaskets. Do not use chemical cleaning. If cleaning cannot be done with conventional equipment, excavate and remove the obstruction. Such excavation must be approved by ENGINEER prior to excavation and will be considered as change order work. Pipe deflections, changes in grade and pipe installed on a radius do not qualify for excavation and removal.
B. Inspect, measure and record host pipe conditions using digital video recording equipment in MPEG 1 format with 352c240/320x240x30 fps resolution and audio bit rate of 256 Kbps.
C. Restore or repair interior of the host pipe to an ovality of five (5) percent or less. Provide a smooth, uniform pre-lined surface with no sharp edges or broken rebar.

3.3 INSTALLATION

A. Follow ASTM F1216, Section 7 requirement and the following.
    1. Prior to tube installation, use a vacuum process to impregnate the tube and a roller system to uniformly distribute the resin. Fill the volume of air voids in the tube. Allow for polymerization shrinkage and loss of resin through cracks and irregularities in the host pipe wall.
    2. After installation, supply a heat source and cure the pipe. Provide temperature recommended by resin manufacturer. At the invert level, monitor temperatures at the insertion point and at the remote end of the tube.
    3. After cure, cool pipe temperature below 100 deg F before relieving pressure.
B. The finished composite pipe product shall be continuous over the length of pipe reconstructed and be free from dry spots, delaminating, wrinkling, bubbles and lifts. It shall also meet the leakage requirements specified in ASTM F1216.

3.4 REINSTATEMENT OF SERVICE CONNECTIONS

A. Open branch or lateral connection to buildings, drop manholes, and intersecting mainline connections without excavation.
B. Keep a minimum of two (2) complete working cutters available during the connection process.
C. Provide full diameter lateral connections that produce watertight holes, free from burrs or projections and finished with a smooth, brushed and buffed crack free edge.
D. Collect ALL cutting coupons.
E. Any excavation required for the purpose of reopening connections is at CONTRACTOR's expense.

3.5 **RESTORE MANHOLES**

A. Acclimate pipe to atmosphere temperatures before cutting pipe.
B. Remove top of composite pipe that passes through existing manholes.
C. If the liner does not pass through the manhole, or if the liner material changes at the manhole feather edge the composite pipe to match existing manhole flowline.
D. Seal openings between the shaft or cone and the liner with a multilayered poly resin composite liner system consisting of (1) epoxy primer moisture barrier, (2) a surface of polyurethane/polymeric blend foam, and (3) a final barrier coat consisting of a modified polymer.

3.6 **SURFACE FINISHING**

A. Restore paved surfaces, Section 33 05 25.
B. Landscapes: Restore landscaping as indicated and as follows where applicable.
   1. Section 32 92 00 for turf and grasses.
   2. Section 32 93 13 for other ground cover.
C. Repair public and private facilities damaged by CONTRACTOR.

3.7 **FIELD QUALITY CONTROL**

A. Leakage testing of the composite pipe shall be accomplished during cure while under a positive head. Comply with Section 33 08 00 requirements for the type of service that the composite pipe provides. Cured-in-place pipe products in which the pipe wall is cured while not in direct contact with the pressurizing fluid (e.g., a removeable bladder) must be tested by an alternative method acceptable to ENGINEER.
B. Monitor and record temperatures and curing data throughout the cooling process.

END OF SECTION

SECTION 33 05 25

PAVEMENT RESTORATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aggregate base restoration.
B. Concrete base restoration.
C. Surface restoration.

1.2 REFERENCES

A. ACI 305: Hot Weather Concreting.
B. ACI 306: Cold Weather Concreting.
C. ASTM C 615: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
D. ASTM C 78: Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Third-Point Loading).
E. ASTM C 928: Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.
F. ASTM D 1664: Standard Test Method for Coating and Stripping of Bitumen-Aggregate Mixtures.

1.3 SUBMITTALS

A. Mix design for,
    1. Temporary patching material.
    2. Permanent cold weather patching material.
B. Manufacturer's chemical additive data sheets.

1.4 WEATHER

A. Asphalt Concrete Pavement Patch:
    1. Provide temporary or permanent cold weather asphalt patching material when air and roadbed temperature in the shade are less than 40 deg. F.
    2. Remove any temporary patching and provide permanent patching material when temperatures exceed 40 deg. F. CONTRACTOR may perform work after cold weather season if authorized in writing by ENGINEER.
B. Portland Cement Concrete Pavement Patch: Comply with hot and cold weather requirements, ACI 305 or ACI 306.

1.5 **ACCEPTANCE**

A. Aggregate base compaction.
B. Asphalt concrete compaction.
C. Grade and cross slope of pavement surface.

PART 2 PRODUCTS

2.1 **MATERIALS**

A. Untreated Base Course: Section 32 11 23.
B. Flowable Fill Base: Section 31 05 15.
C. Portland Cement Concrete Base: Class 4000, Section 03 30 04.
D. Tack Coat: Section 32 12 14, Grade SS-1.
E. Permanent Warm Weather Asphalt Concrete Patching Material: Section 32 12 05, AC-20-DM-1/2 unless indicated otherwise.
F. Permanent Cold Weather Asphalt Concrete Patching Material: MC-250-FM-1, Section 32 12 05 modified as follows.
   1. Asphalt Cement:
      a. Kinematic viscosity at 140 deg F: 250 to 800 cSt.
      b. Flash Point: 175 deg F.
      c. Water: 0.2 percent maximum.
      d. Distillate Test:
         To 437 deg F: None.
         To 500 deg F: 0 -15 percent.
         To 600 deg F: 15 -75 percent.
         To 680 deg F: 75 percent minimum.

      e. Residue Tests: Penetration at 77 deg F: None. Ductility at 77 deg F: 100 cm minimum. Solubility in Trichloroethylene: 99 percent minimum.
   2. Composition of Mixture:
      a. Minimum Mix: 115 pounds asphalt cement per finished ton (5.75 percent).
      b. Maximum Mix: 135 pounds asphalt cement per finished ton (6.75 percent).
      c. Stripping: Not more than 5 percent, ASTM D 1664, after mixing.
      d. Workability: Material stockpiled for 1 year shall be capable of being shoveled, raked, spread and compacted.
   3. Chemical Additives: Capable of coating wet aggregates without stripping and maintains adhesive qualities in damp or wet applications.
G. Temporary Cold Weather Asphalt Concrete Patching Material: Type MC-250-DM-1/2, Section 32 12 05 with hydrated lime or anti-stripping agent as indicated in the mix design.
H. Pavement Sealing:
   1. Slurry seal Type RS-1-SS-II, Section 32 01 13.

2. Chip seal Type MC-250-CS-A, Section 32 01 14.

I. Portland Cement Concrete Patching Material: Class 4000, Section 03 30 05.

J. High Early Strength Portland Cement Concrete Patching Material:

1. Concrete compressive strength of 3,000 psi minimum in 4 hours.
2. Cementatious Material: Rapid hardening or very rapid hardening, ASTM C 928.
3. Cement content of mix, per cement manufacturer's recommendations or approved mix design.
4. Non-reactive aggregates in applications subjected to wetting, extended exposure to humid atmosphere, or contact with moist ground.

K. Pavement Marking: Tape or paint, Section 32 17 23.

PART 3 EXECUTION

3.1 PREPARATION

A. At site, post name, address and telephone number of CONTRACTOR to contact in emergencies.

B. Notify ENGINEER within 24 hours of commencing work of this section but not less than 4 hours.

C. Provide worker and public safety; Section 01 55 26.

D. Cutting Pavements: Cut full depth and straight, Section 02 41 14. Remove all bonding inhibitors.

3.2 AGGREGATE BASE OR FLOWABLE FILL BASE

A. Match depth of existing aggregate base or 8 inches thick minimum.

B. Place crushed aggregate base in lifts not exceeding 8 inches before compaction. Compact per Section 33 23 26 to a Modified Proctor Density of 95 percent or greater.

C. When providing controlled low strength material (CLSM as specified in 31 05 15) match depth of existing aggregate base. Use fill that flows easily and vibration is not required. Cure the fill before placing surface patch.

3.3 CONCRETE SUBSTRATE

A. Apply concrete bonding compound, Section 03 30 10, to edge of existing concrete. Place concrete, Section 03 30 10.

3.4 ASPHALT CONCRETE PATCH

A. Match existing Pavement thickness plus 1 inch, but not less than 4 inches.

B. Clean all vertical surfaces that butt against new patchwork. Provide full coverage spray tack coat. Do not spray tack coat on surfaces exposed to public view. Do not apply tack coat by brush.
C. Place asphalt concrete in lifts not exceeding 3 inches after compaction
D. Compaction: 94 percent of ASTM D 2041 (Rice) plus or minus 2 percent.
E. Match adjacent surface slopes.
   1. Plane off surface distortions that exceed 1/4-inch vertical deviation in 10 feet.
   2. Coat planed surfaces with a cationic or anionic tack emulsion that complies with Section 32 12 03. Cover tack with sand.

3.5 **PORTLAND CEMENT CONCRETE PATCH**

A. Full Depth restorations:
   1. Clean vertical surfaces in patchwork. Install dowels in vertical load bearing joints. Apply concrete bonding compound, Section 03 30 10.
   2. Match adjacent surface slopes. Apply membrane forming compound, Section 03 39 00 immediately to protect work from hot or cold weather.
   3. After concrete cure, plane off surface distortions that exceed 1/4 inch deviation in 10 feet. Use a water repelling product, Section 07 19 00 to water proof planed surfaces.
   4. Do not allow traffic on the repaired area until concrete strength is achieved.
B. Partial Depth Patching:
   1. Chip, hydro-blast or saw cut concrete to a minimum depth of 1 inch.
   2. Make surfaces free of frost, ice, mud, water, grease, dirt and other materials that hamper bonding.
   3. Install bonding agent per manufacturer's recommendations.
   4. Apply membrane forming compound, Section 03 39 00 immediately to protect work from hot or cold weather.
   5. After concrete cure, plane off surface distortions that exceed 1/4 inch deviation in 10 feet. Use a water repelling product, Section 07 19 00 to water proof planed surfaces.
   6. Do not allow traffic on the repaired area until concrete strength is achieved.

3.6 **CONCRETE PAVERS**

A. Screed Bedding with a notched and cambered screed board to achieve a crown between existing pavers. Use graded aggregate, geotextile, and bedding sand, Section 32 14 13.

B. In asphalt concrete or portland cement concrete surfaces place pavers against Pavement cuts to form a border course, i.e. the short side of the paver against the cut except at corners.

C. After placement, use a plate-type vibrating compactor to compact pavers. Size compactor to provide at least 5,000 lbf. force. Sweep sand into the joints and vibrate until joints are full. Remove excess sand.

D. Match adjacent surface grades with no more than 1/4 inch vertical deviation in 10 feet.

3.7 **PAVEMENT MARKINGS**

A. Unless indicated otherwise, repair all damaged Pavement markings with matching type of materials and installation.

END OF SECTION

SECTION 33 08 00

COMMISSIONING OF WATER UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Testing requirements for potable and non-potable water piping systems.

B. Warning: DO NOT use hydrostatic pressures described in this section for air-pressure testing.

1.2 DEFINITIONS

A. Leakage: The quantity of water required to maintain the specified hydrostatic test pressure after the pipeline has been filled with water and the air expelled.

B. Non-rigid Pipe: Any pipe that requires Bedding and backfill material for structural support.

1.3 SUBMITTALS

A. Pipeline Test Report: Submit.

1. Type of test.
2. Identification of pipe system.
3. Size, type, location and length of pipe in test section.
4. Test pressure and time.
5. Video cassette and log of visual examination.
6. Amount of Leakage versus allowable.
7. Date of test approval.
8. Signature of test supervisor.
9. Signature of Resident Project Representative witnessing and accepting the test.

1.4 PROJECT CONDITIONS

A. Repair pipeline system at no additional cost to OWNER until it passes specified commissioning tests.

1.5 WARRANTY

A. At the end of the One Year Correction Period repeat any test requested by ENGINEER to verify warranty of pipeline performance.

PART 2 PRODUCTS

2.1 TESTING MATERIALS

A. Medium: Water, air.

B. Recording Equipment (pressure systems):

1. Supply all equipment and power to perform pressure testing.
2. Secure approval of pressure gages.
3. Locate all gages and recording equipment away from affect of sunshine or unsuitable weather conditions.
4. Place, vents, pressure taps and drains for the test. Repair pipeline at completion of test at no additional cost to OWNER.

PART 3 EXECUTION

3.1 PREPARATION

A. Notify ENGINEER 48 hours in advance of test.

B. Carry out tests as pipeline construction progresses to ensure construction methods are producing satisfactory results.

C. Remove debris, sediment and other material from installed pipe prior to testing. Do not discharge or flush sand, gravel, concrete, debris or other foreign material into any existing pipeline system. Flushing with clean water only will be allowed but with minimal flows to eliminate exceeding capacities of the existing gravity systems. Flushing into existing pressurized water systems will not be allowed.

3.2 ALIGNMENT AND GRADE TEST

A. Do not allow line and grade of pipe to vary more than 1/2 inch in 10 feet and not more than 1 inch variance from true line at any location.

B. Do not allow grade of pipe to vary more than 1/4 inch in 10 feet for all design grades less than or equal to 1 percent and not more than 1/2 inch total variance from true grade at any location. Also, do not allow grade of pipe to vary more than 1/2 inch in 10 feet for all design grades greater than 1 percent and not more than 1 inch total variance from true grade at any location. Theses tolerances shall be acceptable provided that such variation does not result in a level or reverse sloping invert.

C. The variation in the invert elevation between adjoining ends of pipe due to eccentricity of joining surface and pipe interior surfaces shall not exceed 1/64 inch per inch of pipe diameter, or 1/4 inch maximum.

3.3 PRESSURE TEST

A. Air Test: Per pipe manufacturer's recommendation.

B. Hydrostatic test:

1. Provide 225 psi test pressure for 2 hours unless specified otherwise.

2. Provide air release taps at pipeline's highest elevations and expel all air before the test. Insert permanent plugs after test has been completed.
3. No piping installation will be acceptable until the leakage is less than the amount allowed by industry standards for the type of pipe material being tested or if no standard prevails than the number of gallons per hour as determined by the formula:

$$Q = \frac{LD \times \text{square root of } P}{133{,}200}$$

Where

Q = allowable leakage, in gallons per hour.

L = length of pipe under test in feet.

D = nominal diameter of pipe in inches.

P = average test pressure, in pounds per square inch (gage).

C. Locate and repair defective joints and retest until the leakage rate is less than allowable.

D. Repair any noticeable leakage even if total leakage is less than allowable.

3.4 **OBSTRUCTION AND DEFLECTION TEST**

A. Obstructions: Maximum protuberance is 1 inch.

B. Deflections:

1. Do not use mechanical pulling equipment when pulling mandrels through pipe.
2. Maximum reduction of internal diameter in any plane measured full length of installation and not less than 30 days after installation as follows:
   a. Polyvinyl chloride pipe, 7.5 percent.
   b. High density polyethylene pipe, 5 percent.
   c. Ductile iron pipe, 3 percent.
   d. Corrugated metal pipe, 7.5 percent.
3. Recommend an alternate method of measurement if mandrel testing would cause damage to internal pipe coating.

3.5 **INFILTRATION TEST**

A. Maximum is 50 gallons per inch diameter per mile per 24 hours.

3.6 **PIPE TESTING SCHEDULE**

A. Irrigation -Gravity System:

1. Grade test: All circuits drain.

B. Irrigation – Pressure System:

1. Grade test: All circuits drain.
2. Pressure test.

3. Operational Testing:
    a. Perform operational testing after hydrostatic test is complete; backfill is in place and sprinkler heads adjusted to final coverage.
    b. Demonstrate system meets coverage requirements and automatic controls function properly.
    c. Coverage requirements are based on operation of 1 circuit at a time.

C. Sanitary Sewers:

1. Alignment and grade test.
2. Obstructions and deflection test.
3. Infiltration test for gravity pipeline systems.
4. Pressure test for pressure pipeline systems.
5. Video inspection.

D. Subdrains:

1. Grade test: All pipelines drain.
2. Obstructions and deflection test.

E. Storm Drains:

1. Alignment and grade test.
2. Obstructions and deflection test.
3. Infiltration test for gravity pipeline systems.
4. Pressure test for pressure pipeline systems.
5. Video inspection.

F. Potable Water System:

1. Obstruction and deflection test.
2. Pressure test.
3. Disinfection (Section 33 13 00).

END OF SECTION

SECTION 33 11 00

WATER DISTRIBUTION AND TRANSMISSION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water distribution and transmission system identification, valves, boxes, service connections and accessories.

B. This section is applicable to potable and non-potable water pressure systems.

1.2 REFERENCES

A. ACPA: American Concrete Pipe Association.

B. Applicable water company requirements.

C. AWWA C600: AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.

D. AWWA C605: AWWA Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

E. AWWA C800: AWWA Standard for Underground Service Line Valves and Fittings.

F. AWWA M11: AWWA Manual for Steel Pipe -Design and Installation.

G. CDA: Copper Development Association.

1.3 PERFORMANCE REQUIREMENTS

A. Depth of Cover:

1. 48 inches minimum to top of pipe, service line, or as indicated in local building code. 72 inches maximum unless ENGINEER authorizes otherwise.
2. If less cover, provide additional protection to withstand frost and external loads.

B. Remove any section of pipe already placed that is found to be defective or damaged. Relay or replace without additional cost to OWNER.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions.

B. Commissioning: Submit testing data indicated in Section 33 08 00.

C. Record Documents: Submit documents, Section 01 78 39. Include details of underground structures, connections, thrust blocks and anchors. Show interface and spatial relationship between piping and adjacent structures.

D. Operating and Maintenance: Submit data, Section 01 78 23. Include maintenance data, parts lists, product data, and shop drawings.

1.5 **SITE CONDITIONS**

A. Minimize neighborhood traffic interruptions. Barricade stockpiles.
B. Secure acceptance of pipeline lateral tie-in work.
C. Repair public and private facilities damaged by CONTRACTOR.
D. Do not turn on or turn off any valve outside of the Work prior to securing ENGINEER's or water company's permission.

PART 2 PRODUCTS

2.1 **PIPES AND FITTINGS**

A. Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, and capacities indicated. Use only NSF approved products in drinking water systems. All such products shall be appropriately stamped with the NSF logo.
B. Where not indicated, provide proper selection as determined by installer and acceptable to ENGINEER to comply with installation requirements.
C. Provide sizes and types of equipment connections for fittings of material that matches pipe material used in the piping system. Where more than one type of material or product Option is indicated, selection is installer's choice.
D. Provide pipe fittings and accessories of same material and weight or class as pipe, with joining method indicated or recommended by manufacturer.

2.2 **VALVES**

A. Section 33 12 16.

2.3 **VALVE BOX**

A. Buried Valves In Traffic Areas: 2 piece, cast iron, screw adjustable sleeve, 5 -1/4 inch shaft, with a drop lid.
B. Buried Valves in Non-traffic Areas: Slip type of height required for the installation.
C. Markings: On cover of valve box, cast the appropriate utility lettering.

2.4 **VALVE CHAMBER**

A. General: Refer to applicable design criteria requirements explained in Laws and Regulations.
B. Basin: Class 4000 concrete floor and walls.
C. Steps: Plastic, cast into sidewalls greater than 4 feet deep.

D. Top: Flat slab class 4000 concrete.

E. Frame and Cover: Scoriated asphalt coated, heavy duty ductile iron conforming to Section 05 56 00 with flat top design and appropriate utility lettering. Shape and size as indicated.

2.5 MORTAR, GROUT, AND CONCRETE

A. Mortar: Cement, Section 04 05 16.

B. Grout: Cement, Section 03 61 00.

C. Concrete:

1. Cast-in-place: Class 4000, Section 03 30 04.
2. Precast: Class 5000, Section 03 40 00.

2.6 TAPPING SADDLES

A. Provide bronze alloy, ductile iron, or stainless steel saddles with stainless steel double straps.

B. Provide tapping saddles that have a minimum rated working pressure of 300 psi, neoprene Buna N gaskets, and bronze tapered threads.

2.7 SERVICE CONNECTION

A. Type K copper pipe; Section 33 05 03 with flare type 200 psi compression fittings in accordance with AWWA C800. If materials used in main line are non-copper, provide a plastic nipple to separate the metals.

2.8 ACCESSORIES

A. Bolts, Nuts, Washers: Steel, Section 05 05 23.

B. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.

C. Corporation Stops: All bronze with tapered threads.

D. Hydrant and Valve: Dry barrel, Section 33 12 19.

E. Water Meter and Valve: Section 33 12 19.

F. Grease: Non-oxide.

G. Polyethylene Sheet: 8 mil thick.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify Trench Excavation is ready to receive work, and dimensions, and elevations are as indicated.

B. Commencing installation means acceptance of existing conditions.

3.2 PREPARATION

A. Excavation, Section 31 23 16. Hand trim to required elevations. Correct over excavations.

B. Remove stones or other hard matter that could damage pipe embedment or impede backfilling or compaction.

C. Examine areas and conditions under which materials and products are to be installed. Do not proceed with system installation until unsatisfactory conditions have been corrected in manner acceptable to system installer.

D. Clearly identify and promptly set aside defective or damaged pipe.

E. Use pipe cutting tool acceptable to pipe manufacturer.

3.3 LOCATING POTABLE WATER PIPE

A. Comply with Utah Drinking Water Act. As a minimum locate potable water pipe at least 18 inches vertical and 10 feet horizontal edge to edge between water and sewer lines. Place water lines above sewer line.

B. Where potable water pipe crosses under gravity-flow sewer lines, fully encase the sewer pipe in concrete for a distance at least 10 feet each side of the crossing.

1. Do not locate any joint in the water line within 36 inches of the crossing.
2. Encase water line if it is within 24 inches of a sewer force main or inverted syphon.
3. Encase sewer main joints in concrete if joints are horizontally closer than 36 inches to the water line.

C. Do not put potable water lines in the same Trench with sewer lines, storm drains or electric wires.

3.4 INSTALLATION -PIPE AND FITTING

B. Steel Pipe: AWWA M11.

C. Ductile Iron Pipe: AWWA C600.

D. Copper Tube: CDA "Copper Tube Handbook".

E. Polyethylene Pipe: For 3 inches and smaller pipe follow AWWA C901. Install all other sizes per manufacturer's installation instructions.

F. Polyvinyl Chloride Pipe: AWWA C605.

G. Concrete Pipe: ACPA "Concrete Pipe Handbook".

H. Wedges: Install metal wedges on all metal pipe systems.

3.5 INSTALLATION – CONCRETE THRUST BLOCKS

A. Do not make hydrostatic tests of Section 33 08 00 until thrust block concrete has

cured for at least 5 days.

B. Provide thrust blocks on all plugs, caps, tees, hydrants and vertical or horizontal bends.

C. Provide stainless steel or epoxy coated steel tie rods and clamps or shackles to restrain thrust.

D. Unless otherwise indicated or directed by ENGINEER, place the base and bearing sides of thrust blocking directly against undisturbed earth.

E. Sides of thrust blocking not subject to thrust may be placed against forms. Place thrust blocking so the fitting joints will be accessible for repair.

3.6 INSTALLATION -VALVES AND VALVE BOXES

A. Valves:

1. Ensure all parts are in working order.
2. Set location of valves outside of sidewalk limits, Driveway Approaches and other pedestrian or vehicular interference.
3. Install plumb with stems pointing up.
4. Grease all exposed bolts and nuts then apply polyethylene sheet and tape wrap.

B. Valve Boxes:

1. Set over valve nut so operator's key is plumb with clearance in valve box when opening and closing the valve.
2. Adjust box to finish grade.
3. Clean all dirt or foreign material out of box.

3.7 INSTALLATION – TAPS

A. Apply for and pay for applicable permits from water company for the indicated size and location of tap to water main. Comply with all connection requirements of water company.

B. Make all service taps with a tapping machine acceptable to the water company. Use teflon tape on all taps unless indicated otherwise.

C. The minimum distance between taps is 24 inches, with a 5 degree stagger. Do not make service taps within 24 inches of the end of pipe. Install taps at 60 degress from vertical, or authorized by ENGINEER.

D. Service saddles are required on all taps except, 3/4 inch or 1" taps to new ductile iron pipe

E. Grease all exposed bolts and nuts then apply polyethylene sheet and tape wrap.

3.8 INSTALLATION – SERVICE LINES

A. Replacing Existing Water Service Line:

1. Follow AWWA C800, Utah public drinking water regulations and Utah plumbing

code requirements.
2. When replacing water service lines, replace non-copper pipe with type K copper pipe, Section 33 05 03.

B. Looping Existing Water Service:
1. Minimum pipe diameter 3/4 inch.
2. Pinching tools used to close and open service lines may be used only if allowed by ENGINEER. When service line pinches cannot be returned to previous shape or flow, remove and replace damaged portion of pipe.
3. Soldered joints or connections not allowed.
4. For copper to iron connections use a brass pack joint compression coupling with joint locking device.
5. For copper-to-copper connections use a brass flare coupling.
6. Follow details shown in the Drawings.

C. Meter Box: Install meter boxes back of the curb, outside of sidewalks and Driveway Approaches and outside of other pedestrian and vehicular interference.

3.9 **INSTALLATION – WATER MAIN LOOP (SYPHON)**

A. Existing water mains may not match standard size. Excavate to obtain actual pipe diameter and match size.

B. Do not shutdown pipeline until couplings and fittings are on site. Coordinate shutdown with water company.

C. Connections to steel or transite pipe requires transition couplings or sleeves with transition gaskets.

D. Grease all exposed bolts and nuts then apply polyethylene sheet and tape wrap

E. Provide thrust blocks except where joints are welded. Follow details shown on the Drawings.

3.10 **DISINFECTION**

A. Secion 33 13 00.

B. After disinfection, legally dispose of disinfection water.

3.10 **BACKFILLING**

A. Prior to Backfilling:
1. Secure ENGINEER's acceptance of brass wedge installations and concrete thrust block installations.
2. For pressure pipe testing follow Section 33 08 00 requirements and for disinfection follow Section 33 13 00 requirements.

B. Trenches: Section 33 05 20.

C. Landscapes: Section 31 23 23.

3.11 **SURFACING RESTORATION**

A. Roadway Trenches and Patches: Section 33 05 25.
B. Landscapes: Section 32 92 00 or Section 32 93 13 as applicable.

END OF SECTION

SECTION 33 11 11

RELOCATE WATER METERS AND FIRE HYDRANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Relocate existing water meters or fire hydrants which may be necessary because of changes in grade or installation of new improvements which conflict with existing meter and hydrant locations.

1.2 REFERENCES

A. AWWA C203: AWWA Standard for Coal-Tar Protective Coatings and Linings for Steel Water Pipelines -Enamel and Tape -Hot-Applied.

B. AWWA C502: AWWA Standard for Dry-Barrel Fire Hydrants.

1.3 JOB CONDITIONS

A. Secure utility company permit to do relocation work and pay applicable fees.

B. Secure utility company approval of joints, connections, and pipe installations prior to commencing backfill operations.

PART 2 PRODUCTS

2.1 HYDRANTS

A. Use existing hydrant unless Contract Documents specify OWNER or CONTRACTOR will provide a new unit.

B. Use the same type of pipe material as used for existing hydrant piping unless indicated otherwise.

C. Use mechanical and flange joint fittings unless indicated otherwise. Use only new tees, fittings, and bends.

D. Coat all weld connections and damaged areas of metal piping with coal tar enamel. Follow AWWA C203 requirements. Tape wrap coatings.

2.2 WATER SERVICE METERS

A. Use existing water meter and yoke unless Contract Documents specify OWNER or CONTRACTOR will provide a new unit.

B. When relocating meters, use Type K copper pipe (Section 33 05 03) or polyethylene pipe (Section 33 05 06) from main to meter yoke.

2.3 **CONCRETE**

A. Cast-in-place: Class 3000 or 4000, Section 03 30 04.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Before commencing work, coordinate location and shutdown of utility lines with utility company and residents; Section 01 31 13.

B. Protect existing hydrants and meters from damage.

C. Control ground water, surface water, and storm water.

D. Control pedesrian and vehicular traffic, Section 01 55 26.

E. Provide all excavation backfill, compaction, connections, testing, and surface restorations to made the installation complete.

3.2 **MOVING EXISTING HYDRANTS**

A. Relocate to locations indicated.

B. Do not disturb location of hydrant lateral tee at water main.

C. The method of harnessing the hydrant (reshackling or reblocking) shall match existing conditions or approval of ENGINEER.

D. Install hydrant so base flange is even with or less than 4 inches above grade of surrounding surface.

3.3 **RECONNECTING EXISTING HYDRANTS**

A. Hydrant reconnections shall meet new work requirements indicated in Section 33 12 19.

B. When existing tee on water main is to be moved to new location, seal and shackle old tee.

3.4 **HYDRANT BARREL EXTENSIONS**

A. Follow AWWA C502 to extend barrels, operating stems and flanged adapters in design material and workmanship so hydrant base flange is even with or less than 4 inches above grade of surrounding surface.

3.5 **RESETTING WATER METERS**

A. Follow Section 33 12 33 to relocate water meters and service connections to locations indicated.

B. Follow Section 33 05 14 to adjust meter boxes to grade in paved surfaces.

3.6 **FIELD QUALITY CONTROL**

A. Hydrostatic tests, Section 33 08 00.

B. Disinfection, Section 33 13 00.

END OF SECTION

SECTION 33 12 16

WATER VALVES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gate, butterfly, plug, check, pressure reducing, pressure relief, control valves and their installation.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. AWWA C111: American National Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

B. AWWA C504: AWWA Standard for Rubber-Seated Butterfly Valves.

C. AWWA C508: AWWA Standard for Swing-Check Valves for Waterworks Service, 2 In. Through 24 In. NPS.

D. AWWA C509: AWWA Standard for Resilient-Seated Gate Valves for Water and Sewerage Systems.

E. AWWA C550: AWWA Standard for Protective Interior Coatings for Valves and Hydrants.

F. AWWA C600: AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.3 SUBMITTALS

A. Provide technical information as required for evaluating the quality of the valve. As a minimum include dimensions, weights, materials lists and operation charts.

PART 2 PRODUCTS

2.1 VALVES -GENERAL

A. Underground:

1. Less than 3 inches: Screwed ends.

2. 3 inches and larger: Flanged or mechanical joint ends as specified. Non-rising stem. Two inches square operating nut. Low alloy steel bolts, AWWA C111.

B. Submerged or Above Sewage or Water:
   1. Valve body bolts per manufacturer's recommendations.
   2. For joining valve to piping system use stainless steel nuts and bolts, Section 05 05 23.

C. Below an Operating Deck: Provide shaft extension from the valve to deck level.

D. Above Ground: Non-rising stems equipped with a hand wheel.

E. Manually Operated Valves Over 6 feet Above Operating Level: Provide chain operated handles.

F. Clearance: Install so that handles clear all obstruction when moved from open to closed.

G. Rated Working Pressure: 150 psi unless indicated.

H. Coating: Interior, AWWA C550. Exterior per manufacturer's recommendation.

2.2 GATE VALVES

A. Material: Cast iron body, bronze mounted. Furnish valves 3 inches through 48 inches that conform to the requirements of AWWA C509, non-rising stem design with "O" ring seals.

B. Operating Direction: Open counterclockwise.

C. Buried Valves: Flanged, mechanical joint, or as indicated.

2.3 BUTTERFLY VALVES

A. Material: Cast iron body, bronze mounted. Furnish valves 3 inches through 48 inches that conform to the requirements of AWWA C504.

B. Body Type: Short body or long body at CONTRACTOR's option or short body valves only where the disc will not interfere with adjacent fittings.

C. Wafer Valves: Subject to approval.

2.4 ECCENTRIC PLUG VALVES

A. Material: Cast iron body, bronze mounted, non-lubricated, eccentric, quarter-turn type with resilient face plugs, ductile iron discs with upper and lower shafts integral.

B. Markings: Indicate open and close position.

C. Port Areas: At least 82 percent of full pipe area.

D. Resilient Seat Seals: Buna N, field replaceable.

2.5 CHECK VALVES

A. Material: AWWA C508.

B. Valves 2-1/2 inches in Size and Smaller: 200 psi working pressure Y-pattern, bronze, regrinding, swing check valve with screwed ends.

C. Valves 3 inches in Size and Larger: Iron body, bronze mounted, flanged end, swing valves with stainless steel hinge pins.

D. Outside Weight and Lever: Required.

2.6 PRESSURE REDUCING VALVES -SERVICE LINE

A. Operation: Capable of reducing a varying higher upstream pressure to an adjustable constant lower downstream pressure.

B. Spring and nylon reinforced diaphragm type construction.

C. Equip with Y-strainer upstream of valve.

2.7 PRESSURE REDUCING VALVES -MAIN LINE

A. Operation: Capable of maintaining an adjustable constant downstream pressure regardless of upstream pressure.

B. Type: Hydraulically operated using a direct-acting, spring-loaded, normally open, pilot valve controlled diaphragm.

C. Provide a single removable seat and a resilient disc. No "O" ring type discs permitted. No external packing glands permitted. No pistons operating the main valve or pilot controls permitted.

D. Equip with Y-strainers on the pilot controls, variable closing and opening speed controls and a valve position indicator.

E. Rating: 250 psi working pressure with flanged connections.

F. Include an upstream and downstream pressure gage capable of accurately measuring system pressures.

2.8 PRESSURE RELIEF VALVES

A. Operation: Maintain a constant upstream pressure by passing or relieving excess pressure.

B. Closed Valves: Drip-tight.

C. Type: Hydraulically operated, pilot control using a diaphragm with a single removable seat and resilient disc.

D. Pilot Controls: Direct acting, adjustable between 20 and 200 psi, spring-loaded diaphragm valve.

E. Rating: 250 psi working pressure with flanged connections.

2.9 CONTROL VALVE

A. Types: Diaphragm actuated, single seated, composition disc,

hydraulically operated globe valve.

B. Pilot Controls: Externally mounted, four-way, solenoid pilot valve with self cleaning strainers and diaphragm type check valves.

C. Equip with a limit switch for pump control.

D. Equip with a built-in lift check valve to prevent flow reversal.

E. Rating: 250 psi working pressure with flanged connections.

F. Solenoids and the Limit Switch: Supplied with operating voltage as indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Flush all lines before valve installation.

B. In ductile iron water mains install valves, AWWA C600.

C. Install butterfly valve shafts vertical in Vault boxes and horizontal otherwise.

END OF SECTION

SECTION 33 12 19

HYDRANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Dry-barrel fire hydrants, valves, piping and accessories.

1.2 REFERENCES

A. AWWA C110: American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids.

B. AWWA C111: American National Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

C. AWWA C209: AWWA Standard for Cold-Applied Tape Coatings for the Exterior of Special Section, Connections, and Fittings for Steel Water Pipelines.

D. AWWA C210: AWWA Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.

E. AWWA C213: AWWA Standard for Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel water Pipelines.

F. AWWA C214: AWWA Standard for Tape Coating Systems for the Exterior of Steel Water Pipelines.

G. AWWA C502: AWWA Standard for Dry-Barrel Fire Hydrants.

H. AWWA M17: AWWA Manual for Installation, Operation, and Maintenance of Fire Hydrants.

1.3 PRODUCT HANDLING

A. Package fire hydrants, gate valves, and valve boxes for protection against dirt and damage during shipment and storage.

B. Do not plug drain hole.

1.4 SUBMITTALS

A. Product Data: Manufacturer's technical product data and installation instructions.

B. Shop Drawings: Show interface and spatial relationship between piping and adjacent structures.

C. Field Quality Control Reports: For system commissioning.

1.5 JOB CONDITIONS

A. Notify appropriate fire department as soon as hydrant is removed or placed in service.

PART 2 PRODUCTS

2.1 DRY-BARREL FIRE HYDRANT

A. Cast iron compression type, AWWA C502, opening against pressure and closing with pressure, base valve design, 150 psi working pressure, with 1/4 inch diameter minimum tapping and bronze plug in standpipe.
   1. Size: 5-1/4 inch valve opening.
   2. Direction to Open Hydrant: Counterclockwise.
   3. Size and Shape of Operating and Cap Nuts: Pentagon. 1-1/2 inch point to flat.
   4. Hose Nozzles: Two 2-1/2 inch National Standard Thread, cap, gasket and chain.
   5. Pumper Nozzle: One 4-1/2 inch National Standard Thread, cap, gasket and chain.
   6. Depth of Burial: 48 inches or consistent with main depth.
   7. Connection to Main: 6 inches flanges or mechanical joint.
   8. Pressure: 150 psi working pressure and 300 psi hydrostatic pressure.
   9. Inlet Bottom Connection: 6 inches mechanical joint or flanged in accordance with AWWA C110 and AWWA C111, designed to allow separation at the sidewalk level when hydrant is sheared off.
   10. Automatic Drain: Opens as the hydrant is closed.

2.2 PIPE AND FITTINGS

A. Ductile iron, Section 33 05 05. Standard drilling, AWWA C110.

B. PVC, Section 33 05 07.

C. Steel, Section 33 05 09. Standard drilling, 150 lb.

D. Spool, Schedule 40 steel, epoxy lined, exterior wrapped with minimum 60 mil thick tape wrap, AWWA C210 or C213 and C209 or C214 with two welded in place 150 lb. steel ANSI B 16.5 slip on flanges.

2.3 VALVES

A. Gate valve. Section 33 12 16.

B. If indicated, furnish an auxiliary 6 inch diameter valve with end connections as required.

2.4 ACCESSORIES

A. Bolts, Nuts, Washers: Stainless steel, Section 05 05 23.

B. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.

C. Thrust Blocks: Cast-in-plac concrete, Class 2000 minimum, Section 03 30 04.

D. Valve Box, Valve Chamber: Section 33 12 19.

PART 3 EXECUTION

3.1 PREPARATION

A. Excavation, Section 31 23 16.

3.2 INSTALLATION

A. Install hydrants, valves, and valve boxes as indicated and located in accordance with AWWA M17. Hydrants shall not be connected to or lacted within 10 feet of a sanitary sewer or storm drain.

B. Install so bottom of hydrant base flange is even with or less than 4 inches above grade.

C. Point 4-1/2" pumper nozzle to face the street.

D. Drain holes at base of hydrant to remain clear with a minimum of 1 cubic yard of clean Sewer Rock (Section 32 11 23) placed around hydrant base and drain. Place sheet plastic over gravel to prevent silting.

E. Coal tar and tape wrap steel pipe.

F. Grease all buried nuts and bolts and wrap with 8 mil polyethylene sheet and tape.

G. Install thrust blocks, Section 33 12 19.

3.3 BACKFILLING

A. Secure water company permission to commence backfilling operation.

B. Trenches, Section 33 05 20.

C. Structures and landscaping, Section 31 23 23.

D. Pavements, Section 32 05 10.

3.4 PAINT

A. Paint buried portion of hydrant with two coats of coal tar enamel or asphalt.

B. Paint hydrant barrel and caps with one coat primer and final coat per water company paint standards.

3.5 FIELD QUALITY CONTROL

A. Commissioning, Section 33 08 00.

B. Disinfection, Section 33 13 00.

END OF SECTION

SECTION 33 12 33

WATER METER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water meters, service connections, materials.

1.2 REFERENCES

A. **AWWA Standards**

C704 Cold-Water Meters - Propeller Type for Main Line Applications.
C800 Underground Service Line Valves and Fittings

1.3 SUBMITTALS

A. Manufacturer's test records for range and accuracy of meter being furnished.
B. Equipment material diagram and parts schematic.

PART 2 PRODUCTS

2.1 METERS FOR SYSTEM PIPING

A. Materials and Construction: AWWA C704:
   1. Cast iron bodies, 175 psi working pressure, flanged connections.
   2. Built-in straightening vanes.
   3. Working pressure 150 psi.
   4. Polyethylene plastic propeller.
   5. Stainless steel shaft with stainless steel ball bearings, lubricated by means of a single pressure fitting.
B. Accuracy: Plus, or minus two (2) percent of scale for velocities over 1 foot per second.
C. Totalizer: Six digits reading in units required.

2.2 METERS FOR SERVICE PIPIING

A. Provided by OWNER unless indicated otherwise.

2.3 SERVICE LINE, VALVES, AND FITTINGS

A. Service Pipe: Copper, Section 33 05 03 or smooth wall polyethylene, Section 33 05 06. The service pipe between main and meter and to a point not less than 1 foot from the public way side of the property line cannot exceed the meter size.
B. Service Valves and Fittings: AWWA C800
C. Meter Setters: Brass, with angle fittings, saddle nuts and gaskets.
D. Corporation Stops and Angle Valves: Invert key design.
E. Bypasses: Not allowed on any service installation without approval of ENGINEER.

2.4 METER BOXES

A. Meters to 1" Service: Plastic or asphalt-dipped corrugated metal. Fiber meter boxes not acceptable.
B. Meters 1-1/2" and Larger: Reinforced concrete with a minimum clearance of 12" from each side of meter plumbing.
C. Cover: Ductile or cast iron with utility inscription.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install meter box, meter setters, valves, etc. at indicated locations. If not indicated, install in street right-of-way parking strip or at a location approved by ENGINEER.
B. Install meter setters level and horizontal. Provide suitable pipe lengths to prevent stress.
C. DO NOT operate utility agency's main line valves. Contact agency if valves are to be operated. If required by water utility agency notify affected water users, Section 01 31 13.
D. OWNER Supplied Meters: Installed by CONTRACTOR unless indicated otherwise.

END OF SECTION

SECTION 33 13 00

DISINFECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Disinfection of potable water system.
B. Test and report results.

1.2 REFERENCES

A. AWWA A100: AWWA Standard for Water Wells.
B. AWWA B300: AWWA Standard for Hypochlorites.
C. AWWA B301: AWWA Standard for Liquid Chlorine.
D. AWWA C651: AWWA Standard for Disinfecting Water Mains.
E. AWWA C652: AWWA Standard for Disinfection of Water-Storage Facilities.
F. State of Utah: Public Drinking Water Regulations, Part 2, Section 12.

1.3 DEFINITIONS

A. Disinfectant Residual: The quantity of disinfectant in treated water.
B. ppm: Parts per million.

1.4 SUBMITTALS

A. CONTRACTOR's evidence of experience in disinfection.
B. Bacteriological laboratory's evidence of certification if laboratory is not OWNER's laboratory.
C. Disinfection Report: 3 copies containing:
    1. Date issued.
    2. Project name and location.
    3. Treatment contractor's name, address and phone number.
    4. Type and form of disinfectant used.
    5. Time and date of disinfectant injection started.
    6. Time and date of disinfectant injection completed.
    7. Test locations.
    8. Initial and follow-up disinfectant residuals in ppm for each outlet tested.
    9. Time and date of flushing start.
    10. Time and date of flushing completion.
    11. Disinfectant residual after flushing in ppm for each outlet tested.
    12. Flush water disposal location and acceptance by local agency.

D. Bacteriological Report: 3 copies including:
   1. Date issued.
   2. Project name and location.
   3. Laboratory's name, certification number, address, and phone number.
   4. Time and date of water Sample collection.
   5. Name of person collecting Samples.
   6. Test locations.
   7. Time and date of laboratory test start.
   8. Coliform bacteria test results for each outlet tested.
   9. Certification that water conforms or fails to conform to bacterial standards of State of Utah public drinking water regulations.
   10. Bacteriologist's signature.

1.5 QUALITY ASSURANCE

A. Bacteriological Laboratory: Certified by State of Utah if laboratory is other than OWNER's laboratory.

1.6 PRODUCT HANDLING

A. Store and protect disinfectant in accordance with manufacturer's recommendations to protect against damage or contamination. Do not use unsuitable disinfectant.

B. Follow all instruction labeling for safe handling and storage of disinfectant materials.

1.7 REGULATORY REQUIREMENTS

A. Conform to State of Utah public drinking water regulations.

PART 2 PRODUCTS

2.1 DISINFECTANT

A. Liquid Chlorine: AWWA B301 with chlorine 99.5 percent pure by volume.

B. Sodium Hypochlorite: AWWA B300 with not less than 100 grams per liter available chlorine.

C. Calcium Hypochlorite: AWWA B300 with 65 to 70 percent available chlorine by weight in granular form.

D. Powder, tablet, or gas according to manufacturer's specification.

2.2 ALKALI

A. Caustic Soda or Soda Ash.

2.3 **ACID**

A. Hydrochloric (Muriatic) type.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Provide necessary signs, barricades, and notices to prevent accidental exposure to disinfecting materials, consuming disinfecting water, or disturbing the system being disinfected.

B. Make sure the potable water system is complete, clean, and that the system to be disinfected is not connected to the existing system.

3.2 **DISINFECTION OF WATER LINES**

A. Use one method defined under AWWA C651 that is acceptable to ENGINEER.

B. After pressure testing per Section 33 08 00, flush system through hydrants or if a hydrant does not exist, install a tap of sufficient size to provide 2.5 feet per second flushing velocity in the line.

C. Starting at outlet closest to water source, bleed water from each outlet until chlorine residual reaches outlet. Repeat process at each outlet throughout system.

D. Collect a bacteriological water sample at end of line to be tested. If sample fails bacteriological test, flush system and retest. Continue flushing and retesting until a good sample is obtained.

E. If flushing does not produce a passing bacteriological test disperse disinfectant throughout system to obtain 10 to 25 ppm of free chlorine residual.

F. Flush the chlorinated water from the main until chlorine measurements show the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.

G. After a negative bacteriological sample is obtained, let the system relax for 24 hours. Flush and collect a subsequent bacteriological sample for testing. If the subsequent test is negative then water line is acceptable.

3.3 **DISINFECTION OF CULINARY WELLS**

A. Use one method defined under AWWA A100 that is acceptable to ENGINEER.

B. Do not start disinfection until well is thoroughly cleaned.

C. Use a disinfecting solution containing a minimum of 50 ppm residual chlorine.

D. Flush system after disinfection.

3.4 **DISINFECTION OF WATER STORAGE RESERVOIRS**

A. Use one method defined under AWWA C652 that is acceptable to the ENGINEER.

B. Do not start disinfection until water storage tank is thoroughly cleaned.

C. Provide and use necessary safety equipment for workers in contact with disinfectant or gasses.

D. Flush system after disinfection.

3.5 **FIELD QUALITY CONTROL**

A. Bacteriological Test:

1. Collect Samples for testing no sooner than 16 hours after system flushing.
2. Analyze water samples per State of Utah requirements.
3. If bacteriological test proves water quality to be unacceptable, repeat system treatment.
4. Do not place water systems into service until a negative bacteriological test is made. Provide a copy of the negative bacteriological test to ENGINEER.

B. Disposal of Disinfectant:

1. Legally dispose of disinfecting water and ensure no chlorine buildup or damage to the environment.

END OF SECTION

SECTION 33 16 13

WATER TANK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. On grade welded steel water storage tank.
B. Foundation and ring wall construction.
C. Testing requirements.

1.2 REFERENCES

A. **ASME Standards**:
   Boiler and Pressure Vessel Code.
B. **AWWA Standards**
   D100 welded Steel Tanks for Water Storage.

1.3 QUALITY ASSURANCE

A. Workmanship, Section 01 43 00.
B. Welder Certification:
   1. Use only welders qualified in all positions by ASME Boiler and Pressure Vessel Code.
   2. Maintain a record of welds and welders employed on each joint.
   3. Provide a welding supervisor independent of the tank erection foreman's jurisdiction.

1.4 SUBMITTALS

A. List of five (5) tanks, including name of owner, size, location, and year completed.
B. Certification of welders who will be performing welding.
C. Within 30 days after award of contract, furnish two (2) sets of design calculations and four (4) sets of detail drawings of the tank. Furnish drawings prepared by a licensed design professional.

PART 2 PRODUCTS

2.1 GENERAL

A. Furnish a steel tank that is fabricated and erected per AWWA D100 and governing Laws and Regulations.
B. Furnish the tank per Appendix C of AWWA D100. Use a design temperature based on a low one (1) day mean temperature of -10 deg F if not indicated elsewhere.

2.2 TANK ACCESSORIES

A. General: Furnish and install all tank accessories as indicated and as applicable below.
B. Ladder: One fixed ladder with safety cable on the exterior of the tank conforming to OSHA. Extend ladder eight (8) feet above ground surfaces to roof.
C. Shell Manholes: Two 24 inches diameter shell manholes equipped with davits or hinges located near base or tank. Furnish one manhole with a bolting flange for an exhaust fan for ventilation as indicated in AWWA D100.
D. Vent: Mushroom vent of adequate size to handle pressure differential cause by water entering or leaving the tank at the maximum rate indicated. Do not consider the open area of overflow as venting area. Provide a special screened vent to ensure fail-safe operation if screen frosts over or is otherwise clogged. Furnish a vent that is easily dismantled to remove screens for cleaning.
E. Roof Manholes: One 36-inch rainproof roof hatch with hinges and hasp for locking per AWWA D100 and a 24-inch diameter roof manhole with a removable cover.
F. Overflow: Provide tank overflow. Equip overflow with an anti-vortex entrance. Extend overflow down outside of tank.
G. Inlet Nozzle: Equip with a 125-psi working pressure flange connection.
H. Bottom Drain: Weld drain to tank bottom and make required connections.
I. Outlet Nozzle: Equip with a 125-psi working pressure flange connection.

2.3 FILL MATERIALS UNDER TANK

A. Well-graded, sandy gravel with a two (2) inch maximum size for filling inside the ringwall.
B. 4 inch thick layer of oiled sand, Section 31 05 13 directly under the tank floor.

2.4 REINFORCEMENT AND CONCRETE

A. Reinforcement: Steel Section 03 20 00.
B. Concrete: Class 3000 minimum cast-in-place, Section 03 30 04.

PART 3 EXECUTION

3.1 ERECTION

A. AWWA D100

3.2 RADIOGRAPHS

A. AWWA D100. Inspection, by CONTRACTOR.
B. Spot radiographs are to be taken, AWWA D100. Preplanned sections will not be allowed.
C. Provide an independent evaluation of radiographs by a person qualified to read and evaluate radiographs.
D. Provide ENGINEER access to all radiographic film. After completion of structure, films become property of OWNER>
E. Before any repair of welds, submit radiographs with such information as required.
F. Repair all welds by grinding out bad areas and rewelding. Do a second radiograph at the same location.

3.3 ROOF AND FLOOR TESTS

A. Use vacuum box testing on all floor and roof fillet welds.
B. Report results in writing.

3.4 TANK TOLERANCES

A. Test for:
    1. Plumbness: The maximum variation from plumb of the top of the shell relative to the bottom of the shell shall not exceed 1/200 of the total tank height.
    2. Roundness: Radii measured at 1'-0" above the bottom corner weld; a tolerance of 3/4 inch.
    3. Peaking: Using a horizontal sweep board 36 inches long, peaking less than 1/2 inch.
    4. Branding: Using a vertical sweep board 36 inches long, banding less than 1/2 inch.
B. Be responsible for providing all equipment necessary to check these dimensional tolerances.

3.5 CONCRETE RINGWALL CONSTRUCTION

A. General: Pour ringwall monolithically.

B. Ringwall Tolerance: Level top of ringwall to within 1/8 inch in any 30 feet of circumference and within 1/4 inch in total circumference.
C. Interior Backfilling: Below ringwall and tank bottom, use Section 32 11 23 untreated base course. Compact backfill to 95 percent or greater relative to a modified proctor density, Section 31 23 26.
D. Exterior Backfilling: Use Section 31 05 13 common fill which is free of trash, trees, roots, organic material, broken concrete, or other objectionable material. Compact backfill to 90 percent or greater relative to a standard proctor density, Section 31 23 26.

3.6 **TANK FINISHING AND PAINTING**

A. Finish, Section 09 97 15. Color as indicated or selected by ENGINEER.

3.7 **TANK TESTING**

A. Close all tank outlets, inspection holes, or other openings below water level.
B. Fill tank to maximum working water depth and let set for 48 hours.
C. Measure change in water depth over next five (5) day period. Take measurement at least once every 24 hours.
D. Mark any leaks or damp areas for later repair.
E. If the drop in the water exceeds 0.25 percent of tank volume repair and retest.
F. Repair all observed leaks or damp areas and retest full tank again until the tank passes.

3.8 **TANK STERILIZATION**

A. Disinfection, Section 33 13 00.

END OF SECTION

SECTION 33 31 00

SANITARY SEWERAGE SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gravity sanitary sewerage systems.

B. Pressure systems are indicated in Section 33 11 00.

1.2 REFERENCES

A. ASTM C 478: Standard Specification for Precast Reinforced Concrete Manhole Section.

B. ASTM C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures.

C. ASTM C 923: Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

1.3 PERFORMANCE REQUIREMENTS

A. Vertical Cover: Unless indicated otherwise, 2 feet minimum for laterals and 4 feet when subjected to light construction equipment loads.

B. Remove any section of pipe already placed that is found to be out of alignment tolerance indicated, defective, or damaged. Relay or replace at no additional cost to OWNER.

1.4 PROJECT CONDITIONS

A. Minimize neighborhood traffic interruptions. Barricade stockpiles.

B. Provide access to adjacent properties for local traffic and pedestrians, Section 01 31 13.

C. Repair public and private facilities damaged by CONTRACTOR.

D. Prior to Backfilling: Commission pipeline per Section 33 08 00. Provide sizes and types of equipment connections and fittings which match pipe materials when pressure testing system.

1.5 ACCEPTANCE

A. Each sanitary sewer system component must pass applicable requirements in Section 33 08 00.

PART 2 PRODUCTS

2.1 PIPING AND FITTINGS

A. Provide piping materials and factory fabricated piping products of sizes, types, and classes indicated.

B. Where not indicated, provide proper selection acceptable to ENGINEER to comply with installation requirements.

C. Provide pipe fittings and accessories of same material and weight or class as pipe, with joining method indicated or recommended by manufacturer.

2.2 MORTAR, GROUT AND CONCRETE

A. Mortar: Cement, Section 04 05 16.

B. Grout: Cement, Section 03 61 00.

C. Concrete:

1. Cast-in-place: Class 4000, Section 03 30 04.
2. Precast: Class 5000, Section 03 40 00.

2.3 MANHOLES

A. Basin: Precast concrete, ASTM C 478.

B. Steps: None.

C. Top: Concentric cone. Concentric flat slab concrete deck allowed only with ENGINEER's permission.

D. Frame and Cover: Scoriated, asphalt coated, heavy duty, ductile iron; Section 05 56 00 with flat top design meetin load rating H-20 and appropriate utility lettering. Shape, size and lifting device as indicated.

E. Pipe Connectors: Resilient, ASTM C 923. Sand mortar grout pipe connectios.

F. Joints in Sections: Bituminous mastic gasket-type sealant unless indicated otherwise.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify Trench Excavation is ready to receive work, and dimensions, and elevations are as indicated.

B. Hand trim Excavations to required elevations. Backfill over excavations and compact, Section 33 23 26.

C. Examine areas and conditions under which materials and products are to be installed. Do not proceed with system installation until unsatisfactory conditions have been corrected in manner acceptable to system installer.

D. Clearly identify and promptly set aside defective or damaged pipe.

E. Use pipe cutting tool acceptable to pipe manufacturer.

3.2 INSTALLATION -PIPE AND FITTINGS

A. Place bell or groove end facing upstream.

B. Install gaskets per manufacturer's recommendations.

C. Plug leakproof such pipeline branches, stubs or other open ends which are not to be immediately connected.

D. Clean interior of pipe of dirt and debris as work progresses.

E. Meet line and grade tolerance specified in Section 33 08 00.

3.3 INSTALLATION -MANHOLES

A. Form bottom of Excavation clean and smooth to correct elevation.

B. Place structures in location indicated.

C. Install precast units, ASTM C 891.

D. Provide elevations and pipe inverts for inlets and outlets indicated.

E. When structures occur in Pavements, mount frame and cover 1/2 inch below finished surface, elsewhere set 3 inches above finished grade. Provide a concrete Cover Collar between the frame and asphalt Pavement.

3.4 ABANDONED UTILITIES

A. Plug and cap with concrete all open ends of abandoned underground utilities which are to remain in place.

B. Provide closure to withstand hydrostatic or earth pressure which may result after ends of abandoned utilities have been closed.

3.5 TAP CONNECTIONS -6 INCHES AND SMALLER

A. Field cutting into new or existing piping will not be permitted unless written permission is obtained from ENGINEER.

B. Make connections to existing pipe and underground structures, so connections will conform as nearly as practicable to requirements specified for new work.

C. Use commercially manufactured wyes for branch connections. Spring wyes into existing line and encase entire wye, plus 6 inches overlap, with not less than 6 inches of concrete.

D. For taps into existing 24 inches or larger piping, or to underground structures, cut opening into unit sufficiently large to allow 3 inches of concrete to be packed around entering connection. Cut ends of connection passing through pipe or structure wall to conform to shape of and parallel with inside wall, unless otherwise indicated. Grout connection to provide smooth transition inlet into pipe.

3.6 TAP CONNECTIONS -LARGER THAN 6 INCHES

A. Not allowed. Provide a Manhole structure.

3.7 JOINTS

A. Join pipe per manufacturer's recommendation or as indicated.

B. Joining Pipe of Different Sizes: At Manholes only.

C. Use neoprene couplings with stainless steel bands to make connections between dissimilar pipe, or where standard pipeline joints are impractical.

3.8 BACKFILLING

A. Prior to Backfilling: Commission pipeline, Section 33 08 00. Provide sizes and types of equipment connections and fittings which match pipe materials when pressure testing system.

B. Trenches: Section 33 05 20.

C. Structures or Landscapes: Section 31 23 23.

3.9 CLEANING

A. Remove debris, concrete, or other extraneous material which accumulates in existing pipes or structures.

B. Clean all pipelines after testing. Do not flush sand, gravel, concrete, debris or other materials into existing piping system.

3.10 SURFACE RESTORATIONS

A. Provide temporary paved surfaces where Trenches pass through roadways, Driveways, or sidewalks.

B. Restore paved surfaces, Section 33 05 25.

C. Finish landscaped surfaces:

1. With grass, Section 32 92 00 or
2. Other ground cover, Section 32 93 13.

END OF SECTION

SECTION 33 41 00

DRAINAGE SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gravity systems such as irrigation, sub-drains, and storm drains.
B. Pressure systems are indicated in Section 33 12 19.

1.2 REFERENCES

A. ASTM C 478: Standard Specification for Precast Reinforced Concrete Manhole Section.
B. ASTM C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures.
C. ASTM C 923: Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

1.3 PERFORMANCE REQUIREMENTS

A. Vertical Cover: 2 feet minimum or as indicated.
B. Remove any section of pipe already placed that is found to be out of alignment tolerance indicated, defective, or damaged. Relay or replace without additional cost to OWNER.

1.4 PROJECT CONDITIONS

A. Minimize neighborhood traffic interruptions. Barricade stockpiles.
B. Provide access to adjacent properties for local traffic and pedestrians, Section 01 31 13.
C. Repair public and private facilities damaged by CONTRACTOR.
D. Prior to Backfilling: Commission pipeline per Section 33 08 00. Provide sizes and types of equipment connections and fittings which match pipe materials when pressure testing system.

1.5 ACCEPTANCE

A. Each storm drain system component must pass applicable requirements in Section 33 08 00.

PART 2 PRODUCTS

2.1 PIPING AND FITTINGS

A. Provide piping materials and factory fabricated piping products of sizes, types, and classes indicated.

B. Where not indicated, provide proper selection acceptable to ENGINEER to comply with installation requirements.

C. Provide pipe fittings and accessories of same material and weight or class as pipe, with joining method indicated or recommended by manufacturer.

2.2 IN-PLANE WALL DRAINAGE

A. Drainage Core: Manufacturer's standard three-dimensional non-bio-degradable, plastic designed to effectively conduct water to foundation drainage system.

B. Filter Fabric: Manufacturer's standard non-woven geotextile fabric of polypropylene or polyester fibers, or combination.

2.3 SUB DRAIN FILL MATERIALS

A. Sewer Rock, Section 32 11 23 and geotextile, Section 31 05 19.

2.4 MORTAR, GROUT AND CONCRETE

A. Mortar: Cement, Section 04 05 16.

B. Grout: Cement, Section 03 61 00.

C. Concrete:

1. Cast-in-place: Class 4000, Section 03 30 04.
2. Precast: Class 5000, Section 03 40 00.

2.5 CLEANOUTS AND MANHOLES

A. Basin: Concrete floor with cast in place concrete walls or ASTM C 478 precast requirements.

B. Steps: None.

C. Top: Concentric cone. Concentric flat slab concrete deck allowed only with ENGINEER's permission.

D. Frame and Cover: Asphalt coated, heavy duty, ductile iron; Section 05 56 00 with flat top design meeting load rating H-20 and appropriate utility lettering. Shape, size and lifting device as indicated.

E. Pipe Connectors:

1. Precast Bases: Resilient, ASTM C 923. Sand mortar grout pipe connections.
2. Cast in Place or Connections to Existing Manhole with Plastic Pipe: Use rubber Manhole adapter gasket for precast sections. Grout; Section 03 61 00 for cast in place sections.

F. Joints in Sections: Bituminous mastic coating unless indicated otherwise.

2.6 INLETS AND CATCH BASINS

A. Basin: Concrete floor and walls.

B. Frame and Grate:

1. Asphalt coated, heavy duty, cast iron: Section 05 56 00. Shape and size as indicated.
2. Galvanized, heavy duty, steel: Sections 05 12 00 and 05 05 10. Shape and size as indicated.

C. Pipe Connectors: Resilient, ASTM C 923. Sand mortar grout.

2.7 OUTFALLS

A. Cast-in-place or precast concrete with reinforced headwall, apron, and tapered sides. Provide riprap, Section 31 37 00, if indicated.

2.8 DRAIN PIPE JOINT SCREENS

A. Heavy mesh burlap, coal-tar saturated felt, 18 to 14 mesh copper screening or synthetic drainage fabric.

B. Plastic or corrosion resistant metal bands.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify Trench Excavation is ready to receive work, and dimensions, and elevations are as indicated.

B. Hand-trim Excavations to required elevations. Backfill over excavations and compact, Section 33 05 05.

C. Remove stones larger than 2 inches or other hard matter that could damage pipe or impede backfilling or compaction.

D. Examine areas and conditions under which materials and products are to be installed. Do not proceed with system installation until unsatisfactory conditions have been corrected in manner acceptable to system installer.

E. Clearly identify and promptly set aside defective or damaged pipe.

F. Use pipe cutting tool acceptable to pipe manufacturer.

3.2 INSTALLATION -PIPE AND FITTINGS

A. Place bell or groove end facing upstream.

B. Install gaskets per manufacturer's recommendations.

C. Plug pipeline branches, stubs or other open ends which are not to be immediately connected.

D. Clean interior of pipe of dirt and debris as work progresses.

E. Insulate dissimilar metals from direct contact with each other using neoprene gaskets or asphalt coatings.

F. Meet line and grade tolerance specified in Section 33 08 00.

3.3 INSTALLATION -CLEANOUTS AND MANHOLES

A. Form bottom of Excavation clean and smooth to correct elevation.

B. Place structures in location indicated.

C. Install precast units, ASTM C 891.

D. Provide elevations and pipe inverts for inlets and outlets indicated.

E. Where structures occur in Pavements, mount frame and cover 1/2 inch below finished surface, elsewhere set 3 inches above finished grade. Provide a concrete Cover Collar between the frame and asphalt Pavement.

3.4 INSTALLATION -INLETS OR CATCH BASINS

A. Form bottom of Excavation clean and smooth to correct elevation.

B. Construct with all connecting piping and appurtenances in their final position.

C. Cut all piping parallel to interior surface wall. Grout connection to provide smooth transition inlet into pipe.

3.5 INSTALLATION -SUB DRAIN SYSTEMS

A. Install pipe and fittings per manufacturer's instruction.

B. Open Joint Systems: Loosely butt pipe ends. Place 12 inches wide filter fabric around pipe circumference, centered over joint.

C. Mechanical Joint Perforated Pipe System: Place pipe with perforations facing down.

D. Place drainage pipe on bed of Sewer Rock, Section 31 05 13.

3.6 ABANDONED UTILITIES

A. Use concrete to plug and cap open ends of abandoned underground utilities that are to remain in place.

B. Provide closures to withstand hydrostatic or earth pressure that may result after ends of abandoned utilities have been closed.

3.7 TAP CONNECTIONS

A. Not allowed. Provide a cleanout or Manhole structure.

3.8 **BACKFILLING**

A. Prior to Backfilling: Commission pipeline, Section 33 08 00. Provide sizes and types of equipment connections and fittings which match pipe materials when pressure testing system.

B. Trenches: Section 33 05 20.

C. Structures or Landscapes: Section 31 23 23.

3.9 **CLEANING**

A. Remove debris, concrete, or other extraneous material that accumulates in existing piping or structures.

B. Clean all pipelines after testing. Do not flush sand, gravel, concrete, debris or other materials into existing piping system.

3.10 **SURFACE RESTORATION**

A. Provide temporary paved surfaces where Trenches pass through roadways, Driveways, or sidewalks.

B. Restore paved surfaces, Section 33 05 25.

C. Finish landscaped surfaces as applicable.

1. With grass; Section 32 92 00 or
2. Other ground cover; Section 32 93 13.

END OF SECTION

SECTION 33 47 00

PONDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Clearing pond site and disposal of debris and unsuitable material.
B. Materials for dikes.

1.2 REFERENCES

A. ASTM D 3282: Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

1.3 SUBMITTALS

A. Laboratory analysis and control testing reports of fill to be used in dikes.
B. Sample of geosynthetics to be installed.
C. Quality assurance test results within 24 hour of completed test results.

1.4 PERFORMANCE

A. Protection: Do not contaminate Embankment materials with debris or unsuitable material. Protect existing improvements, trees, structures or other items from damage during construction.
B. Dust Control: Refer to Section 01 57 00. Prevent dust being a nuisance to the neighborhood, and concurrent performance of separate work.

1.5 QUALITY ASSURANCE

A. Perform density tests to assure compacted backfills comply.
B. Do not interrupt surface drainage systems at site without ENGINEER's approval.
C. Control erosion during construction and correct any damage caused by runoff.

PART 2 PRODUCTS

2.1 BACKFILL SOILS

A. Section 31 23 16, over-excavation fill.
B. Section 31 05 13, common fill.
C. Section 32 11 23, crushed aggregate base.

D. Section 31 05 15, cement treated fill.

E. Impermeable Embankment: A-4, or A-6 material, ASTM D 3282, with a plasticity index of at least 10, and a coefficient of permeability less than 7×10^{-6} cm/sec.

F. Obtain approval of the material to be supplied prior to beginning construction.

2.2 GEOSYNTHETIC MATERIALS

A. Impermeable, nonbiodegradable sheet material that is inert to soil chemicals, resistant to molds, mildew, acids and alkalis, and within a pH range of 3 to 12.

PART 3 EXECUTION

3.1 CONSTRUCTION

A. Remove and stockpile all topsoil material for later placement on the outer dike surfaces.

B. Excavation: Section 31 23 16. Level areas where dikes are to be constructed.

C. Subgrade: Scarify the top 12 inches and compact Subgrade soils to a Standard Proctor Density of 92 percent or greater, Section 33 05 05.

D. Embankments: Place Embankment materials in lifts consistent with the compaction equipment used. Compact backfill soils to a Standard Proctor of 95 percent or greater. Do not construct Embankment with frozen or unapproved material.

E. Shape dikes to the slopes indicated.

3.2 TOLERANCES

A. Dike Surface: 1 inch plus or minus from true grade.

B. Dike Width: 3 inches plus or minus from design dimension.

C. Dike Alignment: 6 inches plus or minus from true line.

3.3 FINISHING

A. After dikes have been constructed to the lines and grades indicated, spread topsoil on dikes and grade to uniform slope.

B. Dispose of excess or unsuitable materials and smooth grade all affected areas.

C. Leave site free of debris.

END OF SECTION

SECTION 33 71 73

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Under ground and above ground electrical service systems.

1.2 REFERENCES

A. NFPA 70: National Electrical Code.

B. UL: Underwriters' Laboratories Inc.

1.3 RELATED WORK

A. Inspect, splice, and test continuity for all special telemetry cables prior to backfilling Trenches.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.4 PERFORMANCE REQUIREMENTS

A. Conform to.

1. NFPA 70.
2. Electrical authority having jurisdiction.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Conduit: Section 26 05 33.

B. Concrete: Class 3000 minimum, Section 03 30 05 with No. 67 aggregate or larger and dye additive to give permanent red color.

C. Conductors: Section 26 05 13 and as indicated.

D. Cable Lugs: Suitable for application.

E. Duct Spacers: Fabricated plastic, UL approved.

F. Meter Sockets: Provide meter sockets which comply with requirements of power utility company.

G. Metering: Size metering to capacity of main switch or buss as applicable.

2.2 **BACKFILL**

A. Sand fill, Section 31 05 13.

B. Crushed aggregate base, Section 32 11 23.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Cooridnate utility locations, Section 01 31 13.

B. Excavate, Section 31 23 16.

3.2 **INSTALLATION**

A. Provide adaptation from conduit to PVC duct.

B. Slope service to drainage point.

C. Terminate service conduit in main panel and transformer with grounding bushings. Make suitable ground connection from bushing to distribution center ground bus.

D. Install on undisturbed soil where possible. Backfill and compact, Section 33 05 20.

3.3 **DUCTBANK**

A. Place concrete so that voids around ducts are filled.

B. Provide minimum concrete thickness between ducts of 2 inches.

C. Adjust final slopes on site to coordinate with existing utilities.

D. Install drain assembly with saddle cutouts for each conduit. Tape drain assembly to each conduit to prevent entrance of concrete. Band drain assembly with 1/2 inch stainless steel straps to conduit assembly to prevent mechanical displacement. Connect to piping drain.

E. After installation, clean and swab ducts.

F. Install galvanized steel pull wires in spare ducts. Cap spare ducts.

3.4 **DIRECT BURIAL**

A. Level Trench with 3 inches minimum layer of sand. Cover conductors with 6 inches layer of sand. Provide physical protection acceptable to electrical authority having jurisdiction.

3.5 **SERVICE INSTALLATION**

A. Provide ductbank from property line or supply authority's pole to transformer or building as required.

B. Coordinate with utility company to install conductor from source to meter. Coordinate Trenching, supplying and placing of sand and backfilling with power utility company.

END OF SECTION

SECTION 34 41 13

TRAFFIC SIGNALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Traffic signal light system.

B. Related work includes but is not limited to,

1. Excavation, Section 31 23 16.
2. Trench backfill, Section 33 05 20 .
3. Landscape restoration, Section 32 92 00 or Section 32 93 13.
4. Pavement restoration, Section 33 05 25.

1.2 REFERENCES

A. ASTM A 500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

B. ASTM A 501: Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

C. ASTM B 85: Standard Specification for Aluminum-Alloy Die Castings.

D. Federal Standard 595: Colors.

E. FS TT-E-489: Enamel, Alkyd, Gloss, Low VOC Content.

F. FS TT-E-529: Enamel, Alkyd, Semigloss, Low VOC Content.

G. IMSA 20-1: Polyethylene Insulated Polyethylene Jacket Signal Cable.

H. IMSA 20-2: Polyethylene Insulated Polyethylene Jacketed Push Button, Audible Cable.

I. IMSA 40-6: Drop Cable.

J. IMSA 50-2: Loop Detection Lead-in Cable, Polyethylene Insulated Polyethylene Jacketed.

K. IMSA 51-7: Loop Wire, Polyethylene Insulated Polyethylene Jacketed.

L. IMSA 60-6: Buried Cable.

M. IMSA 60-4: Aerial Cable.

N. IMSA 62: Ground Rods.

O. Manual on uniform Traffic Control Devices for Streets and Highways.

P. NEMA 250: Enclosures for Electrical Equipment (1000 Volts Maximum).

Q. NEMA TS 2: Traffic Control Systems.

R. NEMA WC 5: Thermoplastic-Insulated Wire and Cable for Transmission and Distribution of Electrical Energy.

S. NFPA 70: National Electric Code.

1.3 **DEFINITIONS**

A. Controller Assembly: A complete electrical mechanism mounted in a cabinet for controlling the operation of a Traffic Signal Light system.

B. Controller Unit: That portion of a Controller Assembly that is devoted to the selection and timing of signal displays.

C. Traffic Signal Light: A power-operated traffic control device with red, amber and green lights by which vehicular (and pedestrian) traffic is warned or directed to take specific action.

1.4 **SUBMITTALS**

A. Shop Drawings of signal poles, signal arms, signal heads, Controller Assembly, vehicle detectors, walk-no walk light and other traffic control devices.

B. Manufacturer's name and identifying number of equipment and material proposed for the Work. Supplement the list with such other data as may be required, including detailed scale drawings and wiring diagrams of any special equipment.

C. Warranties, and instruction sheets.

D. Field quality control equipment testing results. NEMA TS 2 establishes the test procedures required to demonstrate the conformance of controller and subassemblies.

1.5 **MAINTENANCE EXISTING SYSTEM**

A. Notify ENGINEER prior to performing any work on existing systems.

B. Maintain existing traffic signal systems in effective operation for the benefit of the traveling public during the progress of the Work, except when shutdown is permitted to allow for alterations or final removal of the systems.

C. Obtain safety circuit clearance from serving utility daily before starting work on traffic signals adjacent to existing series street lighting circuits.

PART 2 PRODUCTS

2.1 **EXISTING MATERIALS**

A. Where existing systems are to be modified, incorporate existing material in revised system, Salvage or abandon as indicated.

2.2 **CONDUCTORS**

A. IMSA 20-1: Polyethylene Insulated Polyethylene Jacket Signal Cable.

B. IMSA 20-2: Polyethylene Insulated Polyethylene Jacketed Push Button, Audible Cable.

C. IMSA 40-6: Drop Cable.

D. IMSA 50-2: Loop Detection Lead-in Cable, Polyethylene Insulated Polyethylene Jacketed.

E. IMSA 51-7: Loop Wire, Polyethylene Insulated Polyethylene Jacketed.

F. IMSA 60-6: Buried Cable.

G. IMSA 60-4: Aerial Cable.

H. IMSA 62: Ground Rods.

I. NEMA WC 5: Thermoplastic-Insulated Wire and Cable for Transmission and Distribution of Electrical Energy.

J. NFPA 70: National Electric Code.

2.3 SIGNAL POLE AND SUPPORT ARM

A. Material: Galvanized steel, ASTM A 500 or ASTM A 501. Secure approval prior to procurement and installation.

B. Foundation:

1. Cast-in place Concrete: Class 4000, Section 03 30 04.
2. Reinforcement: Grade 60 epoxy coated or galvanized steel, Section 03 20 00.

C. Anchor bolts: Galvanized steel, Section 05 05 23.

2.4 TRAFFIC SIGNAL LIGHT SUPPORT UNIT

A. For hanging units, 1-1/2 inches standard steel pipes with malleable iron or bronze fittings, adjustable through 360 degrees about a vertical axis.

B. For base support units, clamp-type mounting. Install terminal compartment side away from traffic and parallel with prolongation of nearest curb face.

2.5 TRAFFIC SIGNAL LIGHT HEAD

A. Housing: Adjustable, one-way, waterproof, vertical type, with 3 sections unless indicated otherwise. All parts of housing, including the doors and end plates, die cast aluminum, ASTM B 85.

1. Paint with 2 coats of traffic signal enamel; FS TT-E-489, Class A matching Federal Standard No. 595 for colors black or dark green as selected by ENGINEER.
2. Paint inside of hood with 2 coats of traffic signal flat black enamel, FS TT-E-529.
3. All exposed bolts, screws, hinge pins and door-locking devices, Stainless steel.
4. All interior screws and fittings, Stainless steel or nonferrous, corrosion-resistant material.
5. All gaskets; neoprene.
6. Terminal blocks fitted with sufficient screw type terminals for independent wire connections. Permanently identify terminals.
7. All hoods, 0.030 inch thick sheet aluminum, painted flat black. Length of hoods for 12 inches section; 11 inches minimum unless indicated otherwise.
8. Signal back plate finished in flat black paint of the size indicated.

9. Directional louvers when indicated shall have snug fit and screwed to hoods. Thickness dimensions and arrangements of vanes as indicated.

B. Lenses: Glass or polycarbonate resin free from imperfection, circular with a visible diameter of 12 inches of colors red, yellow and green where indicated.

C. Lampholder: Vibration resistant, weatherproof, and molded construction. Each lampholder shall position the lamp filament at the focal center of the reflector, and be adjustable for filament burn down position.

D. Reflector: One-piece parabolic, alzak finished specular aluminum with a focal length of 3 inches unless indicated otherwise.

E. Lamps: Clear 165 watt initial output, 130 volt, 8,000 hour rated life, 1950 lumens minimum.

2.6 CONTROLLER ASSEMBLY

A. Cabinet: Base mounted NEMA TS-2, size 5 or as specified, Type 1 configuration 4. Aluminum with anodized finish. All internal components to be wired as indicated.

B. Controller Unit:

1. Solid-state Electronic Components: In accordance with NEMA TS 2 Type 1, or as specified, with a minimum Design Life of 5 years based upon 24 hour operation.
2. Timing periods as follows.

Minimum Range	Timing Interval (Second)
Walk 0 to 99	Vehicle Initial 0 to 99 Presect
Gap 0 to 9.9	Green Clearance 0 to 99
Yellow Clearance 0 to 9.9	All Red Clearance 0 to 9.9

3. Two through 8 phase fixed-time, semi-actuated or fully actuated capabilities. With RS-232 modems.

C. Signal Load Relay Units:

1. Solid-state with a Design Life of 5 years based upon 24 hours operation.
2. Circuit capable of switching 1,000 watts load to signal lamps.
3. The load shall not exceed 1,000 volt amperes when inductive leads are switched.
4. Signal switching function controlled by outputs of ground potential from the traffic signal controller.
5. Plug into standard NEMA sockets.

D. Fail Safe Unit: Meet NEMA TS 2. Activated by any malfunction of the controller or solid-state switching modules. Manual reset by push button on the face of the unit only after malfunction that caused activation has been corrected. Capable of monitoring not less than 16 phases. The unit being separate and self-contained with output latch relay being contained in the unit as a standard feature.

2.7 DETECTOR, INDUCTIVE LOOP

A. Adjustable range of sensitivity able to detect all motor vehicles regardless of speed or size capable of operating loops varying in size from 3 x 3 feet to 6 x 12 feet.

B. Modes of Operation: 3 phases as follows.

1. Short: Indicate a normal size vehicle at approximately 1/4 second.
2. Middle: Indicate a presence of vehicle from 4 minutes to not more than 10 minutes.
3. Long: Indicate presence of vehicle indefinitely.

C. The detector shall be fail-safe and shall include in its construction, all material required of the tuning of the detector.

D. A complete detector unit including power supply terminals shall be included with all adjusting switches and dials located on the face of the panel cabinet.

E. Metal objects in the vicinity of, but not within the loops shall not affect detector relay operation.

2.8 PEDESTRIAN SIGNAL LIGHT HEAD

A. Modular type, using international symbols of lunar white person for "walk" and Portland Orange hand for "don't walk" indications.

B. Dust and weatherproof aluminum alloy housing accessible from the front by a swing out door containing incandescent lamps.

C. Message Module: Enclosed with NEMA type nonmetallic cabinet, screened refraction type message lens of polycarbonate plastic and be sealed for protection against moisture and weather.

D. Louvered Visor: Aluminum louvered section with polycarbonate plastic members not more than 0.04 inch thick.

2.9 PEDESTRIAN PUSH BUTTON

A. Weatherproof design to operate at less than 50 volts. Temperature range of minus 30 deg. F. to plus 165 deg. F. and 0 to 100 percent relative humidity.

B. ADA accessible with large button.

C. Sign portion printed with international symbol and arrow for the direction.

2.10 JUNCTION BOXES

A. Buried type, Section 26 05 34 and as follows.

1. Precast reinforced concrete in paved surfaces.
2. Plastic or polymer concrete in landscaped surfaces.

B. Cover Marking: "Traffic Signal", “Fiber Optic” or as applicable.

C. Type and size to be selected by ENGINEER.

2.11 CONCRETE AND GROUT

A. Cast-in-place Concrete: Class 4000, Section 03 30 04.

B. Precast Concrete: Class 5000, Section 03 40 00.

C. Grout: Non-shrink, Section 03 61 00.

2.12 PAINT

A. Oil-alkyld painting system, SSPC PS 1.4.

1. Black; Federal Standard Number 595 color #37056.
2. Green; Federal Standard Number 595 color #14159.
3. Gray; Federal Standard Number 595 color #26306.

PART 3 EXECUTION

3.1 POLE FOUNDATION

A. Match longitudinal grades of foundation cap with top of existing curb.

1. Existing Curb and No Sidewalk: 1/4 inch per foot sloped upward from the top of the back of curb.

2. Existing Curb and Sidewalk: Straight grade from top back of curb to near edge of sidewalk.

3. Existing Parkway: Straight grade between top of back of one curb to top of back of other curb.

C. Construct foundations per details provided. Place and plug conduit ends and place anchor bolts in the proper positions and to the proper heights. Hold in place by means of a template until the concrete sets. Do not weld reinforcing steel, anchor bolts, or conduit.

D. When required, construct foundations of monolithic concrete conforming to the requirements of Section 03 30 04; match color of adjacent concrete. Provide galvanized steel anchor bolts, nuts, and washers; Section 05 05 23.

E. Welding of reinforcing steel, anchor bolts, or conduit; not allowed.

F. Cure foundations for 7 days before erecting signal pole and achieve concrete design strength before erecting arms.

G. Whenever the edge of a concrete foundation extends within 18 inches of any existing concrete improvements, extend a concrete slab with a minimum thickness of 4 inches to meet such improvements.

3.2 STEEL POLE INSTALLATION

A. Plumb pole by adjusting base pedestal anchor bolts before placing foundation cap. After plumbing poles cut anchor bolt off 1 inch above nuts. Place grout under base pedestal. Coat exposed cut metal surface with spray galvanizing.

B. Repair holes in existing poles due to equipment removal as follows:

1. Steel Shaft: Weld a suitable disc, grind smooth to match existing surfaces. Coat exposed surfaces with spray galvanizing or paint primer.
2. Concrete Shafts: Shrinkage resistant grout to match existing texture and color.

C. Painting: Apply coatings, Section 09 91 00. Paint metallic surfaces a primer coat and 2 coats of finish paint per ENGINEER's selection of color and type.

3.3 SYSTEM INSTALLATION

A. Install foundations, signal poles, Controller Assemblies, signal support arm and head, walk -no walk lights, pedestrian push buttons, junction boxes and vehicle detectors as indicated.

B. Place new signal installation in the appropriate flash operation for 72 hours prior to being placed into full operation.

C. Cover all inoperative signal heads in white until placed into operation.

C. Signal heights and positions to match MUTCD requirements.

D. Install conduit, Sections 26 05 33 and 26 56 19.

E. Install wires and cables, Section 26 05 13.

F. Make interconnection between traffic light poles with 2 inch conduit and wiring. Size and place as indicated.

G. Make interconnection between controller and existing communication system with 2 1/2 inches conduit and wiring or as indicated.

H. Keep existing signal system operating until new system is operational.

I. Removal and Salvaging of Existing Equipment: Remove all existing electrical equipment to be salvaged in a manner as to maintain it's usefulness. Deliver to designated location.

3.4 INSTALLATION OF JUNCTION BOXES

A. Install junction boxes in runs of 250 feet maximum and at points identified when conduit runs are more than 250 feet.

B. Without additional cost to OWNER, add such additional boxes as may be desired to facilitate work.

C. Additional requirements Section 26 56 19.

3.5 GROUNDING

A. Comply with NFPA 70 and Section 26 56 19.

3.6 DETECTOR LOOPS

A. Use one continuous length of conductor from junction box to loop and back to junction box.

B. One turn is once around the loop. Two turns are twice around the loop with the same conductor in the same direction. All loops shall contain 4 turns of wire.

C. Loop all conductors in the same direction (clockwise or counter clockwise) for all loops on the same vehicular approach.

D. Label loop conductors in junction box "input" or "output" as applicable.

E. Splicing conductors is not allowed.

F. Splicing of conductor to lead-in cable to be a soldered splice and made in junction box only.

3.7 FIELD QUALITY CONTROL

A. Test each detector loop to provide the following.
   1. Continuity under 600 ohm per volt.
   2. 10 megohms minimum between conductor and ground.
   3. Inductance: 80 to 1000 micro henries.

B. Test all communication cables prior to and after installation and document all readings. All readings are to be within line loss requirements.

C. Test all signal cabling after installation prior to turn on.
   1. Wire to wire.
   2. Wire to ground.

D. Test all grounds after installation prior to turn on 3 ohms or less is desirable. Maximum is 10 ohms. Document all readings.

E. Test all electrical circuits for function and document results prior to turn on.

END OF SECTION

SECTION 34 71 13

VEHICLE BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Galvanized steel beam guardrail and Jersey barrier systems.

1.2 REFERENCES

A. AASHTO M 180: Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail.

B. ASTM A 36: Standard Specification for Structural Steel.

C. WWPA: Western Wood Products Association.

PART 2 PRODUCTS

2.1 BEAM GUARDRAIL

A. Beam guardrail, AASHTO M 180, Class A (0.0105 inch thickness) Type 1 with steel compression blocks.

B. Steel, ASTM A 36.

C. Galvanized, Section 05 05 10.

2.2 GUARD RAIL POSTS AND OFFSET BLOCKS

A. Steel, ASTM A 36 and AASHTO M 180.

B. Wood per douglas fir-larch, hemlock-fir, lodge-pole pine, or ponderosa pine that are Grade No. 1 or better in accordance with WWPA Standard Grading Rules. Provide only one species in Work . Wood posts and blocks may be surfaced or rough sawn.

C. Treat wood guardrail posts, Section 06 10 00. Use preservatives which are compatible with the timber and make rodent repellent for timber in contact with the ground.

2.3 ACCESSORIES

A. Bolts, Nuts, Washers, Section 05 05 23: Steel.

2.4 CONCRETE

A. Cast-in-place Concrete: Class 4000, Section 03 30 04.

B. Precast Concrete: Class 5000, Section 03 40 00.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify utility location, Section 01 31 13.

3.2 POSTS

A. Space and place posts as indicated.

B. Drive posts if satisfactory results are obtained without damage to the post. When posts are driven through asphalt, seal area around posts with concrete.

C. Excavate post holes when not driven. Correct over excavated depth of post holes. Compact backfill material around post to a Relative Density of 95 percent and dispose of excess material.

3.3 RAIL ELEMENTS

A. Erect rail elements to produce a smooth, continuous rail paralleling line and grade of road surface.

B. Lap rail elements in direction of traffic and offset rail from post by a block.

C. Curve rail elements, before erection.

D. Field drill or punch holes for special details.

E. Provide trailing end elements at ends of all sections including bridge rail connections.

F. On 2 lane roads construct approach elements at both ends.

G. At bridge approaches and other designated areas, construct a double thickness of rail with additional posts installed midway between the regular posts as indicated.

H. Provide impact attenuators, mushroom terminal sections, and roll down ends where indicated.

3.4 JERSEY BARRIERS

A. Install in location indicated to produce a smooth wall surface paralleling line and grade of road surface.

B. Anchor and join each barrier section per manufacturer's recommendations.

C. Provide trailing end elements and impact attenuators.

END OF SECTION

SECTION 34 71 19

VEHICLE DELINEATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Delineator posts and reflectors for roadways.

1.2 REFERENCES

A. MUTCD: Manual on Uniform Traffic Control Devices for Streets and Highways.

B. FS L-P-380: Plastic Molding Material Methacrylate.

C. FS L-S-300: Sheeting and Tape, Reflective: Nonexposed Lens.

1.3 SUBMITTALS

A. Submit manufacturer's data on candle power.

PART 2 PRODUCTS

2.1 REFLECTORS

A. Reflective Sheeting: FS L-S-300 with 2,200 hours minimum durability and not less than 6.5 square inches of reflective area.

B. Lens: Methyl methacrylate per FS L-P-380 requirements, with an overall size not less than 6.5 square inches of reflective area, free from projections or indentations, other than a central mounting hole and identification. Specific intensity of the lens to equal or exceed the following minimum values:

Table 1 - Specific Intensity Candle Power

Type of Lens	Observation Angle (Degrees)	Entrance Angle (Degrees)	Candle Power (per Foot-Candle)
White	0.1	00	119
White	0.1	20	47
Amber	0.1	00	84
Amber	0.1	20	39

1. The brightness under rainfall conditions for amber lenses shall not be less than 80 percent of the brightness values of the totally clean and dry lens.
2. Back of Lens: Opaque fused to the lens to seal against dust, water and water vapor.
3. Housing: 0.020 inch 5052-H32 aluminum formed to retain the acrylic reflector and marked with the name and part number of manufacturer.

2.2 POSTS

A. Structural Steel: Galvanized, U-shaped, T-shaped, C-shaped, box-shaped, or round tube, Section 05 12 00, with 3/8 inch diameter mounting holes.

B. Flexible Plastic: Resistant to ultraviolet light, ozone, hydrocarbons and impact from -30 deg. F. to 130 deg. F., with a minimum width of 2 inches facing traffic. White, yellow or orange unless indicated.

C. Length: as determined in the field with a minimum burial of 18 inches or surface attachment bolts.

2.3 ACCESSORIES

A. Bolts, Nuts, Washers, Section 05 05 23: Galvanized steel.

PART 3 EXECUTION

3.1 INSTALLATION

A. Mounting: 4 feet above the near roadway Pavement edge unless indicated otherwise

B. Delineator Posts: In line with guard rail or Jersey barrier if present, or not less than 2 feet nor more than 6 feet outside the edge of roadway.

3.2 DELINEATOR AIMING

A. As indicated in MUTCD.

END OF SECTION

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 10.

Short Title: Shared Agency Agreement and End-User License Agreement for Motorola Flex Software for Police Department

Initiated By: Chief Paul Child

Staff Representative: Chief Paul Child

SUBJECT

Consider Shared Agency Agreement and End-User License Agreement for Motorola Flex Software for Police Department

RECOMMENDATION

Approve Shared Agency Agreement and End-User License Agreement for Motorola Flex Software for Police Department.

BACKGROUND

During a recent City Council meeting, Chief Child presented information to the Council regarding the need for the Police Department to up-grade the City's current RMS and switch from FATPOT to Motorola Flex. The initial first year purchase price for the new software is $129,873.54 with a second year maintenance cost of $11,770.91. The attached Shared Agency Agreement and End-User License Agreement is proposed for purchase of the new software and related modules.

ATTACHMENTS:

Description

- Shared Agency Agreement and End-User License Agreement - Motorola Flex

Shared Agency Agreement
The Centerville Police Department

This Shared Agency Agreement, together with the Computer Software End-User License and Support Agreements ("Agreements") executed by the Host Agency constitutes one integrated agreement and is the complete and exclusive statement of Motorola Solutions' obligations and responsibilities with regard to the Flex software licensed hereunder (the "Software"). All capitalized terms used and not otherwise defined herein shall have the definitions given to such terms in the Agreements.

Section 1: Definitions:

1. 1 **Shared Agency** - A "Shared Agency" is an agency that has purchased the right and license to use the same copy of the Software currently licensed by Motorola Solutions to the Host Agency, as set forth in the Agreements.

1. 2 **Host Agency** – The "Host Agency" is a current Motorola Solutions licensee and customer that is authorized by Motorola Solutions and has agreed to share its use of the Software installed at its facilities with the Shared Agency.

Section 2: License

2. 1 **Grant of License.** Motorola Solutions grants to **The Centerville Police Department** a non-exclusive, non-transferable license to use the same copy of the Software, its Documentation and other related materials, which are presently licensed to the Host Agency, subject to the terms and conditions set forth in the Agreement, as well as the terms and conditions specified in this Shared Agency Agreement. The liability cap set forth in Section 7 of the Software End-User License Agreement, as it applies to Shared Agency, shall be the license fees paid by Shared Agency to Motorola. Shared Agency agrees to comply with all such terms and conditions.

2. 2 **Termination.** This Shared Agency Agreement will terminate automatically if and when the Agreements terminate for any reason. Motorola Solutions or the Host Agency may immediately terminate this Shared Agency Agreement and license at any time if the Shared Agency breaches the terms of this Shared Agency Agreement or the Agreements. The Host Agency may terminate this Shared Agency Agreement at any time, with or without cause, upon ninety (90) days prior written notice to Motorola Solutions and the Shared Agency, unless otherwise agreed in writing by the Host Agency.

2. 3 No Assignment. The Shared Agency may not assign or transfer this Shared Agency Agreement to any other entity or agency, including by operation of law, without the prior written consent of the Host Agency and Motorola Solutions, which shall not be unreasonably withheld.

Section 3: Scope of Rights

3. 1 **Support and Services.** Shared Agency understands that, unless otherwise agreed in writing by all parties, all assistance, support and maintenance services for the Software may be obtained by Shared Agency only through the Host Agency. This Shared Agency Agreement does not entitle Shared Agency to any Motorola Solutions services beyond the license to use the Software.

3. 2 Warranty. The Warranty Period for the Software (as defined in Section 7 of the Software End-User License Agreement) is limited to the remaining time, if any, originally granted under the Agreement (as you can see in the Section 8 of the Software End-User License Agreement).

Section 4: Data and Feedback

4. 1 Shared Agency owns all right, title and interest in its Shared Agency Data as defined in Section 1. Motorola acquires no rights to Shared Agency Data except those rights granted in this Agreement including the right to process and use the Shared Agency Data as follows: (a) processing Shared Agency Data: to the extent permitted by law, Shared Agency grants Motorola and its subcontractors a right to use Shared Agency Data

(including to process, host, cache, store, reproduce, copy, modify, combine, analyze, create derivative works from such Shared Agency Data and to communicate, transmit and distribute such Shared Agency Data to third parties engaged by Motorola) to (1) perform Services and provide products under this Agreement, (2) analyze the Shared Agency Data to operate, maintain, manage, and improve Motorola products and Services, and (3) create new products and services. Motorola may not sell or offer for sale any Shared Agency Data.

4. 2 Motorola owns all right, title and interest in data resulting from System Data that is or has been transformed, altered, processed, aggregated, correlated or operated on (hereafter, "Derivative Data"). Examples of Derivative Data include system health check reports, timing logs, usage logs, error reports and server logs. Motorola uses Derivative Data to support, maintain, and understand the function, operation and performance of the product

Accepted and Approved:

Centerville Police Department	**Motorola Solutions, Inc.**
Signature: _____	Signature: _____
Print Name: _____	Print Name: _____
Title: _____	Title: _____
Date: _____	Date: _____

Centerville Police Department

Flex Pricing Proposal

Quote Date: 4/8/21

Expiration Date: 8/20/21

Prepared By: Brian Dunaway

A summary of the purchase price for all modules identified in the proposal is as follows:

- First-year (12 months) maintenance and warranty coverage, which begins at Go-live
- Upgrades and enhancements included as part of annual maintenance, as a standard business practice
- All travel and per diem costs for onsite implementation, installation, project management, and training

Solution	Price
Integrated System Core and Master Tables (Hub)	$ 21,902.30
Records Management Suite	$ 21,633.41
Mobile Software Suite	$ 32,310.31
Interfaces	$ 32,015.403
Professional Services	$ 39,269.95
Warranty/1st-year maintenance and support	Included
Total:	$ 147,131.37
Motorola 2021 Discount	$ 17,257.83
Total Price	$ 129,873.54
2nd Year Maintenance:	$ 11,770.91

Note- Total project price based on system purchase without financing and aligning the project timeline with Bountiful and West Bountiful. If the contract is signed prior to July 2021 there will be no payments due until after July 1, 2021.

Not Included

***Note:** While the items below are not included in this preliminary quote (unless otherwise specified), Motorola Solutions can work with our partners to provide them, based on further discussions of your agency's exact needs.

- Esri desktop and server licensing
- Networking hardware and any required workstations unless listed in the price table above
- Third-party software requirements
- Data Conversion
- Any applicable taxes

Integrated Hub

Master Tables (names, property, vehicle)

- Utilizes a single-source database for Name, Vehicle, Property, and Wants/Alerts for instant access to updated, organized information
- Stores and organizes all system information, which can be accessed from one central repository with a single login

Message Center

- Supports sending and receiving of agency-wide email and instant messaging, connecting agency personnel to units in the field
- Displays scrolling BOLOs and other alerts along the bottom of the screen to optimize situational awareness

Warrants

- Generates a detailed history of all attempts to serve warrants, informing first responders of possible risks associated with serving a particular warrant
- Organizes warrants and tracks each one throughout its lifecycle from initial receipt to completion of service and return to court
- Displays a prominent alert when a warrant is created, enhancing officer safety

Learning Management System

- Provides online training courses on Flex modules, reducing the stress on agencies to organize and coordinate large-scale training events
- Trains and informs new and experienced users to ensure maximum leverage of the system's capabilities

Imaging and File Attachments

- Agencies can create a full-color, organized library of digital images that are fully searchable from anywhere in the system
- Allows agencies to organize their digital files for streamlined access, saving time and effort
- Integrates with CommandCentral Vault, Motorola's cloud-based digital evidence management solution, to present evidence alongside all other case information captured in the law incident

Records Management

Law Records (RMS)

- Easy report generation on crime analysis, presentation, and archiving saves time and reduces effort for agency personnel
- Reduces errors and duplicate data entry through full integration with the rest of the Flex modules
- Enhances situational awareness along with investigator and officer safety through automatic visual alerts

Evidence Management

- Maintains an organized, complete and accurate chain of custody for all evidence received
- Provides a complete evidence history, detailed evidence data, and displays evidence custody for completed and closed cases in barcode lists

Evidence Barcode and Audit

- Simplifies data entry, precise labeling, and hand-held auditing of storage locations by using a barcode reader
- Enables users to inventory and audit evidence using a handheld barcode reader, reducing effort and saving time

Personnel Management

- Stores and organizes all information in a central repository for easy access
- Prevents redundant entry of information based on system-wide integration, saving users time and preventing duplicate records

Equipment Maintenance

- Tracks the condition, location, history, and upkeep of department equipment, enabling easy tracking with organized information
- Calculates operating cost and equipment value, simplifying budgetary decisions and saving time
- Enables easier, quicker buying decisions by tracking warranty, manufacturer, and vendor information

Mobile Software Suite

Flex Touch

- Designed to provide a quick and easy-to-use process to access an agency's Spillman Flex RMS and CAD from a smartphone or tablet.
- Provides access to dispatch information, connecting first responders to the information they need to prepare for a situation
- Receives call assignments using a mobile device, simplifying the dispatch process

Voiceless Dispatch

- Connects dispatch personnel with field personnel through status updates and the ability to add/view all comments

Mobile Mapping and AVL

- User map viewing options help organize information and enhance situational awareness
- Enables customization for easy viewing, saving time and reducing effort during resource allocation

Mobile Arrest Form

- Integrated with the Mobile Field Report, and completed as part of a related incident record, the Mobile Arrest Form organizes arrest data and saves officers time by populating arrest data into the Flex system
- Users can finalize and save prior to completing the field report, allowing them to focus on their surroundings without losing data

Mobile Field Report with Field Interview (AFR)

- Users can easily navigate fields and drop-down menus using either a touch-screen monitor or keyboard and mouse to record data and conduct field interviews, saving time
- Enables officers to quickly complete forms from their patrol vehicles, eliminating the need to return to the station
- Contains large fields that are easy to navigate with a touchscreen monitor, keyboard, or mouse, streamlining the navigation process and saving time

Mobile Records

- Empowers personnel with universal data access, simplifying the search process in the field
- Mobile personnel can search for records in multiple places without leaving the vehicle or requesting dispatch assistance, saving time and effort

Mobile State & National Queries

- Allows users to perform state and federal searches simultaneously, saving time by requiring only one query
- Returns include alerts on records containing warnings and are delivered audibly as well as with visual highlights, appealing to each officer's most effective mode of notification and saving time

Driver License Scanning

- Enables officers to scan a driver license and populate Mobile search screens with identifying information, reducing the need to enter information by hand and saving time

Interfaces

StateLink Interface
• Integrates agencies with the state, national, and other external databases for better coordination
IBR Reporting interface
• Enables agencies to compile detailed, organized crime summary and activity information such as offenses, arrests, and law incidents for submitting IBR reports that meet state and federal standards • Automatically retrieves data from the Flex system for report generation, saving time and eliminating any manual or redundant efforts to create these reports
InSight Interface
• Integrates agencies by enhancing data sharing initiatives through secure, real-time queries of local agency records • Enables agencies to connect and collaborate more effectively, regardless of public Safety software vendor
UTAH Citation and Accident Interface
• Mobile DI9 Form • Mobile Citations

Professional Services
Implementation Analyst
• Conduct initial business process review (BPR) • Conduct administration training on all purchased products • Serve in a lead trainer capacity as required
End User Trainer
• Provide classroom instruction, written exams, and supervised repetition of system use in a training environment
Admin Trainer
• Conduct administration training and setup on all purchased products (this role may be filled by the Implementation Analyst, depending on customer needs) • Serve in a lead trainer capacity as required
Go-live Assistance
• Project Manager and training personnel provide hands-on assistance before and after Go-live to ensure a successful transition to Flex
Installation Technician
• Install, test, adjust, and perform preliminary configuration of the operating system for Flex • Manage server configuration, oversee core system installation, and coordinate installation of external interfaces

Payment Milestones

Except for a payment that is due on the Effective Date, Customer will make payments to Motorola within thirty (30) days after the date of each invoice. Customer will make payments when due in the form of a check, cashier's check, or wire transfer drawn on a U.S. financial institution. If Customer has purchased additional Professional or Subscription services, payment will be in accordance with the applicable addenda. Payment for the System purchase will be in accordance with the following milestones.

Milestone	Detail	Percentage
1	July 1, 2021	50%
2	Project Completion	50%

Motorola shall make partial shipments of equipment and will request payment upon shipment of such equipment. In addition, Motorola shall invoice for installations completed on a site-by-site basis or when professional services are completed, when applicable. The value of the equipment shipped/services performed will be determined by the value shipped/services performed as a percentage of the total milestone value. Unless otherwise specified, contract discounts are based upon all items proposed and overall system package. Overdue invoices will bear simple interest at the maximum allowable rate by state law.

For Maintenance and Support Plan and Subscription Based Services: Motorola will invoice Customer annually in advance of each year of the plan.

Technical Product Descriptions

Utah StateLink Interface

Software: PCs and MDCs that are used to send transactions must have the Java virtual machine installed.

Feature List

- State and National Database Queries
- CAD Integration
- Alerts on Potential Dangers
- Multiple Response Destinations
- Mobile Integration

Utah transactions available from Mobile

Transaction type	Screen command line access	Screen name / Description	Message key(s) sent
Administrative		Change Password	PWD, CPW
		User Identification	XID
		Set Password	PWD, XID
	AM	Administrative Message (NLETS)	AM or AML
	YQ	Hit Confirmation Query (NLETS)	YQ
	YR	Hit Confirmation Response (NLETS)	YR
Boats	BQ	Boat Registration Inquiry (NLETS)	BQ
	QB	Query Boat (NCIC)	QB
Criminal History	FQ	Criminal History by State ID (NLETS)	FQ
	CHQ	Criminal History Query	UcchNameSearch or UcchDLnSearch or

			UcchSsnSearch or UcchRapsheetBySID or UcchRapsheetByFBI or SMTPhotosForIdent
	IQ	Criminal History Query by Name (NLETS)	IQ
	JUV	Juvenile Query	AliasNameListRequest, NameListRequest
	QH	III Index Record Existence (NCIC)	QH
	QR	III Criminal History Record (NCIC)	QR
Driver license	DLQ	Driver License Query	GetDLSummary or DLSSNSearch or DLNamSearch or DLCountyDOBSearch
	DNQ	Driver Query By Name Only (NLETS)	DNQ
	DQ	Driver License Query (NLETS)	DQ or DQG
	EMRG	Emergency Contact	EMRGEmergencyContact
	KQ	Driver's History Query (NLETS)	KQ
Guns	QG	Query Gun (NCIC)	QG
Missing Person	QM	Query Missing Person (NCIC)	QM
Protection Order	QPO	Query Protection Order (NCIC)	QPO or QV or QW or QWA or QWB or QWE or QWF or QWI or QWS or ZV or ZW
Sex Offender	QXS	Query Sex Offender (NCIC)	QXS

Vehicle	QV	Query Vehicle (NCIC)	QV
	RNQ	Registration By Name (NLETS)	RNQ
	RQ	Registration Query (NLETS)	RQ or RQG
	RQH	Plate History Query	RQPlateHistory
	RQN	Vehicle Registration By Name	RQNameQuery
	RQP	Placard Query	RQPlacardQuery
	RQPVP	Partial VIN/Plate Query	RQPartialVinPlateQuery
	RQV	Vehicle Registration	RQVWAQuery
	SQ	Snowmobile Registration Query (NLETS)	SQ
Wanted	QSW	Query Statewide Warrants	Qsw
	QW	Query Wanted (NCIC)	QW or ZW or QWA or QWE or QWF or QWS or QWB or QWI or QV or ZV
	SWQ	State Warrant (NLETS)	SWQ
Name Search Screen		QW/QSW - Query Wanted	QW, Qsw
		DQ - Driver License or XDQ – Utah Driver License	DQ or DQDriversQuery

		MIP - Person Multi-Query	QWQueryWanted, Qsw, (GetDLSummary or DLSSNSearch or DLNameSearch) , DQDriverLicenseQuery, ProtectiveOrderSearch
		IQ - Criminal History or FQ - Criminal History	Iq or IQ or FQ
		KQ – Driver's History Query	KQ
		QH – NCIC Criminal History Or QR – NCIC Criminal History	QH or QR
		JUV – Juvenile Criminal History	AliasNameListRequest, NameListRequest
		PO – Protective Order	ProtectiveOrderSearch
		RQN - Vehicle Registration Or RNQ - Vehicle Registration	RQNameQuery or RNQ
		RQ - Placard Query	RQPlacardQuery
Vehicle Search Screen		MIV - Vehicle Multi-Query	wqv, QV, QW, (RQVWAQuery or RQ),
		DQ – NLETS Driver License or XDQ – Utah Driver License	DQ or DQDriversQuery

		MIP – Person Multi-Query	QWQueryWanted, Qsw, (GetDLSummary or DLSSNSearch or DLNameSearch) , DQDriverLicenseQuery, ProtectiveOrderSearch
		RQ – Registration Query	RQVWAQuery or RQRegistrationQuery
		RQ - Partial VIN/Plate Query	RQPartialVinPlateQuery
		RQ - Placard Query	RQPlacardQuery
		RQ - Plate History	RQPlateHistory
		RQ - Permit Number	RQPermitNumber
		RQ - State Assigned Number	RQStateAssignedNumber
Boat Search Screen		BQ - Boat Registration	RQVWAQuery or BQ
		QB - Stolen Boat	QB

Requirements

Software

Software	Version	Vendor/Company	Notes
Flex	Version 4.5 or higher	Motorola Solutions, Inc.	
O/S	Windows	Microsoft	• AIX • Linux
Other Requirements			• StateLink Version: 2.0 • Executable: StateLinkUT.war (War) • Protocol: Web Services • Interface Standard: Local and NCIC 2000 Standard Transactions using NLETS National Standard • Delivery Package: Installation Package Available • NCIC 2000 Standard: Yes • Displays Images in Returns: Yes • Voiced Responses: Yes • Highlighting: Yes

			• Import to Flex: Yes • Requesting Unit Auto Forward: Yes • Hit Alerts: Yes

Utah Flex IBR Interface

The Utah Incident-Based Reporting (UTIBR) module gives Flex users the ability to compile detailed crime information for submission to the state of Utah's UCR program. In addition to compiling crime statistics, the UTIBR module has a data auditing feature that assists users in locating data errors or questionable data prior to submission. The software will also aid users in correcting these errors. As Utah is now following the FBI's technical specifications, any submissions generated by the Flex software meets both organizations requirements.

Modules

Knowledge of the following modules is recommended
• Training in UT NIBRS procedures and Flex UTIBR module • Training in Flex Law and RMS modules

Requirements

General

The UTIBR module has been updated to meet the requirements as established by the FBI in the document *National Incident-Based Reporting System Technical Specifications v3.0.* This update includes additional updates released by the FBI in November, 2017.

Software

Software	Version	Vendor/Company	Notes
Flex	Version 6.3	Motorola Solutions, Inc.	
Hub module	Version 6.3	Motorola Solutions, Inc.	
Law module	Version 6.3	Motorola Solutions, Inc.	
RMS module	Version 6.3	Motorola Solutions, Inc.	

InSight

Agencies can enhance their data sharing initiatives by performing secure, real-time queries of local agency records. The Flex InSight module enables agencies to collaborate effectively, regardless of whether they are using Flex or a non-Flex information database. Through a multi-system, multi-jurisdictional data sharing broker, users are able to run real-time queries on the databases of participating agencies for:

- Names
- Associated images
- Vehicles
- Property information
- Other records

Strong Security

Agencies receive all the benefits of advanced information sharing, while maintaining the highest level of data security. InSight supports simultaneous, multi-agency returns with one search, and incorporates the Global Justice XML Data Model (GJXDM) and advanced data encryption and user-defined privileges.

The InSight model allows each agency to search for information outside its jurisdiction and receive critical returns. Data is protected through user-defined security privileges and 192-bit encryption – the established standard for the public safety industry. When several counties or regions want to share information, multiple InSight brokers can be connected.

XML Framework

InSight incorporates the Global Justice XML Data Model. The XML-based framework of appropriate federal specifications allows justice and public safety agencies to share information at all levels. Using XML, Flex provides the power needed to share mission-critical data among other law enforcement agencies, regardless of vendor and without costly interfaces.

Powerful Searching

Information such as arrest warrants, history of driving under the influence, or assaulting officers can be critical to a field officer's safety. Without leaving the patrol car, picking up the radio, or going back to the office, personnel can utilize InSight to search their own agency data and that of other jurisdictions. Users can even create subscriptions for searches, alerting them when other users are searching for the same record.

For example, an investigator can receive notification if another user is searching the system for the same name record, thereby assisting in the investigation of a suspect. Sample return information includes the following:

Sample Return Information

Name Search	Vehicle Search	Property Search	Jail Search
First Name	License Plate Number	Item Name	Name
Last Name	State	Recovered Date	Physical Descriptions
Street Address	Registration Exp. Date	Item Value	Arrest Date
Telephone	Year	Year	Arresting Agency/Officer
SSN	Make	Brand	Location of Arrest
Height	Model	Model	Disposition
Gender	Color	Serial Number	Age of Arrest
Hair Color	Owner	Color	Arrest Type
Eye Color	Agency Code	Owner	Location Code
Ethnic Group	Responding Officer	Responsible Officer	Circumstances
Photograph	Photograph	Photograph	Arrest Comments
Alerts & Involvements	Alerts & Involvements	Alerts & Involvements	Offense Details

When InSight sends data back, the program labels the name of the agencies from which the return came, along with a link giving access to additional information on a person, vehicle, or property item. InSight is a browser-based application and has been designed to work over slower connections. It can also be fully utilized in Mobile environments as needed. With InSight, users can also see related involvements on the record.

Utah State eCitation Form

The Utah Citation Form (UT Cite) provides a simple, easy to use, tool for officers in the field to complete electronic citations. The UT Cite can be completed quickly and efficiently by officers using name and vehicle records from

the Flex database. Validation is built into the electronic citation to ensure the information entered into the electronic citation is correct.

Workflow records can be created for each citation to allow an agency to define the process for approval.

Requirements

General

Not applicable.

Hardware

Not applicable.

Software

Flex 6.2 +
Mobile 4.6+
.NET 4.0

Documentation

Mobile eCitation and State Crash Forms Manual.

Training

Training is available through the training department. Training videos are also available.

User Information

The UT Cite is opened from within Mobile. When the UT Cite is started the officer is presented with the state specific citation they are familiar with.

A list of name and vehicle records that have recently been ran by the officer are available for quickly completing the UT Cite. The electronic citation can be completed by dragging and dropping a name or vehicle record onto the citation. When the record is dropped, the appropriate fields are completed. Names and vehicles can also be added to the UT Cite by selecting the record to add to the citation and then selecting the area on the citation to populate using the keyboard.

Information specific to the UT Cite is completed by typing directly on the citation or selecting from predefined values where applicable. UT Cite specific values for each box are built into the form for the officer to choose from where appropriate.

SAA Information

- The electronic citation can be turned on or off by individual user or group.
- The completed citation is attached to the appropriate citation record within the Flex software for easy retrieval and viewing.
- A translation tool is provided to allow an agency to translate state specific coding to values in the Flex database the agency has already defined to the values required on the UT Cite.

Maintenance Information

The UT Cite is updated as state requirements are updated.

iyeTek Crash import to Flex

The iyeTek Crash Interface imports Crash from iyeTek crash form into the Flex database. The changes for iyeTek consist of a specific stylesheet used with our CitationInterface war file. On a time interval that is configurable, the iyeTek Crash Interface pulls fixed length files alongside with the crash images from an FTP site over to the Flex server.The iyeTek Crash Import uses a custom CitationInterface XmlSplitter (CrashXmlSplitter) to split the fixed format NIST file into XML.

1. The first pass XSLT wraps the text file in an XML element called <iyeTek.Crash> and transforms it into a record per line (with type, seqno, and length attributes) that will make it easier to transform into fully structured XML for further processing.
2. The second pass XSLT further parses each record into individual xml elements for easier consumption. This form is what crash.xslt will use to further transform the input into DEx XML.

Feature List

- Import of Crash data
- Import New Name records with system involvements, or system involvements between the Accident record and existing Name records
- Import of New Vehicle records with system involvements, or system involvements between the Accident record and existing Vehicle record
- Crash Image Import
- Local Directoy, SFTP and FTPS supported pickup methods

Modules

Knowledge of the following modules is recommended

- CitationInterface.war
- Accident Flex Tables

Requirements

General

The agency must provide an FTP server to store the XML files output by Michigan iyeTek and allow traffic between that FTP server and the Flex server.

Fields that are to be transferred must currently exist in the Flex database.

Hardware

This project has no special requirements beyond the standard Flex server requirements.

Software

Software	Version	Vendor/Company	Notes
Flex	2020.3 and above		
DEx	2020.3 and above		

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 11.

Short Title: Municipal Code Amendments - Glass Recycling - CMC 7.08

Initiated By: City Council

Staff Representative: Lisa Romney, City Attorney

SUBJECT

Consider Municipal Code Amendments to CMC 7.08 to allow glass recycling services - Ordinance No. 2021-15

RECOMMENDATION

Approve Ordinance No. 2021-15 amending various provisions of CMC 7.08 to allow glass recycling services.

BACKGROUND

The City Council directed Staff to prepare Ordinance amendments to CMC 7.08 to allow for glass recycling services within the City. The proposed Ordinance No. 2021-15 has prepared in response to this request.

ATTACHMENTS:

Description

- Ordinance No. 2021-15 - Glass Recycling

ORDINANCE NO. 2021-15

AN ORDINANCE AMENDING SECTION 7.08.010 REGARDING SOLID WASTE AND RECYCLING DEFINITIONS AND SECTION 7.08.020 REGARDING COLLECTION OF SOLID WASTE, GREEN WASTE, AND RECYCLABLE MATERIALS TO ALLOW FOR GLASS RECYCLING AND COLLECTION WITHIN THE CITY

WHEREAS, the City has previously adopted Chapter 7.08 of the Centerville Municipal Code regarding Solid Waste and Recycling; and

WHEREAS, the City Council desires to amend certain provisions of Chapter 7.08 of the Centerville Municipal Code regarding Solid Waste and Recycling to allow for glass recycling and collection within the City; and

WHEREAS, the City Council finds the amendments to Chapter 7.08 of the Centerville Municipal Code as provided herein are in the best interest of the public health, safety, and welfare by providing more opportunities within the City for recycling.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF CENTERVILLE CITY, STATE OF UTAH:

Section 1. Amendment. Section 7.08.010 of the Centerville City Municipal Code regarding Definitions for solid waste and recycling is hereby amended to revise the definition of "Garbage, Rubbish, and Trash" to read as follows:

7.08.010 Definitions

The following words and phrases, as defined in this Section, shall be applicable to this Chapter:

* * *

(b) Approved Recycling Containers. Approved recycling containers shall consist of 90 or 100 gallon recycling containers constructed from cross linked, high-density polyethylene, or equivalent, designed specifically for automated collection equipped with wheels for easy movement by residential users and containing permanently attached, tight-fitting lids, or as approved by the City. Recycling containers for glass recycling shall be approved by the City.

* * *

(h) Garbage, Rubbish and Trash. All solid waste except hazardous waste, including but not limited to combustibles such as paper, wood, yard trimmings, etc., and non-combustibles such as metal, glass, stone, etc. Glass may also be considered a recyclable material when collected by a City-approved glass recycling service provider.

* * *

(l) Recyclable Materials. Those materials which can be recovered from or otherwise diverted from the waste stream for the purpose of recycling, such as metals, paper,

and plastics, as mutually agreed upon and determined by the contractor and the City. Glass may also be considered a recyclable material when collected by a City-approved glass recycling service provider.

Section 2. Amendment. Section 7.08.020 of the Centerville City Municipal Code regarding Collection of Solid Waste, Green Waste and Recyclable Materials is hereby amended to allow for glass recycling to read as follows:

7.08.020 Collection Of Solid Waste, Green Waste And Recyclable Materials

(a) Unless otherwise provided herein, the City, its agent or contractor, shall collect, remove and dispose of all residential solid waste, green waste, and recyclable materials. All residential solid waste, green waste, and recyclable materials shall be collected, removed and disposed of with such frequency and in such manner as the City Council may from time to time establish by regulation or contract. The City may separately contract for glass recycling services.

(b) Except as otherwise expressly permitted by this Chapter, no solid waste, refuse, green waste, or recyclable materials shall be removed or hauled away or transported upon the streets or public ways of the municipality except by the municipality, its agent or contractor, and except by authorized persons hauling commercial solid waste, green waste, or recyclable materials as hereinafter provided. It is hereby declared to be unlawful for any person, except as permitted in this Chapter, to haul or remove garbage or refuse in the municipality.

(c) The collection and disposal of commercial solid waste, green waste, and recyclable materials, as defined herein, shall not be a normal function of or provided by the City. Commercial establishments, public or quasi-public institutions and establishments creating commercial solid waste, green waste, and recyclable materials may remove commercial solid waste, green waste, or recyclable materials themselves or may employ the services of authorized contractors to remove commercial solid waste, green waste, and recyclable materials. Authorized commercial solid waste, green waste, and recyclable materials haulers must apply for and receive a business license to operate within the City, and written authorization from the City to do so. Haulage of commercial solid waste, green waste, and recyclable materials must be done in the manner, at such times and in such vehicles as may be approved for such purposes as the City Council may from time to time by regulation provide.

(d) Nothing contained in this Chapter shall preclude persons from hauling their own solid waste, green waste, or recyclable materials over the streets and rights-of-way of the municipality as the City Council may authorize.

(e) Except for those residences who have opted-out from curbside recycling in accordance with CMC 7.08.030(d), or those residences who have not signed up for green waste collection services in accordance with CMC 7.08.030(e), nothing in this Chapter shall be construed as eliminating the charge made for residential solid waste, green waste, or recyclable collection and disposal service.

Section 3. Severability Clause. If any section, part, or provision of this Ordinance is held invalid or unenforceable, such invalidity or unenforceability shall not affect any other portion of this Ordinance, and all provisions, clauses and words of this Ordinance shall be severable.

Section 4. Effective Date. This Ordinance shall become effective immediately upon publication and posting, or 30 days after passage, whichever occurs first.

PASSED AND ADOPTED BY THE CITY COUNCIL OF CENTERVILLE, STATE OF UTAH, ON THIS 1st DAY OF JUNE, 2021

ATTEST: **CENTERVILLE CITY**

_____ By: _____

Jennifer Hansen, City Recorder Mayor Clark A. Wilkinson

Voting by the City Council:

	"AYE"	"NAY"	"ABSENT"
Councilmember Fillmore	_____	_____	_____
Councilmember Ince	_____	_____	_____
Councilmember Ivie	_____	_____	_____
Councilmember McEwan	_____	_____	_____
Councilmember Mecham	_____	_____	_____

CERTIFICATE OF PASSAGE AND PUBLICATION OR POSTING

According to the provisions of the U.C.A. § 10-3-713, as amended, I, the municipal recorder of Centerville City, hereby certify that foregoing ordinance was duly passed by the City Council and published, or posted at: (1) 250 North Main; (2) 655 North 1250 West; and (3) RB's Gas Station, on the foregoing referenced dates.

_____ DATE: _____

JENNIFER HANSEN, City Recorder

RECORDED this ____ day of _____, 2021.

PUBLISHED OR POSTED this ____ of _____, 2021.

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 12.

Short Title: Glass Collection and Recycling Agreement with Momentum Recycling, LLC

Initiated By: Jason Utgaard, Momentum Recycling, LLC

Staff Representative: Jacob Smith, Administrative Services Director

SUBJECT

Consider Glass Collection and Recycling Agreement with Momentum Recycling, LLC for glass recycling services

RECOMMENDATION

Approve Glass Collection and Recycling Agreement with Momentum Recycling, LLC for glass recycling services.

BACKGROUND

On May 18, 2021, Momentum Recycling, LLC presented a proposal to the City Council to provide glass recycling services within the City. The City Council directed Staff to prepare amendments to the Municipal Code to allow for separate glass recycling services to be provided within the City and to bring back a contract with Momentum Recycling, LLC to provide such services.

ATTACHMENTS:

Description

- Glass Collection and Recycling Agreement - Momentum Recycling, LLC
- ACE Disposal Approval Letter for Glass Recycling
- Curbside Glass Recycling Program - Executive Summary
- Curbside Glass Recycling Program - Overview

GLASS COLLECTION AND RECYCLING AGREEMENT

BETWEEN

CENTERVILLE CITY

AND

MOMENTUM RECYCLING, LLC

THIS GLASS COLLECTION AND RECYCLING AGREEMENT is between CENTERVILLE CITY, a municipal corporation and political subdivision of the State of Utah, herein called the "**City**", and MOMENTUM RECYCLING, LLC, a limited liability company with offices located at 658 South 4050 West, Salt Lake City, UT 84104, herein called "**Contractor**". The City and Contractor may be referred to herein individually as a "**Party**" and collectively as the "**Parties**".

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RECITALS

1. Contractor wishes to provide curbside glass collection for residents within the City who are eligible for the City's waste collection services and who subscribe to the glass collection service ("**Subscriber**"); and

2. The City wishes to provide curbside glass collection and recycling for its residents (the "**Service**"); and

3. Contractor is a sole source local curbside glass collection provider with expertise and specialized equipment for glass collection and recycling; and

4. Contractor currently has the only glass recycling facility in the Salt Lake Valley;

THEREFORE, in consideration of the covenants set forth herein, the Parties agree as follows:

AGREEMENT

1. SCOPE OF SERVICES

The scope of services will include, but is not limited to the following:

a. The City will forward all customer service inquiries to Contractor.

b. Contractor will:

i. Act as the City's agent in providing collection and recycling services for waste glass to each Subscriber once a month, and in otherwise performing Contractor's obligations

under this Agreement. The glass collected from Subscribers will be delivered directly to the Momentum Recycling facility located at 658 South 4050 West, Salt Lake City, UT 84104.

ii. Notify Subscribers as requested and the City once a month of Subscribers' collection day reasonably in advance of such collection day.

iii. Provide and deliver to Subscribers glass collection containers specific to match with Contractor's equipment. Contractor shall own the glass collection containers.

iv. Provide service and/or replacement of damaged glass collection containers.

v. Clean up glass or tipped glass collection containers at Subscriber locations when providing service to Subscribers. When notice is received by either Party of spilled or broken glass at a Subscriber location, Contractor will make reasonable effort to clean up the glass within 24-hours of receiving notice Monday through Friday. If notice is received on Saturday, Contractor will clean up the glass by 5:00 PM MST the following Monday. If Contractor fails to clean up the glass within such time period, the City may do so and Contractor will be pay the City Seventy-Five and No/100 Dollars ($75.00) for each such occurrence.

vi. At the request of the City, provide a report on glass collection tonnage collected from Subscribers.

vii. Provide the City information on routing and collection days.

viii. Provide customer service support to Subscribers including contact information and response.

ix. Provide can to curb assistance for a Subscriber who receives similar assistance with City garbage collection services. For purposes of this subsection, "can to curb assistance" means that Contractor will pick up glass recycling containers that are located on Subscriber's property, visible from the public street and accessible over an unobstructed path to the curb. Contractor will not enter any: (A) structure, including without limitation a residence, garage, shed or other accessory structure outbuilding, or (B) fenced or gated area; or (C) other area that is deemed to be unreasonable by the Contractor, employee or agent.

2. COMMENCEMENT OF SERVICES

Curbside glass collections under this Agreement shall commence on the Effective Date.

3. EFFECTIVE DATE/TERM

This Agreement shall have an Effective Date of **April 1, 2021**, provided that it has been executed by both Parties on or prior to that date. This Agreement shall continue for a term of four years from the Effective Date ("**Initial Term**"). The Agreement will be renewed automatically for up to two additional three-year terms (each a "**Renewal Term**"), unless either Party gives written notice of its intent not to renew the Agreement at least sixty (60) days prior to the expiration of the Initial Term or Renewal Term, as applicable.

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4. FEES AND PAYMENTS

a. The City shall have no financial obligation to Contractor under this Agreement.

b. Contractor is solely responsible to collect all Subscriber fees related to the Service, and will do so without reference to or use of City facilities, personnel, or regulations.

5. INDEPENDENT CONTRACTOR AND TAXES

The relationship of Contractor to the City under this Agreement shall be that of an independent contractor. Each Party shall have the entire responsibility to discharge all of the obligations related to the independent contractor relationship under federal, state, and local law, including but not limited to, those obligations relating to employee supervision, benefits and wages; taxes; unemployment compensation and insurance; social security; worker's compensation; disability pensions and tax withholdings, including the filing of all returns and reports and the payment of all taxes, assessments and contributions and other sums required of an independent contractor. Nothing contained in this Agreement shall be construed to create the relationship between the City and Contractor of employer and employee, partners, or joint venturers.

The Parties agree that Contractor's obligations under this Agreement are solely to the City. This Agreement shall not confer any rights to third Parties unless otherwise expressly provided for under this Agreement.

6. AGENCY

No agent, employee or servant of Contractor or the City is or shall be deemed to be an employee, agent or servant of the other Party. None of the benefits provided by each Party to its employees including, but not limited to, workers' compensation insurance, health insurance and unemployment insurance, are available to the employees, agents, or servants of the other Party. Contractor and the City shall each be solely and entirely responsible for its acts and for the acts of its agents, employees, and servants during the performance of this Agreement. Contractor and the City shall each make all commercially reasonable efforts to inform all persons with whom they are involved in connection with this Agreement to be aware that Contractor is an independent contractor.

7. CITY REPRESENTATIVE

The City Representative who will assist in the administrative management of this Agreement is the City's Public Works Director or designee. The City will notify Contractor of any change in representative for purposes of this Agreement.

8. CONTRACTOR REPRESENTATIVE

Contractor hereby appoints its General Manager as Contractor's representative to work with the City and to coordinate the performance of its obligations under this Agreement. Contractor is authorized to designate another representative at any time by notifying the City of such change.

9. STANDARD OF PERFORMANCE/PROFESSIONALISM

Contractor acknowledges the standard of performance and professionalism required in the performance of its services under this Agreement. Contractor agrees to perform the services under this Agreement consistent with: (a) all applicable laws and regulations; (b) the level of professionalism expected in its industry/profession; and (c) the degree of knowledge, skill and judgment normally exercised by professional firms and individuals with respect to services of a

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similar nature. Further, Contractor, while performing its obligations under this Agreement, will conduct itself in such a manner that will promote the best interests of the City. Contractor will cooperate, and will not interfere, with other agents of the City in collecting, removing, or disposing of garbage and other waste within the City.

10. CONTRACTOR INDEMNIFICATION AND INSURANCE

To the fullest extent permitted by law, Contractor shall indemnify, defend, and hold harmless the City, its elected and appointed officials, employees, and agents from and against any claim, liability, cause of action, or expense (including reasonable attorney and expert fees) arising out of the performance of, or failure to perform, any of Contractor's obligations under this Agreement, including the Service. Contractor shall provide insurance pursuant to the terms of Exhibit A of this Agreement, which is attached hereto and incorporated herein by this reference. Such insurance will name the City, its elected and appointed officials, employees, and agents as additional insureds. Upon request from time to time, Contractor will provide the City a certificate evidencing the insurance required under this Agreement.

11. GOVERNMENTAL IMMUNITY

The City is a governmental entity subject to the Governmental Immunity Act of Utah, Utah Code Ann. §§ 63G-7-101 to -904 (the "**Act**"). The Parties agree that the City shall be liable only within the parameters of the Governmental Immunity Act. Nothing contained in this Agreement shall be construed in any way, to modify the limits of liability set forth in the Act or the basis for liability as established in the Act.

12. CITY INSURANCE

The City represents that it is insured pursuant to the provisions of Utah Law.

13. EARLY TERMINATION

a. Termination for Default. The City may terminate this Agreement for an "Event of Default" as defined below, upon written notice from the City to Contractor.

b. Termination by Contractor for Default. Contractor may terminate this Agreement for an Event of Default, as defined below, upon written notice from Contractor to the City.

c. Event of Default. As used in this Agreement, the term "**Event of Default**" means (a) a Party fails to perform services or any of its material obligations agreed upon herein and such failure continues for a period of 45 (forty-five) days after written notice to such defaulting Party; (b) any material representation or warranty of a Party contained in this Agreement proves to be untrue or incorrect in any material respect when made; or (c) Contractor repeatedly violates cleanup requirements, has repeated customer service problems or fails to continually maintain licensing and insurance.

d. Force Majeure. Neither Party shall be liable for any failure of or delay in the performance of this Agreement for the period that such delay is due to causes beyond its reasonable control, including but not limited to acts of God, war, strikes or labor disputes, embargoes, government orders, fires, floods, unusually severe weather, or any other force majeure event. If such condition continues for a period in excess of 60 days, Contractor or the City shall have the

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right to terminate this Agreement without liability or penalty effective upon written notice to the other Party.

e. No Limitation of Rights. The rights and remedies of the Parties hereto are in addition to any other rights and remedies provided by law or under this Agreement. The Parties agree that the waiver of any breach of this Agreement by either Party shall in no event constitute a waiver as to any future breach.

f. Removal of Glass Collection Containers upon Termination. Contractor shall remove all glass collection containers within sixty (60) calendar days after termination of this Agreement.

14. COMPLIANCE WITH LAWS

Each Party agrees to comply with all applicable federal, state and local laws, rules and regulations in the performance of its duties and obligations under this Agreement. Any violation by Contractor of applicable law shall constitute an Event of Default under this Agreement and Contractor shall be liable for and hold harmless and defend the City, its elected and appointed officials, employees and agents from and against any and all liability arising out of or connected with the violation, to include all attorney fees and costs incurred by the City as a result of the violation. Contractor is responsible, at its expense, to acquire, maintain and renew during the term of this Agreement all necessary permits and licenses required for its lawful performance of its duties and obligations under this Agreement.

15. NON-DISCRIMINATION

Contractor and any agent of Contractor agree that they shall comply with all federal, state and county laws, rules and regulations governing discrimination and they shall not discriminate in the engagement or employment of any professional person or any other person qualified to perform the services required under this Agreement.

16. LABOR REGULATIONS AND REQUIREMENTS

Contractor agrees to comply with all applicable provisions of Title 34 of the Utah Code, and with all applicable federal, state and local labor laws. Contractor shall indemnify, defend and hold harmless the City, its elected and appointed officials, employees and agents from and against any and all claims for liability arising out of any violation by Contractor, its agents or employees of this paragraph or the laws referenced.

17. EMPLOYEE STATUS VERIFICATION SYSTEM

The Status Verification System is an electronic system operated by the federal government, through which an authorized official of a state agency or a political subdivision of the state may inquire by exercise of authority delegated pursuant to 8 U.S.C. § 1373 to verify the citizenship or immigration status of an individual within the jurisdiction of the agency or political subdivision. Contractor is individually responsible for verifying the employment status of only new employees who work under Contractor's supervision or direction and not those who work for another contractor or subcontractor, except each contractor or subcontractor who works under or for another contractor shall certify to the main contractor by affidavit that the contractor or subcontractor has verified, through the Status Verification System, the employment status of each new employee of the respective contractor or subcontractor. Contractor shall comply in all respects with the provisions of Utah Code Ann. § 63G-12-302. Notwithstanding any provision of this

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Agreement to the contrary, Contractor's failure to so comply may result in the immediate termination of this Agreement.

18. CONFIDENTIALITY

Contractor shall hold all information provided to it by the City for the purposes of its performance of this Agreement, whether provided in written or other form, in strict confidence, shall make no use thereof other than for the performance of the Agreement, and shall not release any of said information to any third Party, any member of Contractor's firm who is not involved in the performance of services under this Agreement, or to any representative of the news media without prior written consent of the City. Materials, information, data, reports, plans, analyses, budgets and similar documentation provided to or prepared by Contractor in performance of this Agreement shall also be held confidential by Contractor. The City shall have the sole obligation or privilege of releasing such information as required by law. City agrees to take all necessary precautions to protect all information or data relating to Contractor's (a) service fees, operations and sale techniques; (b) business partners, service providers, affiliate, and other information related to Contractor's partners; (c) policies, procedures, and business plans; and (d) internal systems owned by Contractor. The Parties agree not to divulge the terms of this Agreement and related documentation, except as required by law.

19. GOVERNMENT RECORDS ACCESS MANAGEMENT ACT

Notwithstanding the foregoing, Contractor acknowledges that the City is a governmental entity subject to the Utah Government Records Access and Management Act ("**GRAMA**"), Utah Code Ann. §§ 63G-2-101 to -901. As a result, the City is required to disclose certain information and materials to the public, upon request. Contractor agrees to timely refer all requests for documents, materials and data in its possession relating to this Agreement and its performance to the City's Representative for response by the City.

Generally, any document submitted to the City is considered a "**public record**" under GRAMA. Any person who provides to the City a record that the person believes should be protected under Utah Code Ann. §§ 63G-2-305(1) or (2) shall provide both: (1) a written claim of business confidentiality and (2) a concise statement of reasons supporting the claim of business confidentiality. Contractor acknowledges that GRAMA only protects against the disclosure of trade secrets or commercial information that could reasonably be expected to result in unfair competitive injury.

20. ASSIGNMENT

Contractor shall not assign or transfer its duties of performance nor its rights to compensation under this Agreement, without the prior written approval of the City, which shall not be unreasonably withheld. The City reserves the right to assert any claim or defense it may have against Contractor and against any assignee or successor-in-interest of Contractor.

21. SUBCONTRACTING

Contractor agrees that it shall not subcontract to provide any of the services under this Agreement or execute performance of its obligations under this Agreement without prior express written consent of the City. Contractor acknowledges that the services provided under this Agreement are strictly optional for residents of the City. Contractor agrees that the use of coercion or undue pressure placed on residents to sign up shall be prohibited.

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22. NOTICES

All notices to be given under this Agreement shall be made in writing and shall be deemed given upon personal delivery, upon the next business day immediately following the day sent if sent by overnight express carrier, or upon the third business day following the day sent if sent postage prepaid by certified or registered mail, return receipt requested, to the Parties at the following addresses (or to such other address or addresses as shall be specified in any notice given):

CITY: Centerville City Public Works Director
250 N. Main Street
Centerville, Utah 84014

CONTRACTOR: John Lair, President
658 South 4050 West
Salt Lake City, Utah 84104

23. GOVERNING LAW

It is understood and agreed by the Parties hereto that this Agreement shall be governed by the laws of the State of Utah, both as to interpretation and performance. All actions, including but not limited to court proceedings, administrative proceedings, arbitration and mediation proceedings, shall be commenced, maintained, adjudicated and resolved within the jurisdiction of the State of Utah.

24. COUNTERPARTS

This Agreement may be executed in several counterparts and all so executed shall constitute one agreement binding on all the Parties, notwithstanding that each of the Parties are not signatory to the original or the same counterpart. Further, executed copies of this Agreement delivered by facsimile shall be deemed an original signed copy of this Agreement.

25. SEVERABILITY

The City and Contractor agree that, whenever possible, each provision of this Agreement shall be interpreted in such a manner as to be consistent and valid under applicable law; but if any provision of this Agreement shall be invalid, prohibited or unenforceable under applicable law, such provision shall be ineffective to the extent of such invalidity or prohibition, without invalidating the remainder of such provision or the remaining provisions of this Agreement.

26. ENTIRE AGREEMENT/AMENDMENT

Except for Contractor's proposals and submitted representations for obtaining this Agreement, this Agreement supersedes any other agreements, either oral or in writing, between the Parties with respect to the rendering of services, and contains all of the covenants and agreements between the Parties with respect to said services. Any modifications of this Agreement will be effective only if it is in writing and signed by the Parties.

[Signatures on following page.]

DRAFT

IN WITNESS WHEREOF, the Parties execute this Agreement the day and year recited above.

CENTERVILLE CITY

By:_____
Mayor Clark Wilkinson Date

ATTEST:

_____
City Recorder

APPROVED AS TO LEGAL FORM:

_____
Legal Counsel for the City

MOMENTUM RECYCLING, LLC

By:_____
John Lair, President Date

ACKNOWLEDGEMENT

STATE OF _____)
:ss
County of _____)

On this ____ day of _____, 20__, personally appeared before me, John Lair, who being by me duly sworn did say that he is the President of Momentum Glass Recycling, LLC, by authority of its members or its articles of organization, and he acknowledged to me that said limited liability company executed the same.

_____
NOTARY PUBLIC

My Commission Expires: _____
Residing in _____ County, Utah

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EXHIBIT A

Contractor's Insurance

- Commercial General Liability Limits:
    a. Each Occurrence: $1,000,000.00
    b. Damage to Rented Premises: $100,000.00
    c. Med Exp (any one person): $10,000.00
    d. Personal & Adv Injury: $1,000,000.00
    e. General Aggregate: $2,000,000.00
    f. Products- Comp/CP AGG- $2,000,000.00
- Automobile Liability Limits:
    a. Combined Single Limit: $1,000,000.00
- Umbrella Liability Limits:
    a. Each Occurrence: $2,000,000.00

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ACE Recycling & Disposal
Family Owned & Operated Since 1980

January 25, 2021

Subject: Curbside Glass Recycling Program Provided by Momentum Recycling

Dear City Manager Hanson:

I am writing you today to express support of the **curbside glass recycling program** provided by Momentum Recycling.

On behalf of Ace Recycling & Disposal, and as the City's existing contractor for residential waste & recycling services, we support Momentum Recycling expanding their residential glass collection service into the City.

Ace Disposal does not have any interest in hauling the glass from resident's homes, and we anticipate Momentum will contract directly with the homes. Keeping the glass separated from mixed recyclables is critical to our recycling processors. Momentum provides a good service for the community and Utah's recycling objectives.

Should you have any questions regarding Momentum Recycling's service being performed alongside our existing services, please feel free to contact me at any time.

Kind regards,

Dawn Beagley
Director of Municipal Sales
dawnb@acedisposal.com

MOMENTUM RECYCLING
www.MomentumRecycling.com
info@momentumrecycling.com
658 S 4050 W, SLC, UT 84104
(801) 355-0334

Brant Hanson
250 N. Main Street
Centerville, UT 84014

January 29, 2021

RE: Curbside Glass Recycling Program

Dear City Manager Hanson:

I am writing you today to notify you of our plan to expand **curbside glass recycling** into Centerville in 2021 (forecasted commencement in March).

As Utah's only glass recycling facility, Momentum Recycling collects & processes thousands of tons of glass every year from throughout the region. Not only is this glass diverted from local landfills, but the high-quality end product is used by local industries as well – creating a circular economy for our state.

Since partnering with Salt Lake City to launch the first curbside glass recycling program in Utah back in 2012, we have since expanded the program to numerous other cities – including Millcreek, Murray, Holladay, Cottonwood Heights, Taylorsville, Sandy, Draper and Park City. Momentum Recycling now services 10,000+ households along the Wasatch Front.

About the Service:
Interested residents will be able to sign up on our website for a monthly glass collection service for only $8/month. As part of the service, they will receive a small, portable curbside cart with wheels & lid to collect their glass (a one-time $25.00 activation fee is applied upon signup to make & deliver the bin to their home). All colors of glass are accepted, and the resident does not need to rinse their glass containers or remove labels. The service is month-to-month, so the resident can cancel at any time.

Benefits to Centerville:
Did you know? – The EPA estimates that 68.9 pounds of glass per person are generated each year. Given Centerville's population, that is 1,219,530 pounds a year!

Reduce Waste Disposal Costs: In terms of weight, glass makes up about 5% of the waste stream. Removing glass from the City's waste stream means savings on landfill tipping fees.

Extend Landfill Life: By diverting glass from the landfill, the capacity of the landfill is extended.

Satisfy Residential Demand: Momentum Recycling increasingly receives expressions of interest from residents via our website to offer more glass recycling in Centerville.

City Code:
Existing City Code **7.08 – Solid Waste & Recycling** appears to prohibit residents from opting in for the service. Specifically, the code **(1)** defines glass under "garbage, rubbish and trash," and **(2)** says the collection of waste & recyclables can only be performed by the City, its agent or contractor.

Proposal:
Centerville contracts Momentum Recycling to provide the identical glass recycling collection service as we currently provide in neighboring cities. The City would have no financial obligations and no administrative responsibilities associated with the service. We can provide a draft agreement for the City's review.

- Ace Disposal: as the City's existing contractor for residential waste & recycling services, Ace Disposal **fully supports** Momentum Recycling expanding our service into the City.

In summary, our mission is to help communities move towards zero waste. Expanding the curbside glass collection service to residents of Centerville moves us all one step closer to achieving that goal. Should you have any questions regarding Momentum Recycling or any of our services, please feel free to contact me at any time.

Kind regards,

Jason Utgaard
General Manager, Momentum Recycling
jason@momentumrecycling.com
(801) 335-6501

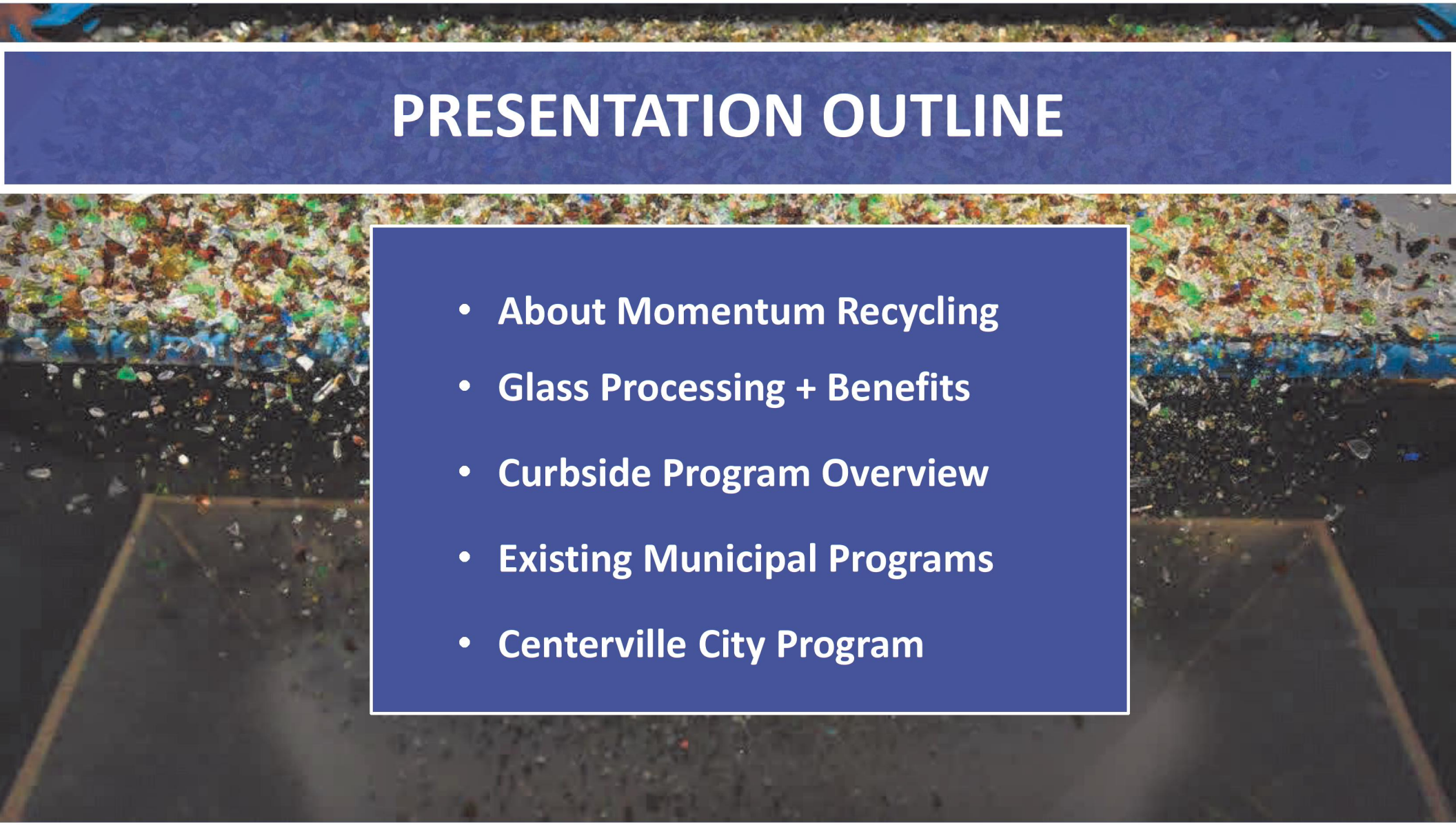
Curbside Glass Recycling Program

Prepared For: Brant Hanson, City Manager

Date: April 13th, 2021



PRESENTATION OUTLINE



- About Momentum Recycling
- Glass Processing + Benefits
- Curbside Program Overview
- Existing Municipal Programs
- Centerville City Program



Family-owned business founded in 2008 in Salt Lake City.

Started initially as only a recycling hauler.





Built a glass recycling plant in response to community need.





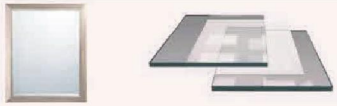
Serve 800+ Commercial and 10,000+ Residential Customers.

What Glass Is Accepted?

MOMENTUM RECYCLING

GLASS RECYCLING

MOMENTUM RECYCLING

YES	NO
 All Sizes + COLORS of Glass	 Ceramic • Porcelain
 Bottles • Drinkware	 Caps/Lids • Corks
 Food & Condiment Containers	 Mirrors • Glass with Coatings/Laminates
 Plate Glass (windows)	 Light Bulbs

FOR MORE INFORMATION: (801) 355-0334 • info@momentumrecycling.com • www.MomentumRecycling.com

Consumable Foods in Glass

Beverages


Alcoholic Beverages


Juice


Soda


Sparkling Water

Condiments


BBQ Sauce


Honey


Hot Sauce


Jam / Jelly


Ketchup & Mustard


Mayonnaise


Peanut Butter


Salad Dressing


Salsa


Soy Sauce


Syrup

Jar Foods


Baby Food


Fruits


Nuts


Vegetables

Oils & Vinegars


Essential Oil


Olive Oil


Vinegar


Misc. Oils

Sauces & Spices


Applesauce


Pasta Sauce


Salt & Pepper


Misc. Spices

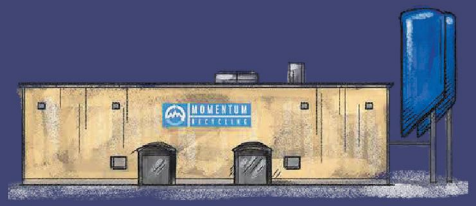
What Happens To The Glass?

Transported



We bring the glass to our Salt Lake City glass recycling facility.

Processed Locally



Glass is processed into “cullet” to be used by local industries.

Multiple End Uses



Most of the recycled glass is sent to southern Utah to be made into fiberglass insulation. The rest is used for abrasives or bottle-making.



Take a tour!

See the process up close: schedule a visit if you are in the area or let’s coordinate a time for a virtual tour.

Uses for Recycled Glass

MOMENTUM RECYCLING



Fiberglass Insulation



Sandblasting Media



Bottle Making

Glass Recycling is Good for Utah!



Creates
Local Jobs



Cuts Waste
Disposal Costs



Saves
Energy



Reduces CO_2
Emissions



Glass Is Endlessly
Recyclable

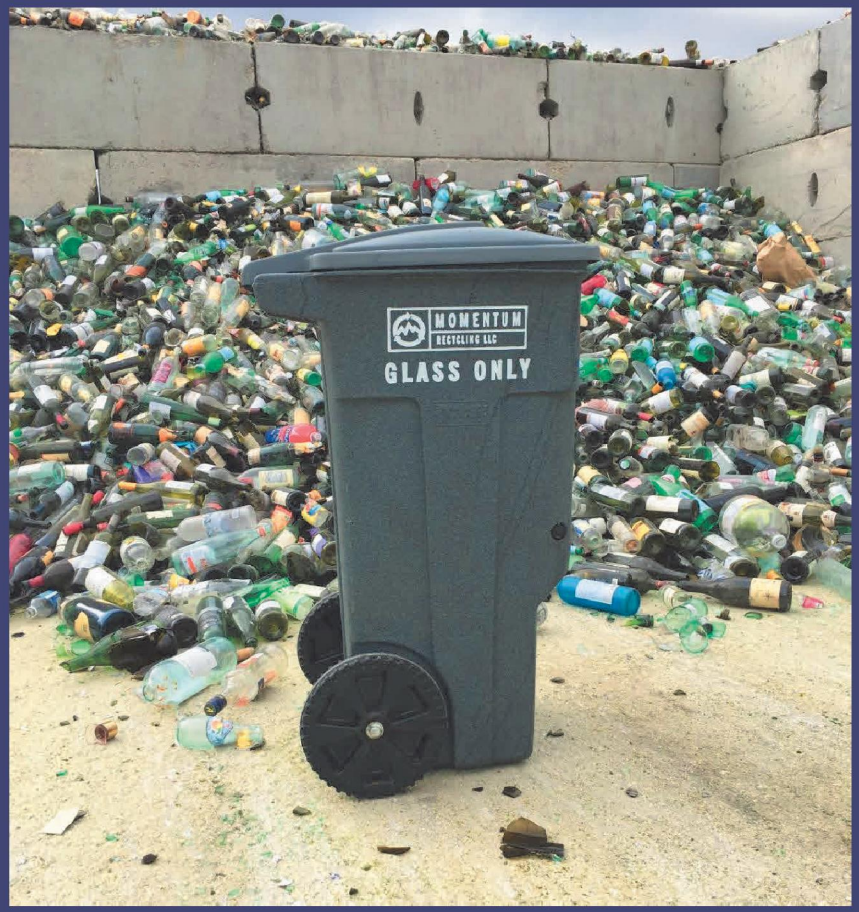


Stretches Tax $ By
Extending Landfill Life



Conserves
Raw Materials

Curbside Glass Recycling – Program Overview



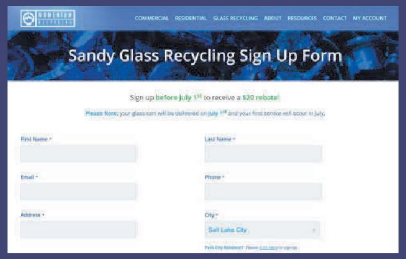
1. Program Model
2. Existing Programs
3. Centerville City Program



Program Model – How Does It Work?

MOMENTUM RECYCLING

Sign Up Online



Residents signup on Momentum's website.
(Opt-In Service)

Select Reminder



Download the mobile app, or set a phone, text or email reminder.

Receive Bin



35G cart* is delivered to the resident's home within 7-10 days.

Monthly Service



Momentum collects their glass on the same day each month.

Month-to-Month: No Contract
Convenient: Billed directly via Momentum Recycling

***Cart Dimensions:** 38" H **x** 20" W **x** 24" D



Program Model – Dedicated Signup Page

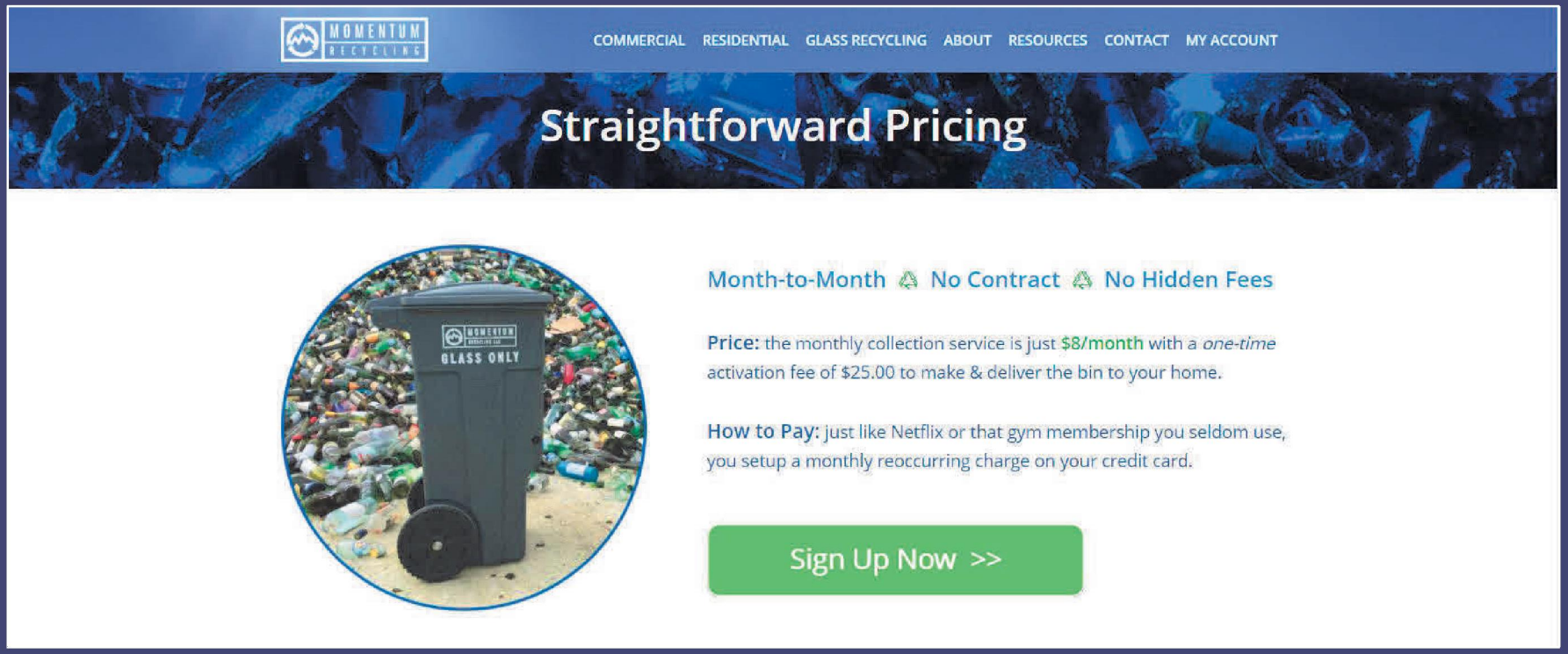
Website → https://utah.momentumrecycling.com/centerville





Program Model – Pricing

$8.00 / month with a *one-time* activation fee of $25.00





Program Model

Provided to residents at no cost to the City.

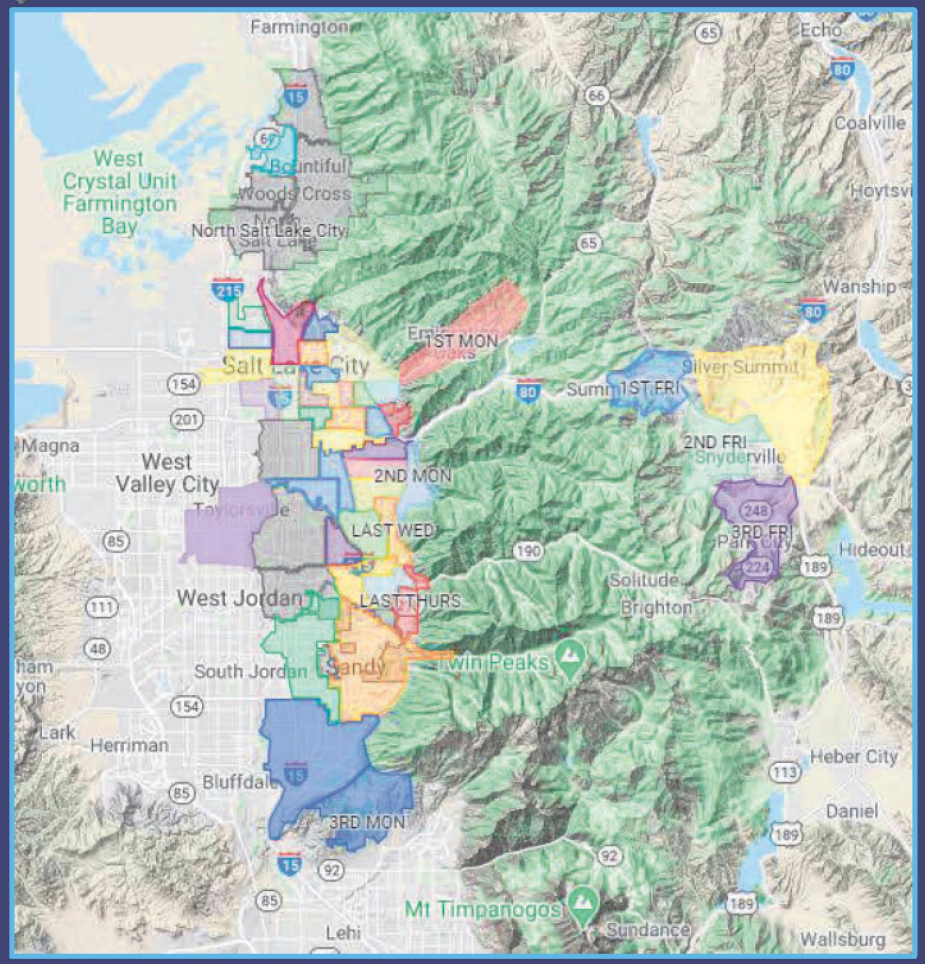
Momentum Recycling covers all administrative and financial costs associated with the program.

Cost	Description
Route Performance:	Labor, Fuel, Maintenance, Insurance
Billing:	Processing, General Inquiries
Bin Maintenance:	Delivery, Removal & Replacement
Customer Service:	Missed Pickups, Misc. Inquiries

Existing Curbside Programs

10,000+ Customers

MOMENTUM RECYCLING



Existing Cities (11)

- Alta
- Cottonwood Heights
- Draper
- Emigration Canyon
- Holladay
- Millcreek
- Murray
- Park City
- Salt Lake City
- Sandy
- Taylorsville

2021 Expansion Cities (7)

- ✓ Bountiful
- → Centerville
- ✓ Midvale
- North Salt Lake
- South Salt Lake
- ✓ West Bountiful
- Woods Cross

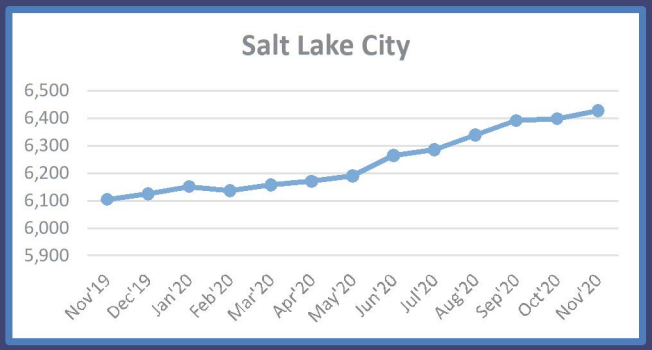


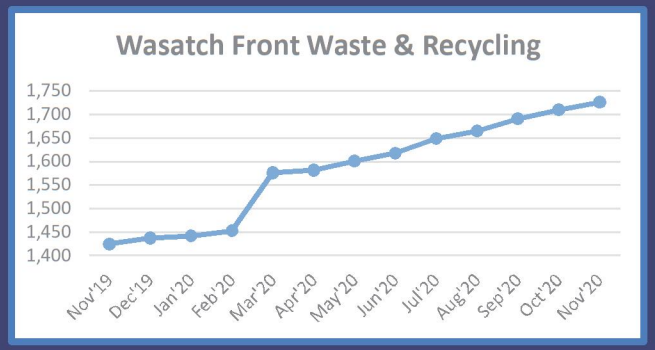
Existing Programs – Steady MoM Growth

MOMENTUM RECYCLING

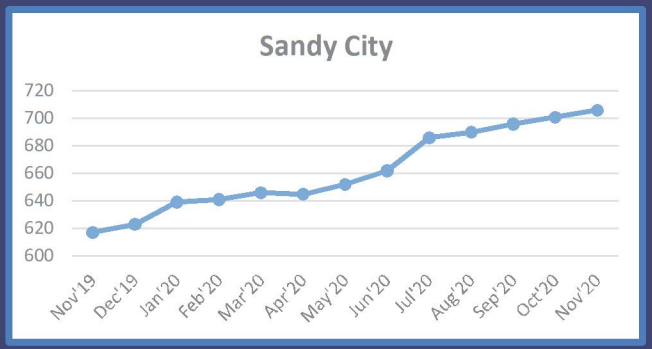
Nov. 2019 – Nov. 2020

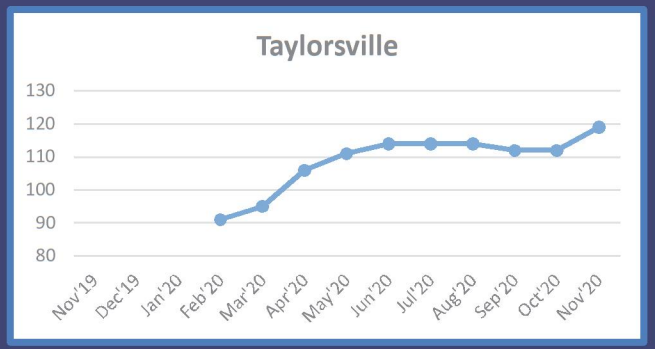
(as of November 30th, 2020)

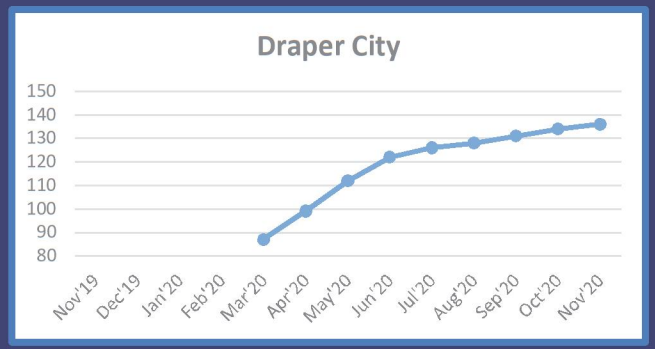














Existing Programs – Structure

	SLCgreen	Wasatch Front Waste & Recycling District	Sandy – Heart of the Wasatch	City of Centerville, Utah – Friendly City Beside The Great Salt Lake – 1848
	Est. 2012	Est. 2015	Est. July 1st, 2019	New Program
Monthly Fee:	$7.00	$8.00	$8.00 →	$8.00
Activation Fee (bin):	-	$45.00	$25.00 →	$25.00
Households (serviceable):	39,839	42,684	28,300	5,632
Subscribers (as of 1-4-21):	6,434	1,781	722	50*
Participation Rate:	16.15%	4.17%	2.55%	~1.00%
Route Performance:	Momentum Recycling	Momentum Recycling	Momentum Recycling	Momentum Recycling
Billing:	SLCgreen	Wasatch Front	Sandy	Momentum Recycling
Bin Maintenance:	Momentum Recycling	Wasatch Front	Momentum Recycling	Momentum Recycling
Customer Service:	Momentum Recycling, SLCgreen	Momentum Recycling, Wasatch Front	Momentum Recycling, Sandy	Momentum Recycling

* We already have 13 leads in our system from website submissions by interested residents.



Program Model – Forecast

Centerville City	
Households (serviceable):	5,632
Subscribers (forecast):	**80 – 120**
Participation Rate (at launch):	0.50 – 1.00%

Our initial target is ~50 subscribers when we initially launch the service in May/June 2021.

With the City's support in promoting the program to residents (i.e. newsletter, social media, etc.), we think this could be as high as 100+ subscribers.



Program Model – Other Considerations

MOMENTUM RECYCLING



Residents Love It!

The service's fan base is widespread along the Wasatch Front.

↑ Population = ↑ Glass

Centerville's population is increasing, which increases glass:

~17,400 people **x** 70 lbs glass/yr **=** 609 tons/yr (1,218,000 lbs/yr)

Indirect Cost Savings

The City should realize some cost savings via reduced landfill tipping fees by removing heavy glass from the landfill stream along with helping to extend the life of its current landfill.


How to Implement
GLASS RECYCLING
in the City

Proposed Next Steps

Step #1

Review proposed amendments to Chapter 7 of the City's code.

Step #2

Assess contracting Momentum Recycling as City's authorized agent for glass recycling.

City Code

Chapter 7.08 – Solid Waste & Recycling

Existing City Code prohibits residents from opting in for curbside service.

Momentum Recycling's curbside glass recycling service is desired by residents and beneficial in helping Centerville City reduce its landfill-bound waste, yet existing City Code does not technically allow for the service to be provided directly to residents.

Let's look at two (2) proposed amendments to the City Code →

https://centerville.municipalcodeonline.com/book?type=ordinances#name=7.08_Solid_Waste_And_Recycling

City Code

Chapter 7.08 – Solid Waste & Recycling

Proposed Amendment #1

7.08.010 Definitions:

(h) "Garbage, Rubbish and Trash. All solid waste except hazardous waste, including but not limited to combustibles such as paper, wood, yard trimmings, etc., and non-combustibles such as metal, glass, stone, etc.."

Proposal: Reclassify "glass" as one of the "Recyclable Materials" listed in (l).

City Code

Chapter 7.08 – Solid Waste & Recycling

Proposed Amendment #2

7.08.020 Collection Of Solid Waste, Green Waste And Recyclable Materials:

(a). "The City, or its agent, shall collect, remove and dispose of all residential garbage, the removal of which is not otherwise provided for by the establishment or institution hereunder provided. All garbage and refuse shall be collected, removed and disposed of with such frequency and in such manner as the City Council may from time to time establish by regulation."

Proposal: Authorize Momentum Recycling as approved agent for glass recycling collection.

Contract Momentum Recycling

Service Agreement – General Terms:

City contracts Momentum Recycling (MR) as authorized agent to perform the monthly glass recycling collection service as MR currently provides in neighboring cities.

The agreement clearly states that the City has no financial obligations and no administrative responsibilities associated with the service. Furthermore, it does establish requirements of MR to safeguard the City and its interests – such as:

1. Standard of Performance & Professionalism
2. Indemnification + Insurance Requirements
3. Reporting on Diversion Data (tonnage collected)
4. Guaranteeing Can-to-Curb Assistance for the Disabled
5. Cleaning Up Spilled or Broken Glass
6. Ensuring Glass Collected is Responsibly Recycled
7. Non-Discrimination, Labor Regulations & Requirements
8. Etc.

Draft Agreement: Momentum Recycling has included a Draft for the City's review.

Ace Disposal Endorsement

Momentum Recycling has the full support of Ace Recycling & Disposal, the City's existing contractor for residential waste & recycling services:

ACE Recycling & Disposal
Family Owned & Operated Since 1980

January 25, 2021

Subject: Curbside Glass Recycling Program Provided by Momentum Recycling

Dear City Manager Hanson:

I am writing you today to express support of the curbside glass recycling program provided by Momentum Recycling.

On behalf of Ace Recycling & Disposal, and as the City's existing contractor for residential waste & recycling services, we support Momentum Recycling expanding their residential glass collection service into the City.

Ace Disposal does not have any interest in hauling the glass from resident's homes, and we anticipate Momentum will contract directly with the homes. Keeping the glass separated from mixed recyclables is critical to our recycling processors. Momentum provides a good service for the community and Utah's recycling objectives.

Should you have any questions regarding Momentum Recycling's service being performed alongside our existing services, please feel free to contact me at any time.

Kind regards,

Dawn Beagley
Director of Municipal Sales
dawnb@acedisposal.com

Next Steps…



Taylorsville Mayor + Councilmembers touring Momentum Recycling's facility.
(Pre-COVID: February 18th, 2020)

(1) Assess Proposed Code Amendments

- We simply wish to ensure our service is within Code.

(2) Review Contract

- We are open to any proposed edits by the City.

(3) Tour Momentum Recycling's Facility {optional}

- We are happy to host a tour for City Staff + Councilmembers.

(4) Co-Promote Launch of Curbside Program

- Newsletter, press release, social media, etc.

THANK YOU!



MOMENTUM RECYCLING

Jason Utgaard
General Manager
(801) 335-6501
jason@momentumrecycling.com

Momentum Recycling
658 S 4050 W
Salt Lake City, UT 84104
(801) 355-0334
https://utah.momentumrecycling.com

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 13.

Short Title: Minutes Review and Acceptance

Initiated By:

Staff Representative:

SUBJECT

May 18, 2021 Work Session Minutes
May 18, 2021 Regular Session Minutes

RECOMMENDATION

Accept May 18, 2021 Work Session Minutes and May 18, 2021 Regular Session Minutes

BACKGROUND

ATTACHMENTS:

Description

- 05-18-2021 CC Minutes
- 05-18-2021 WS Minutes

Minutes of the Centerville **City Council** meeting held Tuesday, May 18, 2021, at 7:00 p.m. with participants present at Centerville City Hall, 250 North Main Street, Centerville, UT, and electronically via Zoom.

MEMBERS PRESENT

Mayor	Clark Wilkinson
Council Members	Tamilyn Fillmore William Ince Stephanie Ivie George McEwan Robyn Mecham
STAFF PRESENT	Brant Hanson, City Manager Lisa Romney, City Attorney Jennifer Hansen, City Recorder Cory Snyder, Community Development Director Kevin Campbell, City Engineer Mackenzie Wood, Assistant Planner Bruce Cox, Parks and Recreation Director Jacob Smith, Administrative Services Director
VISITORS	Dane Stone, South Davis Metro Fire Chief Jason Utgaard, Momentum Recycling Interested Citizens
PRAYER OR THOUGHT	Councilmember Ince

PLEDGE OF ALLEGIANCE

OPEN SESSION

Don Barton, Logan City resident – Mr. Barton said he was born and raised in Centerville and hoped to live in Centerville again in the future. He referred to a City ordinance prohibiting installation of monument stones in the City Cemetery until burial sites were opened. Mr. Barton said he and his wife had a monument stone made last year for their cemetery space, and were then informed of the ordinance. He described costs involved in purchasing and installing monument stones, and commented that costs associated with installation may increase over time. Mr. Barton said he sent a letter to the City for consideration.

PUBLIC HEARING – ZONE MAP AMENDMENT – PASTURE BUSINESS PARK

Assistant Planner Mackenzie Wood explained that applicants had purchased a parcel of land from UDOT adjacent to their current parcel in Shorelands Commerce Park. She said the intention was to combine the new parcel with their current parcel in order to use it in Phase 3 of development. In order for the applicants to use the land, Parcel 06-003-0055 needed to be zoned into the Shorelands Commerce Park. On April 28, 2021, the Planning Commission voted to recommend approval for the Zone Map Amendment for Parcel 06-003-0055.

Mayor Wilkinson opened a public hearing at 7:13 p.m., and closed the public hearing seeing that no one wished to comment. Councilmember McEwan **moved** to adopt Ordinance No. 2021-13. Councilmember Ivie seconded the motion, which passed by unanimous vote (5-0).

FIREWORKS RESTRICTION AREAS

The City was authorized by State law to prohibit the discharge of fireworks in restricted areas. In order to enforce these restrictions, the City was required to provide a map of the restricted area and to make a finding that the historical hazardous environmental condition had existed in the defined area before July 1 of at least two of the preceding five years. South Davis Metro Fire Chief Dane Stone stated he did not propose changes to the previously adopted fireworks restrictions and map, and answered questions from the Council.

Councilmember McEwan said he was interested in requiring that all fireworks retailers in the City display the restriction map where fireworks were sold, and asked Staff to find out if the State had such a requirement. The Mayor suggested displaying restriction maps of surrounding cities as well.

MOMENTUM RECYCLING PRESENTATION – GLASS RECYCLING

Jason Utgaard with Momentum Recycling gave a presentation about glass recycling and the Momentum curbside glass recycling program. He proposed an optional curbside program that would cost Centerville residents $8.00 per month with a one-time $25.00 activation fee. Mr. Utgaard explained two amendments to City Code that would be needed to begin curbside glass recycling in Centerville. Responding to a question from Councilmember McEwan, Mr. Utgaard explained water was not used in their recycling process.

Mr. Utgaard explained that a bulk glass collection pod for community collection, usually placed on municipal property, would cost $700 to place and $40 for each pick-up. Councilmember McEwan expressed interest in providing both curbside and bulk collection options. Councilmember McEwan **moved** to direct Staff to move forward with drafting appropriate ordinance changes to be presented to the Council during the month of June. Councilmember Mecham seconded the motion, which passed by unanimous vote (5-0). Mr. Utgaard commented that some neighbors or cul-de-sacs shared a glass recycling can between them. The Council discussed the possibility of requiring a glass recycling pod in multi-family developments. Councilmember Ince **moved** to instruct Staff to look into the possibility of requiring a glass recycling pod wherever possible in multi-family developments. Councilmember McEwan seconded the motion, which passed by unanimous vote (5-0).

UDOT FEDERAL AID AGREEMENT – PARRISH LANE INTERSECTIONS AT 400 WEST AND MARKETPLACE DRIVE

Staff applied for and obtained tentative approval to receive federal funding for improvements to the Parrish Lane intersections at 400 West and Marketplace Drive. Pursuant to federal regulations, UDOT had the responsibility to oversee federal aid projects. City Engineer Kevin Campbell explained the proposed UDOT Federal Aid Agreement described the respective roles and requirements of UDOT and the City to ensure compliance with the federal requirements for receipt of federal funding for the project. Under the terms of the Agreement, the total estimated project cost was $3,667,100. The City would be required to match federal funds in the amount of $387,060. Mr. Campbell said the hope was for construction to take place summer of 2022.

Councilmember Fillmore **moved** to approve the UDOT Federal Air Agreement. Councilmember Ince seconded the motion, which passed by unanimous vote (5-0).

BID AWARD – STREET REBUILD PROJECT #20-144 – 400 EAST (CHASE LANE TO PARRISH LANE)

Mr. Campbell stated seven bids were received for the 400 East (Chase Lane to Parrish Lane) Street Rebuilt project. He recommended the Council award the project to Post Asphalt. Councilmember Fillmore **moved** to award the 400 East project to Post Asphalt in the amount of $573,847.50. Councilmember McEwan seconded the motion, which passed by unanimous vote (5-0).

MASTER PLAN FOR WILLIAM R. SMITH PARK AND CITY HALL

In light of the recent purchase by the City of the Randall Property located at 285 North 100 East, Staff recommend reviewing the existing Master Plan for the William R. Smith Park and City Hall. Parks and Recreation Director Bruce Cox explained that the existing Master Plan showed the newly acquired property becoming additional open park space. He asked for Council input regarding whether the Master Plan needed to be updated or revised.

Responding to a question from Councilmember McEwan about the existing Ron Randall service station and its status on the historic register, Mr. Cox explained the historic status would not prevent the City from removing the building and placing a nice historic marker on the property. Mr. Cox expressed the opinion the City would benefit more from additional open park space than from a historic refurbished service station. Councilmember McEwan said he disagreed, and expressed the opinion that something would be lost from the character of the area if the service station were removed. Councilmembers Ince and Mecham expressed agreement with Councilmember McEwan. City Manager Brant Hanson commented that the City did not currently own the Ron Randall service station property, and may not want to acquire the property if historic preservation were the goal. He suggested a private party may be interested in acquiring the historic property.

Councilmember Fillmore suggested using the newly acquired Randall property as community garden space. Mr. Hanson asked the Council to consider the future of 4th of July celebrations and the need for more open park space. Mr. Cox added that the Randall property the City acquired would not be ideal for garden space because of boulders and rocks on the property. Councilmember Mecham said she agreed with the idea of putting down irrigation and grass to extend open park space for now. Mr. Cox said he believed the space could be a great continuation of the City Hall campus blending into Smith Park. Councilmember McEwan said he could agree with putting down grass on the newly acquired property, but wanted to make sure the Council revisited the Master Plan soon to make sure the alignment issue involving the service station property was resolved. Councilmember Ivie commented the need to update the Master Plan was urgent, and suggested Whitaker Museum representatives should be involved.

City Attorney Lisa Romney explained that changes to the Master Plan for the area would require a General Plan amendment. She recommended the Council allow Staff to move forward with irrigation and lawn on the newly acquired property, and schedule work sessions and budget funds to reevaluate the Master Plan.

Councilmember McEwan **moved** to direct Staff to proceed with putting in sprinkling systems and grass on the newly acquired property, and further direct Staff to prepare a budget for a Master Plan amendment for the park, and ordinance amendment for the General Plan, to bring back to the Council as a work session item in June. Councilmember Mecham seconded the motion. Mr. Hanson suggested increasing the budgeted amount for General Plan amendments by $30,000.

Councilmember Fillmore said she was in favor of the sentiment of the motion, but said she had been interested for a long time in creating a cohesive plan to beautify that whole area of Main Street. She said she would want the Master Plan for City Hall and Smith Park to be part of the bigger Main Street design plan, which the current Council chose to take off the table. Councilmember McEwan suggested the plan for the Smith Park and City Hall area could be developed as a "crown jewel" of a bigger design plan that could be completed at a later time. Councilmember Fillmore said she hoped the Council would keep the need for a bigger design plan in mind. Councilmember McEwan said he agreed all stakeholders should be involved in discussions. Mr. Hanson cautioned against tapping into General Fund balance for the project.

The motion passed by unanimous vote (5-0).

TRUTH-IN-TAXATION

On May 4, 2021, the Council approved a motion to direct Staff to prepare for the Truth-in-Taxation process. Staff prepared various scenarios and possible infographics as options to ensure the public were informed through various means. Mayor Wilkinson expressed the opinion it would be difficult to convince citizens of the need for a property tax increase in FY2022.

Councilmember Fillmore commented that the previous property tax increase in 2017 was not high enough to catch the City up to where it had been 20 years before, and the City was still very behind. She said she believed a property tax increase could be justified solely on the need for road maintenance. Councilmember Mecham said she could not tell citizens the City needed a property tax increase considering the pandemic-related funds received from the federal government. Councilmember Mecham commented that Staff were not pushing for a property tax increase. Councilmember McEwan pointed out that use of the pandemic-related funds was restricted. He spoke of on-going needs, rising construction costs, and rising labor costs. He commented that the pandemic-related funds could help fill one-time needs the City had been putting off, but could not help with on-going long-term needs. Councilmember McEwan said he was concerned the City would get behind again, and even further behind, because of all the external pressures. He said he agreed with Councilmember Fillmore that road maintenance alone would justify a property tax increase. Councilmember Mecham said she wanted to wait and see what happened, and maybe consider an increase in two years.

Councilmember Ince said he was concerned the City was not keeping up with inflation, and said the Council needed to implement some increase to keep up with inflation in the long-run. He suggested an increase of 14.5% in FY2022. He said citizens he had spoken with were not opposed to an increase when he explained the situation. Councilmember Ivie said she did not disagree that inflation was going up, and did not disagree the City would need the funds in the future, but said she could not tell citizens she was increasing their property tax this year because it would be needed next year. Councilmember McEwan responded the City was already not meeting needs and was already behind. Councilmember Ivie said she did not think the City was behind enough. Councilmember McEwan commented citizens still expected the City to provide services, and said he did not believe prices were going to drop. He acknowledged that many citizens were on fixed incomes, but stated that critical services needed to be provided. Councilmember Ivie said the key word was "critical", said the City had had the luxury of providing more than critical services, and suggested that was not the right direction. She stated she could not approve a property tax increase at that time. Councilmember McEwan responded that a community needed to reinvest in itself or the quality of the community would drop and the community would suffer as a whole.

Mr. Hanson spoke of increasing on-going costs. Councilmember Fillmore commented that the quality of a physical environment had an effect on policing. She said there was data showing

that maintained roads and beautified streetscapes helped reduce crime. Mayor Wilkinson added that providing recreation opportunities also contributed to reduced crime. Responding to a question from Councilmember Ince, Mr. Hanson stated a balanced FY2022 Budget was presented to the Council, and adding $30,000 into the Budget for the City Hall/Smith Park Master Plan would require removing $30,000 from something else. Mr. Hanson and Administrative Services Director Jacob Smith answered questions about American Rescue Plan Act (ARPA) funds. Mr. Hanson stated an increase in revenues (property tax increase) would allow the City to expand services and meet needs. He said he agreed the City was still trying to catch up from 2009. Mr. Hanson said he supported using a portion of ARPA funds to recognize City employees and show appreciation with a one-time bonus. Councilmember Mecham said she could support a one-time employee bonus, but could not support an employee bonus in addition to a property tax increase. Mr. Hanson stated Centerville compensation was low compared to neighboring cities, which was reflected in the quality of applicants to fill City positions.

Nate Plazier, the City's new Finance Director, said in his experience working for Murray City they were insistent that one-time revenues like the ARPA funds should only be used for one-time expenses. He commented that salary increases were on-going expenses. Regarding property tax increases, he said he had received feedback from Murray residents in the past in favor of more frequent smaller increases rather than less frequent large increases.

Councilmember McEwan said he believed a 20% increase would be easier to explain to citizens than a 14.5% increase. Councilmember Fillmore said she agreed. She said she favored the approach of smaller, more frequent increases. She stated it was about inflation and providing services at the same level they currently were. Councilmember McEwan commented that a 20% increase would provide the City a small amount above inflation for a buffer. Councilmember Ince said he preferred a 14.5% increase. Mr. Hanson explained that a 14.5% increase would put the City back where it was in 2017 in terms of property tax revenue, but would not account for inflation since then.

Councilmember Ince **moved** to direct Staff to prepare for Truth-in-Taxation at 14.5%, and that the justification be for general cost inflation, not tied to any specific activity, recognizing that inflation would continue to go up. Councilmember Fillmore seconded the motion. Mayor Wilkinson said he believed a 20% increase made more sense than a 14.5% increase. To Councilmembers Ivie and Mecham, Councilmember Ince said he recognized what they were saying, but he believed it was in the long-term best interest of everyone not to have another 40% increase a year or two down the road. He said he believed previous Councils did the residents of the City a disservice at the same time they were trying to protect them from increasing taxes. Councilmember Ince said he believed a 20% increase was probably the more proper number, but in view of the arguments of Councilmember Mecham and Ivie, and everything that had happened, he said he believed 14.5% was more salable and defendable. Councilmember Fillmore added that the more united the Council could be in the situation the better. Councilmember Mecham said she believed an annual property tax increase would be a disservice to the citizens. She repeated that she wanted to wait and see what happened in the next year or two. Councilmember Ivie said she could not vote in favor this year.

The motion passed by unanimous vote (3-2), with Councilmembers McEwan, Ince, and Fillmore in favor, and Councilmember Ivie and Mecham dissenting.

Mayor Wilkinson asked Fire Chief Stone to talk about a recent structure fire in Bountiful. Chief Stone spoke of the many difficulties encountered during the situation, and said he was grateful for his staff.

FINANCIAL REPORT

Monthly financial statements were included in the agenda packet. The Council said they appreciated the notations included in the statements.

APPOINTMENT

Mayor Wilkinson recommended reappointment of Brian Hulse and Paula Tew to the Board of Adjustment. Councilmember McEwan **moved** to give advice and consent to the reappointment of Brian Hulse and Paul Tew to the Board of Adjustment. Councilmember Ince seconded the motion, which passed by unanimous vote (5-0).

MINUTES REVIEW AND ACCEPTANCE

Minutes of the May 4, 2021 Council Meeting and May 11, 2021 Special Council Meeting were reviewed. Councilmember McEwan **moved** to accept both sets of minutes. Councilmember Ivie seconded the motion, which passed by unanimous vote (5-0).

CITY COUNCIL REPORT

Councilmember Mecham reported the Transportation Board had not been meeting. She provided an update on UTOPIA/UIA.

MAYOR'S REPORT

- Mayor Wilkinson recognized it was National Police Week and National Public Works Week.
- The Mayor reported the City Treasurer would retire at the end of June 2021.

CITY MANAGER'S REPORT

- Mr. Hanson explained the City Treasurer position would be open for applications internally.
- Mr. Hanson said he had delayed the City newsletter slightly to be able to include information about the Truth-in-Taxation process. He suggested the City begin a monthly online newsletter in addition to the existing printed newsletter.
- The City Manager made the Council aware of concerns related to increases in South Davis Metro Fire District funding.

ADJOURNMENT

At 10:00 p.m., Councilmember McEwan **moved** to adjourn the meeting. Councilmember Ince seconded the motion, which passed by unanimous vote (5-0).

_____ _____
Jennifer Hansen, City Recorder Date Approved

_____
Katie Rust, Recording Secretary

Minutes of the Centerville **City Council work session** held Tuesday, May 18, 2021 at 6:00 p.m. with participants present at City Hall, 250 North Main Street, Centerville, Utah, and electronically via Zoom.

MEMBERS PRESENT

Mayor	Clark Wilkinson
Council Members	Tamilyn Fillmore
	William Ince
	Stephanie Ivie
	George McEwan
	Robyn Mecham

STAFF PRESENT	Brant Hanson, City Manager
	Lisa Romney, City Attorney
	Jacob Smith, Administrative Services Director
	Nate Plazier, Finance Director
	Jennifer Hansen, Deputy Recorder

LANDMARKS COMMISSION DISCUSSION

Mayor Wilkinson explained that the Landmarks Commission was low on members, and said he questioned whether there was enough for the Landmarks Commission to do to justify appointing new individuals. As Council liaison to the Landmarks Commission, Councilmember Ivie said she had been frustrated more people had not been appointed to the Landmarks Commission. She said the Landmarks Commission was involved in getting historic sites listed on the historic register. She said the Commission had not had enough members to meet prior to the pandemic, and still did not have enough members. Councilmember Ivie emphasized the lack of meetings was not due to a lack of things to do. She pointed out the "V" on the hillside was turning 50, and there was interest in pursuing some type of recognition. She referred to the suggestion to combine the Landmarks Commission with the Whitaker Museum Board, and stated she was strongly against the idea. Considering the momentum lost during the pandemic, she suggested going back to some of the previous members of the Landmarks Commission and request that they share some of the vision with new people brought on. Councilmember Ivie stated there was not a shortage of potential historic sites to explore, or a shortage of other things for the Landmarks Commission to do. She commented that addition of historic sites to the historic register requires a Landmarks Commission.

Councilmember Fillmore said she believed the situation was largely due to the pandemic and miscommunication. She said she was aware of multiple citizens willing to serve on the Landmarks Commission, and expressed the opinion that the City should continue to have a body focused on what could be done to highlight Centerville's rich history. Councilmember McEwan said it sounded like the City should fill the vacancies and let the Landmarks Commission continue with their work. Councilmember Mecham said she would like to see the Landmarks Commission continue.

Mayor Wilkinson said he would reach out to Landmarks Commission members whose terms had expired and ask if they were interested in continuing on the Landmarks Commission,

and told the Council he would welcome suggestions of Centerville residents interested in joining the Landmarks Commission.

ADJOURNMENT

At 6:40 p.m., Councilmember McEwan **moved** to adjourn the work session. Councilmember Ivie seconded the motion, which passed by unanimous vote (5-0).

_____ _____

Jennifer Hansen, Deputy Recorder Date Approved

_____

Katie Rust, Recording Secretary

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 14.

Short Title: City Council Report

Initiated By:

Staff Representative:

SUBJECT

Councilman George McEwan

RECOMMENDATION

BACKGROUND

City Council may report on meetings/events attended and issues discussed in meetings/events attended by a Councilmember in their official capacity as the City's representative.

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 15.

Short Title: Mayor's Report

Initiated By: Mayor Wilkinson

Staff Representative:

SUBJECT

RECOMMENDATION

BACKGROUND

This is the Mayor's opportunity to make appointments and report on meetings/events attended and issues discussed in meetings/events attended, in his official capacity as the City's representative.

ATTACHMENTS:

Description

- Davis County Council of Governments Resolution

Davis Council of Governments

Davis County Council of Governments

OFFICIAL RESOLUTION

Council of Governments:

Randy Lewis
Bountiful City

Clark Wilkinson
Centerville City

Mark Shepherd
Clearfield City

Mitch Adams
Clinton City

Jim Talbot
Farmington City

John Pohlman
Fruit Heights City

Katie Witt
Kaysville City

Joy Petro
Layton City

Len Arave
North Salt Lake City

Jo Sjoblom
South Weber City

D. Howard Madsen
Sunset City

Michael Gailey
Syracuse City

Erik Craythorne
West Point City

Ken Romney
West Bountiful City

Rick Earnshaw
Woods Cross City

WHEREAS, all cities in Davis County are committed to the concept of water conservation;

WHEREAS, water is an increasingly scarce resource, limited in supply, and is subject to ever increasing demands based on population growth;

WHEREAS, Weber Basin Water Conservancy District actively promotes water conservation through classes, events and rebates;

WHEREAS, it is recommended that all cities in Davis County promote the efficient use and preservation of this valuable resource;

WHEREAS, the cities in Davis County recognize that landscapes and parks provide areas for passive and active recreation;

WHEREAS, the cities in Davis County promote the designs, installation, and maintenance of landscapes that are both attractive and water efficient;

WHEREAS, the cities in Davis County can accomplish water conservation goals by adopting this resolution and leading by example;

NOW THEREFORE, BE IT RESOLVED that the Cities in Davis County are committed to the following actions:

1. Review the irrigation control settings of all city properties each week by:
   a. Verifying irrigation systems are not running from 10:00 AM to 6:00 PM.
   b. Verifying sprinkler heads are properly positioned and not wasting water on paved surfaces.
   c. Broken sprinkler heads and pipe are replaced in a timely manner.
   d. Performing field soil tests and water audits on a regular basis.
2. Actively promote water conservation to businesses, churches, and residents.
3. Set aside funds to replace old irrigation controls with smart watering systems.
4. Incentivize employees in finding ways to conserve water.
5. Adopt an ordinance to promote water conservation.
6. Actively promote and utilize the resources available from Weber Basin Water Conservancy District to educate businesses and residents on ways to conserve water.

ATTEST

I, Jo Sjoblom, Council of Governments Chairman, hereby certify the resolution was adopted by the Council of Government Board at a meeting held on May 19, 2021

_____

Jo Sjoblom, COG Chairman

CENTERVILLE
CITY COUNCIL
Staff Backup Report
6/1/2021

Item No. 16.

Short Title: City Manager's Report

Initiated By: Brant Hanson

Staff Representative:

SUBJECT

RECOMMENDATION

BACKGROUND

This is the City Manager's opportunity to give notice to the City Council of current events impacting the City.