SARATOGA SPRINGS

Life's just better here

1. 2020-05-14 Pc Agenda

   Documents:

   2020-05-14 PC AGENDA.PDF

2. 2020-05-14 Pc Packet

   Documents:

   2020-05-14 PC PACKET.PDF

AGENDA – Planning Commission Meeting

Planning Commissioner Troy Cunningham, Chair
Planning Commissioner Ken Kilgore – Vice Chair
Planning Commissioner Bryce Anderson
Planning Commissioner Audrey Barton
Planning Commissioner Reed Ryan
Planning Commissioner Josh Wagstaff

CITY OF SARATOGA SPRINGS
Thursday, May 14, 2020, 6:00 pm
City of Saratoga Springs 1307 North Commerce Drive, Suite 200, Saratoga Springs, UT 84045
https://www.youtube.com/c/CityofSaratogaSprings

Pursuant to State and Federal Guidelines concerning COVID-19, this Meeting will be conducted electronically.
Questions and comments to Staff and/or Commissioners may be submitted to comments@saratogaspringscity.com

1. Pledge of Allegiance.
2. Roll Call.
3. Public Hearing: Rezone from Regional Commercial to Planned Community and General Plan amendment from Office Warehouse and Regional Commercial to Planned Community for Wildflower Commercial located at SR-73 and Mountain View Corridor. DAI as applicant.
4. Public Hearing: Engineering Standards and Specifications Update. City initiated.
5. Public Hearing: Code Amendment for Title 18 – Flood Plain. City initiated. **(Item to be continued.)**
6. Approval of Minutes: April 23, 2020.
7. Reports of Action.
8. Commission Comments.
9. Director's Report.
10. Possible motion to enter into closed session for the purchase, exchange, or lease of property; pending or reasonably imminent litigation; the character, professional competence, or the physical or mental health of an individual; or the deployment of security personnel, devices, or systems.
11. Adjourn.

PLEASE NOTE: The order of items may be subject to change with the order of the planning commission chair. One or more members of the Commission may participate electronically via video or telephonic conferencing in this meeting.

In compliance with the Americans with Disabilities Act, individuals needing special accommodations (including auxiliary communicative aids and services) during this meeting should notify the City Recorder at 801.766.9793 at least one day prior to the meeting.

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SARATOGA SPRINGS PLANNING

Planning Commission Staff Report

Rezone and General Plan Amendment
Wildflower Commercial
May 14, 2020
Public Hearing

Report Date:	Thursday, May 7, 2020
Applicant:	DAI Utah, Nate Shipp and Dan Herzog
Owner:	Collins One LLC; CLH Holdings LLC; and Collins Brothers Land Development LLC
Location:	Northwest corner of Mountain View Corridor and SR-73
Major Street Access:	Mountain View Corridor and SR-73
Parcel Number(s) & Size:	58:033:0498, 64.60 acres; 58:033:0504, 4.19 acres; and 58:033:0505, 50.27 acres
Parcel Zoning:	Regional Commercial (RC)
Adjacent Zoning:	Planned Community (PC), Agricultural (A), and RC
Current Use of Parcel:	Undeveloped
Adjacent Uses:	Undeveloped, future PC Business Park, future multi-family residential
Previous Meetings:	11/14/19 – Planning Commission recommended Community Plan approval 12/17/19 – City Council conditional approval of MDA Amendment 4/14/20 – City Council conditional approval of amended Community Plan
Previous Approvals:	2/24/2015 – Wildflower Community Plan, Master Plan Agreement, General Plan Amendment, and Rezone approved 4/21/2015 – Springs Annexation, General Plan Amendment, and Rezone approved 11/15/2016 – Wildflower Community Plan Amendment approved
Type of Action:	Legislative
Land Use Authority:	City Council
Future Routing:	City Council
Author:	Tippe Morlan, AICP, Senior Planner

A. Executive Summary:

This is a request to modify the land use and zoning designations for the commercial property within the Wildflower Development as outlined in Section C of this report and in the attachments. These changes are in line with the amended Wildflower Community Plan which was conditionally approved at the April 14, 2020 City Council meeting.

Recommendation:

Staff recommends that the Planning Commission conduct a public hearing, take public comment, review and discuss the proposal, and choose from the options in Section "H" of this report. Options include recommendations to the City Council for approval or denial or continuance.

Tippe Morlan, AICP, Senior Planner
tmorlan@saratogaspringscity.com
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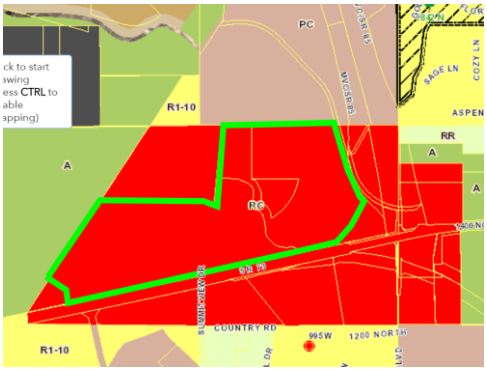
801-766-9793 x116 • 801-766-9794 fax

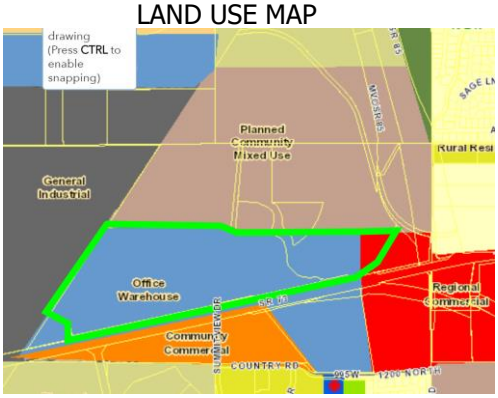
B. **Background:** When the original Wildflower Community Plan was approved in 2015, approximately 200 acres of commercial property to the south of the development was designated to be subject to the City's Regional Commercial zone. The latest amendment to the Community Plan requests that the commercial property now be incorporated into the Community Plan requiring the land use and zone designations to be changed to Planned Community.

Specific Request: The applicant is requesting a rezone and general plan amendment for 120.37 acres of commercial property within the Wildflower Development. The rezone and general plan amendment requests require a public hearing with the Planning Commission and a recommendation to the City Council.

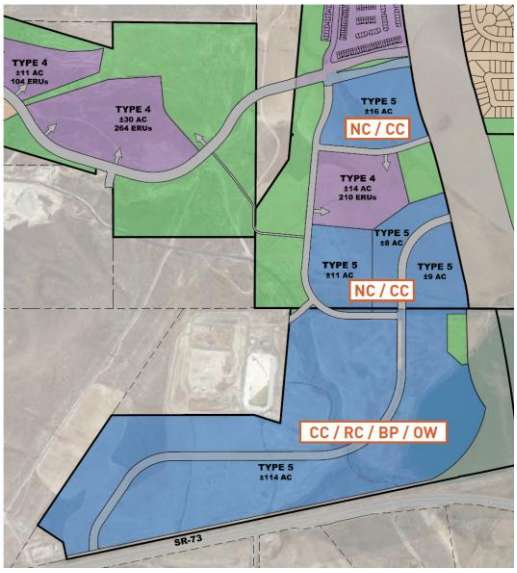
ZONING MAP



LAND USE MAP



This property is located in the southeastern portion of the overall project area and was originally designated with Regional Commercial zoning when the Community Plan was first approved. With the latest amendment to the Community Plan incorporating the Springs Development into the Wildflower plan, the applicant also chose to formally incorporate the commercial area into the plan. The applicant intends to develop a Business Park compatible with several commercial zones rather than a Regional Commercial shopping center in this location. Several potential zones have been identified for the future commercial uses (see Exhibit A), and details will be finalized with each respective Village Plan submittal.



The applicant did request a zone change and general plan amendment concurrent with the Community Plan amendment; however, this was only to incorporate the Springs property into the Planned Community zone. This application is required because the commercial property was not included in the previous request.

Tippe Morlan, AICP, Senior Planner
tmorlan@saratogaspringscity.com
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C. Process:
General Plan Amendment and Rezone: Section 19.13.04 indicates that a public hearing and recommendation is required by the Planning Commission and the City Council makes the final decision.

D. Community Review: The request to amend the General Plan and Zoning Map has been noticed as a public hearing in the *Daily Herald,* posted on the Utah public notice website, and mailed notice sent to all property owners within 300 feet of the subject neighborhoods.

E. General Plan: The applicant requests to amend the General Plan designation on the southern portion of this property from Office Warehouse and Regional Commercial to Planned Community – Mixed Use. The northern portion of this property is already designated Planned Community – Mixed Use, and this designation is in line with the recently approved Community Plan.

Staff finding: If the proposed changes are approved, the requested Planned Community zone would be consistent with the General Plan. A General Plan Amendment is a legislative decision and the criteria for an amendment are reviewed in Section H of this report.

F. Code Criteria:

General Plan Amendment and Rezone:
Zoning Map and General Plan Amendments are a legislative action; therefore the City Council has significant discretion in making decisions to amend the land use and rezone property. The criteria in Section 19.17.04, outlined below, are not binding and may act as guidance in making a rezone decision:

The Planning Commission and City Council shall consider, but not be bound by, the following criteria when deciding whether to recommend or grant a general plan, ordinance, or zoning map amendment:

1. the proposed change will conform to the Land Use Element and other provisions of the General Plan;

2. the proposed change will not decrease nor otherwise adversely affect the health, safety, convenience, morals, or general welfare of the public;

3. the proposed change will more fully carry out the general purposes and intent of this Title and any other ordinance of the City; and

4. in balancing the interest of the petitioner with the interest of the public, community interests will be better served by making the proposed change.

Findings for either approval or denial are outlined in section H of this report.

G. Recommendation and Alternatives:
Staff recommends that the Planning Commission review the proposed Rezone and General Plan Amendment, discuss any public input received, and select from the options below.

Option 1 – Positive Recommendation
"I move that the Planning Commission recommend to the City Council approval of the proposed Rezone and General Plan Amendment for Wildflower as described in Section C of this report and as depicted in the attached exhibits, with the findings and conditions below."

Findings:

1. The request is for a rezone and general plan amendment. If the proposed General Plan Amendment is approved, the proposed zoning will be consistent with the Land Use Map of the General Plan.

2. The proposed change will not decrease nor otherwise adversely affect the health, safety, convenience, morals, or general welfare of the public because it more clearly designates the commercial areas within the Wildflower development prior to development of these neighborhoods.

3. The proposed change will more fully carry out the general purposes and intent of this Title and any other ordinance of the City so long as appropriate conditions are in place to ensure access, infrastructure, layout and appearance, traffic mitigation, trail connectivity, and other code compliance. These items will be reviewed further with each individual village plan, subdivision, and site plan application for compliance with the Land Development Code.

4. In balancing the interest of the petitioner with the interest of the public, community interests will be better served by making the proposed change because this will preserve future commercial areas within the City which will be a benefit to the community at buildout.

Conditions:

1. Any conditions as articulated by the Planning Commission or City Council: _____
   _____

Alternative Motions:

Option 2 – Negative Recommendation

"I move that the Planning Commission forward a recommendation to the City Council for denial of the proposed General Plan Amendment and Rezone for Wildflower based on the Findings below:"

1. The amendment is not consistent with the General Plan, as articulated by the City Council: _____, and/or,
2. The amendment is not consistent with Section [19.XX] of the Code, as articulated by the City Council: _____, and/or
3. The amendment does not comply with the Second MDA, as articulated by the City Council: _____.
4. Any other findings as articulated by the City Council:
   _____

Option 3 - Continuance

"I move to **continue** the item to another meeting, with direction to the applicant and Staff on information and/or changes needed to render a decision as to whether the application meets the requirements of City ordinances, as follows:

1. _____
2. _____
3. _____

H. Exhibits:

A. Approved Community Plan – Land Use and Commercial Standards
B. Approved MDA Amendment

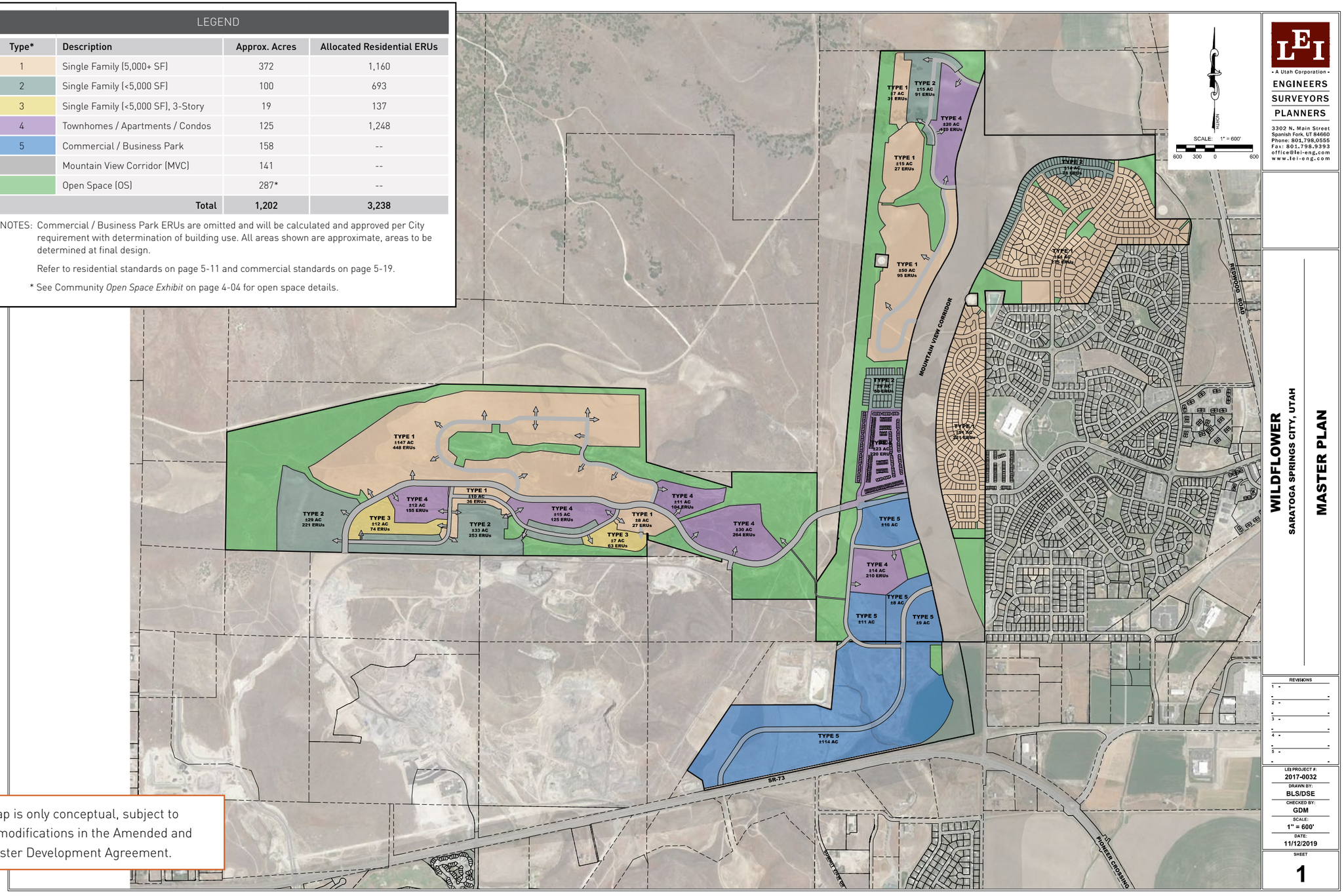
02 Land Use Map Exhibit

LEGEND			
Type*	**Description**	**Approx. Acres**	**Allocated Residential ERUs**
1	Single Family (5,000+ SF)	372	1,160
2	Single Family (<5,000 SF)	100	693
3	Single Family (<5,000 SF), 3-Story	19	137
4	Townhomes / Apartments / Condos	125	1,248
5	Commercial / Business Park	158	--
	Mountain View Corridor (MVC)	141	--
	Open Space (OS)	287*	--
	Total	**1,202**	**3,238**

NOTES: Commercial / Business Park ERUs are omitted and will be calculated and approved per City requirement with determination of building use. All areas shown are approximate, areas to be determined at final design.

Refer to residential standards on page 5-11 and commercial standards on page 5-19.

* See Community *Open Space Exhibit* on page 4-04 for open space details.



Note: This map is only conceptual, subject to exceptions and modifications in the Amended and Restated Master Development Agreement.

LEI
- A Utah Corporation -
ENGINEERS
SURVEYORS
PLANNERS
3302 N. Main Street
Spanish Fork, UT 84660
Phone: 801.798.0555
Fax: 801.798.9393
office@lei-eng.com
www.lei-eng.com

WILDFLOWER
SARATOGA SPRINGS CITY, UTAH
MASTER PLAN

REVISIONS
1 -
2 -
3 -
4 -
5 -

LEI PROJECT #: 2017-0032
DRAWN BY: BLS/DSE
CHECKED BY: GDM
SCALE: 1" = 600'
DATE: 11/12/2019
SHEET: 1

Commercial Standards

Type 5 — Community Commercial / Business Park

The purpose of the Community Commercial / Business Park type is to allow for medium-sized permitted commercial developments near residential neighborhoods, with establishments that will serve the nearby community. Development under these regulations should provide for Neighborhood Commercial (NC), Community Commercial (CC), Regional Commercial (RC), Business Park (BP), and Office Warehouse (OW), subject to location restrictions as determined during Village Plan review. Improvements such as trails, seating, and lighting that would help create gathering spaces and promote pedestrian activity are expected. Setbacks and configurations will be in line with City code.

Permitted Uses

Permitted uses within Type 5 areas will follow as per the table provided in ***Saratoga City Municipal code, section 19.04.11***. The labels show correlating uses as a guideline.

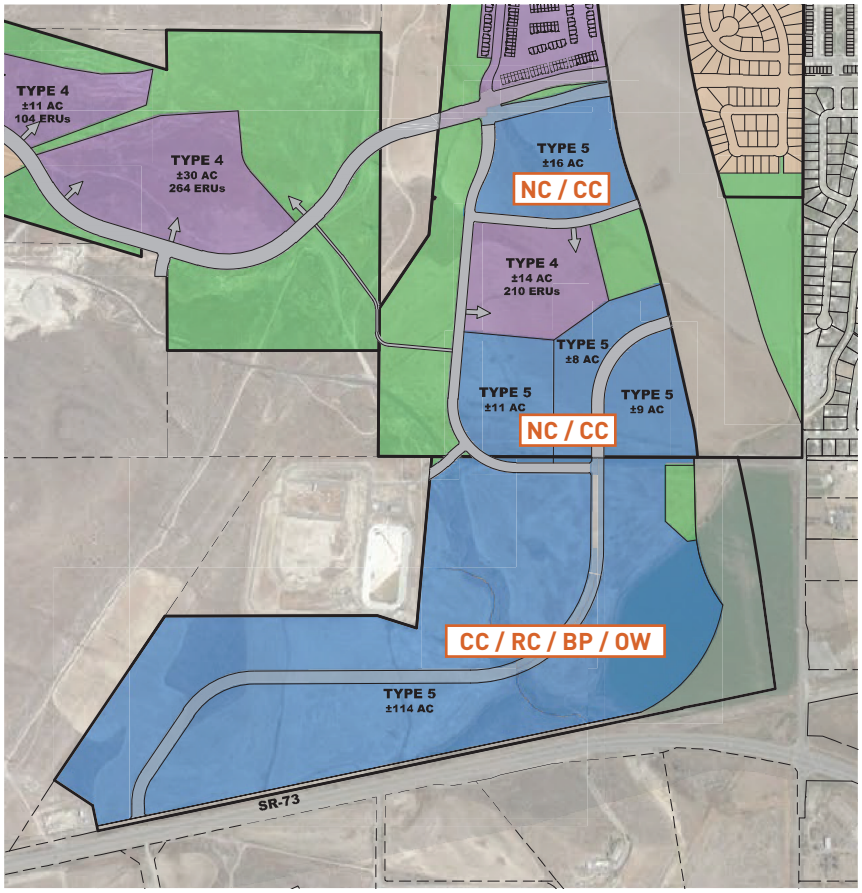


Exhibit B: Approved MDA Amendment

ORDINANCE NO. 19-40 (12-17-19)

AN ORDINANCE OF THE CITY OF SARATOGA SPRINGS, UTAH, APPROVING A MASTER DEVELOPMENT AGREEMENT AMENDMENT FOR THE WILDFLOWER DEVELOPMENT

WHEREAS, the City approved the Wildflower community plan ("CP") with a master development agreement ("MDA") in 2015, and an amended CP in 2016, which vested the Developer with 1,468 residential units; and

WHEREAS, the City approved an MDA for the Springs in 2015 following annexation of 479 acres into the City, which vested the Developer with 1,770 residential units; and

WHEREAS, DAI Utah has applied for an amendment to the Wildflower Community Plan and to the corresponding Master Development Agreement pursuant to Chapter 19.26 of the Land Development Code ("Application"); and

WHEREAS, the application combines both the Wildflower and the Springs communities maintaining the existing allocated 3,238 Equivalent Residential Units (ERUs) on the 1,201.71 acre site; and

WHEREAS, the application proposes to amend and restate the entire CP and MDA with amendments to increase the intensity of homes in the Springs, establish development standards for the development of the property, and establish updated open space regulations; and

WHEREAS, pursuant to its legislative authority under Utah Code Annotated § 10-9a-101, et seq., the City Council, in exercising its legislative discretion, has determined that approving the application furthers the health, safety, prosperity, security, and general welfare of the residents and taxpayers of the City.

NOW THEREFORE, the City Council of the City of Saratoga Springs, Utah hereby ordains as follows:

SECTION I – ENACTMENT

The Wildflower Community Plan amendment and the Amended and Restated Master Development Agreement, attached hereto as Exhibit A and incorporated herein by this reference, are hereby approved and enacted, subject to the City Council's adopted findings and conditions of approval.

SECTION II – AMENDMENT OF CONFLICTING ORDINANCES

If any ordinances, resolutions, policies, or zoning maps of the City of Saratoga Springs heretofore adopted are inconsistent herewith they are hereby amended to comply with the provisions hereof. If they cannot be amended to comply with the provisions hereof, they are hereby repealed.

SECTION III – EFFECTIVE DATE

This ordinance shall take effect upon its passage by a majority vote of the Saratoga Springs City Council and following notice and publication as required by the Utah Code.

SECTION IV – SEVERABILITY

If any section, subsection, sentence, clause, phrase, or portion of this ordinance is, for any reason, held invalid or unconstitutional by any court of competent jurisdiction, such provision shall be deemed a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of this ordinance.

SECTION V – PUBLIC NOTICE

The Saratoga Springs Recorder is hereby ordered, in accordance with the requirements of Utah Code § 10-3-710—711, to do as follows:

a. deposit a copy of this ordinance in the office of the City Recorder; and
b. publish notice as follows:
   i. publish a short summary of this ordinance for at least one publication in a newspaper of general circulation in the City; or
   ii. post a complete copy of this ordinance in 3 public places within the City.

ADOPTED AND PASSED by the City Council of the City of Saratoga Springs, Utah, this 17th day of December, 2019.

Signed: _____
Jim Miller, Mayor

Attest: _____
Cindy LoPiccolo, City Recorder

	VOTE
Shellie Baertsch	aye
Michael McOmber	aye
Ryan Poduska	aye
Chris Porter	aye
Stephen Willden	aye

EXHIBIT A

Wildflower Amended and Restated Master Development Agreement

WHEN RECORDED, RETURN TO:

_____
_____

AMENDED AND RESTATED
MASTER DEVELOPMENT AGREEMENT
FOR THE
WILDFLOWER MASTER PLANNED COMMUNITY

[_____], 2019

TABLE OF CONTENTS

AMENDED AND RESTATED
MASTER DEVELOPMENT AGREEMENT
FOR THE
WILDFLOWER MASTER PLANNED COMMUNITY

THIS AMENDED AND RESTATED MASTER DEVELOPMENT AGREEMENT is made and entered as of the [____] day of [_____], 2019, by and between the CITY OF SARATOGA SPRINGS, WF II, LLC, a Utah limited liability company, Collins One, LLC, a Utah limited liability company, Sunrise 3, LLC, a Utah limited liability company, Tanuki, LLC, a Utah limited liability company, and Wildflower Developers, LLC, a Utah limited liability company.

RECITALS

A. The capitalized terms used in this ARMDA and in these Recitals are defined in Section 1.2, below.

B. Owners owns the Property which is located within the City.

C. Master Developer is under contract with Owners to develop the Project on the Property.

D. A portion of the Property, along with the Excluded Property, is currently the subject of the Original Development Agreement.

E. Another portion of the Property is currently the subject of the Springs ADA.

F. The Parties desire to enter into this ARMDA to novate, replace and supersede, where applicable, the Original Development Agreement and the Springs ADA in their entirety as they relate to the Property.

G. Contemporaneously with the approval of this ARMDA the City has zoned the Property with its "PC" Zone.

H. As a part of this AMRDA the City has approved the Community Plan.

I. The Parties intend that the Original Development Agreement shall remain in full force and effect as it relates to the Excluded Property.

J. Owners, Master Developer and the City desire that the Property be developed in a unified and consistent fashion pursuant to the Master Plan.

K. The Parties acknowledge that development of the Property pursuant to this ARMDA will result in significant planning and economic benefits to the City, and its residents by, among other things requiring orderly development of the Property as a master planned development and increasing property tax and other revenues to the community based on improvements to be constructed on the Property.

L. The Parties desire to enter into this ARMDA to specify the rights and responsibilities of Owners and Master Developer to develop the Property as expressed in this ARMDA and the rights and responsibilities of the City to allow and regulate such development pursuant to the requirements of this ARMDA.

M. The Parties understand and intend that this ARMDA is a "development agreement" within the meaning of the Act and entered into pursuant to the terms of the Act.

N. The City finds that this ARMDA and the Community Plan conforms with the intent of each potential the City's General Plan.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the City and Master Developer hereby agree to the following:

TERMS

1. **Incorporation of Recitals and Exhibits/ Definitions**.

1.1 **Incorporation**. The foregoing Recitals and Exhibits "A" - "F" are hereby incorporated into this ARMDA.

1.2 **Definitions**. As used in this ARMDA, the words and phrases specified below shall have the following meanings:

1.2.1 **Act** means the City Land Use, Development, and Management Act, Utah Code Ann. §10-9a-101 (2019) et seq.

1.2.2 **Administrator** means the person designated by the City as the Administrator of this ARMDA.

1.2.3 **Applicant** means a person or entity submitting a Development Application.

1.2.4 **ARMDA** means this Amended and Restated Master Development Agreement.

1.2.5 **Buildout** means the completion of all of the development on the entire Project.

1.2.6 **Cemetery Property** means that property located at _____ _____.

1.2.7 **City** means the City of Saratoga Springs.

1.2.8 **City Consultants** means those outside consultants employed by the City in various specialized disciplines such as traffic, hydrology or drainage for reviewing certain aspects of the development of the Project.

1.2.9 **City's Future Laws** means the ordinances, policies, standards, and procedures which may be in effect as of a particular time in the future when a Development Application is submitted for a part of the Project and which may or may not be applicable to the Development Application depending upon the provisions of this ARMDA.

1.2.10 **City's Vested Laws** means the ordinances, policies, standards and procedures of the City in effect as of December 17, 2019 except as those may be modified in the Community Plan and in this ARMDA. Certain of those provisions of the City's Vested Laws that are modified by this ARMDA are listed in Exhibit "___" but the Parties acknowledge that there may be additional provisions in the ARMDA and the future Community Plans.

1.2.11 **Community Plan** means the plan for the development of the entire Project as shown on Exhibit "B".

1.2.12 **Council** means the elected City Council of the City.

1.2.13 **Default** means a material breach of this ARMDA as specified herein.

1.2.14 **Denied** means a formal denial issued by the final decision-making body of the City for a particular type of Development Application but does not include review comments or "redlines" by The City staff.

1.2.15 **Development** means the development of a portion of the Property pursuant to an approved Development Application.

1.2.16 **Development Application** means a complete application to the City for development of a portion of the Project including a Village Plan, Subdivision, Plan or any other permit, certificate or other authorization from the City required for development of the Project.

1.2.17 **Development Report** means a report containing the information specified in Section2.4 submitted to the City by Master Developer for a Development by Master Developer or for the sale by Owners of any Parcel to a Subdeveloper or the submittal of a Development Application by a Subdeveloper pursuant to an assignment from Owners and Master Developer.

1.2.18 **Equivalent Residential Dwelling Units** shall have the meaning specified in the City's Vested Laws.

1.2.19 **Exceptions to City's Vested Laws** means those provisions in the Community Plan that modify the City's Vested Laws for the Project.

1.2.20 **Excluded Property** means that property as described in Exhibit A-2 which has previously been developed pursuant to the Original Development Agreement.

1.2.21 **Intended Uses** means the development on the Project of the Maximum Equivalent Residential Uses and all of the commercial, retail, office and other uses specified in the Community Plan

1.2.22 **Master Developer** means Wildflower Developers, LLC, a Utah limited liability company, and its assignees or transferees as permitted by this ARMDA.

1.2.23 **Maximum Equivalent Residential Units** means the development on the Property of three thousand seven hundred twenty-nine (3,729) Equivalent Residential Dwelling Units.

1.2.24 **Master Utility Plan** means a plan for providing utilities to the Project as more fully specified in Exhibit "C" and lawful updates made pursuant to the Utah Impact Fees Act, Utah Code § 11-36a-101 et seq.

1.2.25 **Non-City Agency** means any regulatory body having any jurisdiction over the consideration of any Development Application other than the City.

1.2.26 **Notice** means any notice to or from any Party to this ARMDA that is either required or permitted to be given to another party.

1.2.27 **Original Development Agreement** means a Development Agreement dated February 24, 2015 which is recorded as Entry # _____ in the official records of the Utah County Recorder which applies to a portion of the Property.

1.2.28 **Outsourc[e][ing]** means the process of the City contracting with the City Consultants or paying overtime to the City employees to provide technical support in the review and approval of the various aspects of a Development Application as is more fully set out in this ARMDA.

1.2.29 **Owners** means WF II, LLC, a Utah limited liability company, Collins One, LLC, a Utah limited liability company, Sunrise 3, LLC, a Utah limited liability company, Tanuki, LLC, a Utah limited liability company, that own those portions of the Property as more fully specified in Exhibit "D".

1.2.30 **Parcel** means a portion of the Property that is created by the Owners and Master Developer to be sold to a Subdeveloper.

1.2.31 **Party/Parties** means, in the singular, either Master Developer, Owners or the City; in the plural each of Owners, Master Developer and the City.

1.2.32 **Plan** means plans approved by the City pursuant to a Development Application.

1.2.33 **Planning Commission** means the City's Planning Commission.

1.2.34 **Pod** means an area of the Project as generally illustrated on the Master Plan intended for a certain number of square feet of industrial or warehousing space.

1.2.35 **Powerline Corridor** means a powerline corridor owned by Rocky Mountain Power that is illustrated on the Community Plan.

1.2.36 **Project** means the total development to be constructed on the Property pursuant to this ARMDA with the associated public and private facilities, and all of the other aspects approved as part of this ARMDA.

1.2.37 **Property** means the real property to be developed into the Project as more fully described in Exhibit "A-1".

1.2.38 **Public Infrastructure** means those elements of infrastructure that are planned to be dedicated to the City as a condition of the approval of a Development Application.

1.2.39 **Springs ADA** an Annexation and Development Agreement dated April 21, 2015 which is recorded as Entry # _____ in the official records of the Utah County Recorder which applies to a portion of the Property.

1.2.40 **Subdeveloper** means a person or an entity not "related" (as defined by Section 165 of the Internal Revenue Code) to Owners or Master Developer which purchases a Parcel for development.

1.2.41 **Subdivision** means the division of any portion of the Project into developable area pursuant to State Law and/or the Zoning Ordinance.

1.2.42 **Subdivision Application** means the application to create a Subdivision.

1.2.43 **System Improvements** means those components of the City's infrastructure that are defined as such under the Utah Impact Fees Act.

1.2.44 **Village Plan** means plans for the development of portion of the Project required by Chapter 19.26 of the City's Vested Laws.

1.2.45 **Zoning** means the City's PC Zone as specified in the City's Vested Laws.

2. Development of the Project.

2.1 **Exclusive Agreement/Novation and superceding of the Original Development Agreement.** This ARMDA shall be the exclusive agreement between the Parties for development

of the Property. As it relates to the Property, the Original Development Agreement and the Springs DA are hereby acknowledged to be novated, superseded and of no effect.

2.2 **Excluded Property.** The Excluded Property shall remain subject to the Original Development Agreement.

2.3 **Compliance with this ARMDA**. Development of the Project shall be in accordance with the City's Vested Laws (as modified by the Exceptions to City's Vested Laws), the City's Future Laws (to the extent that these are applicable as otherwise specified in this ARMDA), the Zoning Map and this ARMDA.

2.4 **Accounting for Parcels Sold to Subdevelopers**. Any Parcel sold by Owners to a Subdeveloper shall include the transfer of the right and obligation to develop such Parcel in accordance with this Agreement. At the recordation of a Final Plat or other document of conveyance for any Parcel sold to a Subdeveloper, Master Developer shall provide the City a Sub-Development Report showing the new ownership of the Parcel(s) sold and the projected or potential uses.

2.5 **Cemetery Property**. Master Developer shall postpone development of the Cemetery Property until December 31, 2024 If, prior to the end of that postponement, Camp Williams completes purchase of some or all of the Cemetery Property, Master Developer may transfer 77 units, consisting of 63 vested units and 14 additional units (to compensate Master Developer for the delay), prorated in accordance to the amount of Cemetery Property sold, to any other area of the Development. Developer may use these units to increase the total number of units in the receiving area notwithstanding the number of units specified in the community plan.

3. **Zoning and Vested Rights.**

3.1 **Zoning**. The Property is zoned as shown on the Zoning Map and that zoning accommodates and allows all development contemplated by Owners and Master Developer,

including the development rights and uses described herein and depicted in the Master Plan, as more particularly set forth below.

3.2 **Vested Rights Granted by Approval of this ARMDA**. To the maximum extent permissible under the laws of Utah and the United States and at equity, the Parties intend that this ARMDA grants Owners and Master Developer all rights to develop the Project in fulfillment of this ARMDA, the City's Vested Laws, and the Zoning Map except as specifically provided herein and in the Community Plan. The Parties specifically intend that this ARMDA grants to Owners and Master Developer "vested rights" as that term is construed in Utah's common law and pursuant to Utah Code Ann. § 10-9a-508. As of the date of this ARMDA, the City confirms that the uses, configurations, densities, and other development standards reflected in the Master Plan are approved under, and generally consistent with the City's existing laws, Zoning Map, and General Plan. However, the Parties acknowledge that the Master Plan is conceptual in nature and additional details may need to be provided by Developer to determine full compliance with the Vested Laws, Future Laws, Zoning Map, General Plan, and this ARMDA. If there is a conflict between any provision of Chapter 19 of the City Code and any portion of this ARMDA, even if not listed in Exhibit A, then the provisions of this ARMDA shall control.

3.3 **Exceptions**. The restrictions on the applicability of the City's Future Laws to the Project as specified in Section 3.2 are subject to only the following exceptions:

3.3.1 Owners and Master Developer Agreement. The City's Future Laws that Owners and Master Developer agree in writing to the application thereof to the Project, except for the remaining exceptions in 3.3.2 to 3.3.9;

3.3.2 State and Federal Compliance. The City's Future Laws which are generally applicable to all properties in the City's jurisdiction and which are required to comply with State and Federal laws and regulations affecting the Project;

3.3.3 Codes. The City's development standards, engineering requirements and supplemental specifications for public works, and any of the City's Future Laws that are updates or amendments to existing building, plumbing, mechanical, electrical, dangerous buildings, drainage, or similar construction or safety related codes, such as the International Building Code, the APWA Specifications, AAHSTO Standards, the Manual of Uniform Traffic Control Devices or similar standards that are generated by a nationally or statewide recognized construction/safety organization, or by the State or Federal governments and are required to meet legitimate concerns related to public health, safety or welfare;

3.3.4 Taxes. Taxes, or modifications thereto, so long as such taxes are lawfully imposed and charged uniformly by the City to all properties, applications, persons and entities similarly situated; or,

3.3.5 Fees. Changes to the amounts of fees for the processing of Development Applications that are generally applicable to all development within the City and which are adopted pursuant to State law.

3.3.6 Impact Fees. Future Impact Fees or modifications thereto which are lawfully adopted and imposed by the City.

3.3.7 Planning and Zoning Modification. Changes by the City to its planning principles and design standards such as architectural or design requirements, setbacks or similar items so long as such changes do not work to reduce the Maximum Residential Units, are generally

applicable across the entire City and do not materially and unreasonably increase the demonstrable costs or diminish the demonstrable profits of any Development.

3.3.8 Processing of Development Applications. Changes in the City's Future Laws that relate to the processing of Development Applications which are generally applicable across the entire City and do not materially and unreasonably increase the demonstrable costs, or diminish the demonstrable profits.

3.3.9 Compelling, Countervailing Interest. Laws, rules or regulations that the City's land use authority finds, on the record, are necessary to prevent a physical harm to third parties, which harm did not exist at the time of the execution of this Agreement, and which harm, if not addressed, would jeopardize a compelling, countervailing public interest pursuant to Utah Code Ann. § 10-9a-509(1)(a)(ii) (2019), as proven by the City by clear and convincing evidence.

4. **Term of Agreement**. The term of this ARMDA shall be until December 31, 2029. If as of that date Master Developer has not been declared to be in default as provided in Section 14, and if any such declared default is not being cured as provided therein, then this MDA shall be automatically extended until December 31, 2034, and, thereafter, for up to one (1) additional period of five (5) years. This ARMDA shall continue beyond its term as to any rights or obligations for subdivisions or site plans that have been given final approval and have been recorded prior to the end of the term of this ARMDA. However, this ARMDA shall terminate as to any subdivisions or site plans that have not been given final approval and have not been recorded prior to the end of the term of this ARMDA. When public improvements required by this ARMDA and the adopted community and village plans have been constructed and accepted by City (after the expiration of applicable warranty periods), Developer shall be released from and have no continuing obligations with respect to such improvements.

5. **Processing of Development Applications**.

5.1 **Outsourcing of Processing of Development Applications**. Within fifteen (15) business days after receipt of a Development Application and upon the request of Master Developer the City and Master Developer will confer to determine whether the City desires to Outsource the review of any aspect of the Development Application to ensure that it is processed on a timely basis. If the City determines in its sole discretion that Outsourcing is appropriate then the City shall promptly estimate the reasonably anticipated differential cost of Outsourcing in the manner selected by the Master Developer or Subdeveloper in good faith consultation with the Master Developer or Subdeveloper (either overtime to The City employees or the hiring of a City Consultant). If the Master Developer or a Subdeveloper notifies the City that it desires to proceed with the Outsourcing based on the City's estimate of costs then the Master Developer or Subdeveloper shall deposit in advance with the City the estimated differential cost and the City shall then promptly proceed with having the work Outsourced. Upon completion of the Outsourcing services and the provision by the City of an invoice (with such reasonable supporting documentation as may be requested by Master Developer or Subdeveloper) for the actual differential cost (whether by way of paying a City Consultant or paying overtime to The City employees) of Outsourcing, Master Developer or the Subdeveloper shall, within ten (10) business days pay or receive credit (as the case may be) for any difference between the estimated differential cost deposited for the Outsourcing and the actual cost differential.

5.2 **Acceptance of Certifications Required for Development Applications**. Any Development Application requiring the signature, endorsement, or certification and/or stamping by a person holding a license or professional certification required by the State of Utah in a particular discipline shall be so signed, endorsed, certified or stamped signifying that the contents

of the Development Application comply with the applicable regulatory standards of the City. The City should endeavor to make all of its redlines, comments or suggestions at the time of the first review of the Development Application unless any changes to the Development Application raise new issues that need to be addressed.

5.3 **Independent Technical Analyses for Development Applications**. If the City needs technical expertise beyond the City's internal resources to determine impacts of a Development Application such as for structures, bridges, water tanks, and other similar matters which are or are not required by the City's Vested Laws to be certified by such experts as part of a Development Application, the City may engage such experts as The City Consultants with the actual and reasonable costs being the responsibility of Applicant. The City Consultant undertaking any review by the City required or permitted by this ARMDA shall be selected pursuant to The City ordinances or regulations and Utah State law, in particular Utah Code § 11-39-101 et seq., as amended. Except where doing so would violate state law or the City's contracting or purchasing policy, applicant may, in its sole discretion, strike from the list of qualified proposers any of such proposed consultants so long as at least three (3) qualified proposers remain for selection. The anticipated cost and timeliness of such review may be a factor in choosing the expert. The actual and reasonable costs are the responsibility of Applicant.

5.4 **City Denial of a Development Application**. If the City denies a Development Application the City shall provide a written determination advising the Applicant and Master Developer of the reasons for denial including specifying the reasons the City believes that the Development Application is not consistent with this ARMDA, and/or the City's Vested Laws (or, if applicable, the City's Future Laws).

5.5 **Meet and Confer regarding Development Application Denials**. Upon a written request from an Applicant, the City and Applicant shall meet within fifteen (15) business days of any Denial to resolve the issues specified in the Denial of a Development Application. Master Developer may, at its option, participate in this Meet and Confer process.

5.6 **The City's Denials of Development Applications Based on Denials from Non-City Agencies**. If the City's denial of a Development Application is based on the denial of the Development Application by a Non-City Agency, Applicant shall appeal any such denial through the appropriate procedures for such a decision and not through the processes specified below.

5.7 **Mediation of Development Application Denials**.

5.7.1 Issues Subject to Mediation. Issues resulting from the City's Denial of a Development Application that the Applicant and the City are not able to resolve by "Meet and Confer" shall be mediated and include the following:

(i) the location of on-site infrastructure, including utility lines and stub outs to adjacent developments,

(ii) right-of-way modifications that do not involve the altering or vacating of a previously dedicated public right-of-way,

(iii) interpretations, minor technical edits or inconsistencies necessary to clarify or modify documents consistent with their intended purpose of the Development Standards, and

(iv) the issuance of building permits.

5.7.2 Mediation Process. If the City and Applicant are unable to resolve a disagreement subject to mediation, the City and Applicant shall attempt within ten (10) business days to appoint a mutually acceptable mediator with knowledge of the legal issue in dispute. If

the City and Applicant are unable to agree on a single acceptable mediator they shall each, within ten (10) business days, appoint their own representative. These two representatives shall, between them, choose the single mediator. Applicant shall pay the fees of the chosen mediator. The chosen mediator shall within fifteen (15) business days, review the positions of the City and Applicant regarding the mediation issue and promptly attempt to mediate the issue between the City and Applicant. Master Developer may, at its option, participate in the mediation. If the City and Applicant are unable to reach agreement, the mediator shall notify the City, Applicant, Master Developer and Owners in writing of the resolution that the mediator deems appropriate. The mediator's opinion shall not be binding on the City and Applicant.

5.8 **Arbitration of Development Application Objections**.

5.8.1 Issues Subject to Arbitration. Issues regarding the City's Denial of a Development Application that are subject to resolution by scientific or technical experts such as traffic impacts, water quality impacts, pollution impacts, etc. are subject to arbitration.

5.8.2 Mediation Required Before Arbitration. Prior to any arbitration the City and Applicant shall first attempt mediation as specified in Section 5.7.

5.8.3 Arbitration Process. If the City and Applicant are unable to resolve an issue through mediation, the City and Applicant shall attempt within ten (10) business days to appoint a mutually acceptable expert in the professional discipline(s) of the issue in question. If the City and Applicant are unable to agree on a single acceptable arbitrator they shall each, within ten (10) business days, appoint their own individual appropriate expert. These two experts shall, between them, choose the single arbitrator. Applicant shall pay the fees of the chosen arbitrator. The chosen arbitrator shall within fifteen (15) business days, review the positions of the City and Applicant regarding the arbitration issue and render a decision. Master Developer may, at its

option, participate in the arbitration. The arbitrator shall ask the prevailing party to draft a proposed order for consideration and objection by the other side. Upon adoption by the arbitrator, and consideration of such objections, the arbitrator's decision shall be final and binding upon the City and Applicant. If the arbitrator determines as a part of the decision that the City's or Applicant's position was not only incorrect but was also maintained unreasonably and not in good faith then the arbitrator may order the City or Applicant to pay the arbitrator's fees.

5.8.4 Limitation on Damages. The arbitrator may not award monetary damages or attorney fees, and any award shall be limited to specific performance by the breaching party.

6. **Application Under the City's Future Laws.** Without waiving any rights granted by this ARMDA, Master Developer may at any time, choose to submit a Development Application for all of the Project under the City's Future Laws in effect at the time of the Development Application so long as Master Developer is not in current breach of this Agreement.

7. **Infrastructure.**

7.1 **Construction by and Master Developer**. Master Developer shall have the right and the obligation to construct or cause to be constructed and installed all Public Infrastructure reasonably and lawfully required as a condition of approval of the Development Application.

7.2 **Consistency with Master Utility Plan.** The Public Infrastructure shall be consistent with and fulfill the purposes of the Master Utility Plan.

7.3 **Bonding**. If and to the extent required by the City's Vested Laws, unless otherwise provided by Chapters 10-9a of the Utah Code as amended, security for any required improvements shall be provided in a form acceptable to the City as specified in the City's Vested Laws. Partial releases of any such required security shall be made as work progresses based on the City's Vested Laws.

8. **Upsizing/Reimbursements to Master Developer**.

8.1 **"Upsizing"**. The City shall not require Owners or Master Developer to "upsize" any future Public Infrastructure (i.e., to construct the infrastructure to a size larger than required to service the Project) unless financial arrangements reasonably acceptable to Owners and Master Developer are made to compensate Master Developer for the incremental or additive costs of such upsizing. For example, if an upsizing to a water pipe size increases costs by 10% but adds 50% more capacity, the City shall only be responsible to compensate Master Developer for the 10% cost increase. An acceptable financial arrangement for upsizing of improvements means reimbursement agreements, payback agreements, and impact fee credits and reimbursements.

9. **Public Infrastructure Financing.** The City will use its best efforts at the request of Master Developer, within the scope of the City's legislative discretion, to create an "assessment area", "local district" or other similar financial vehicle to pay for portions of the Public Infrastructure.

10. **Impact Fees.** The City acknowledges that the Master Developer or Subdeveloper shall be entitled to impact fee waivers, credits, and/or reimbursements as provided by Utah Code § 11-36a-402(2), as amended, which as of the date of this ARMDA allows a developer to receive waivers, credits, and/or reimbursements if such developer: (a) dedicates land for a system improvement; (b) builds and dedicates some or all of a system improvement; or (c) dedicates a public facility that City and the developer agree will reduce the need for a system improvement.

11. **Site Preparation.**

11.1 **Certain Extraction, Processing and Uses Permitted.** Master Developer, and/or its agents, successors, assigns, tenants, guests, and invitees shall be permitted to extract and process the natural materials located on the Property such as aggregate (rock, sand or gravel products, but excluding any other underground materials or other minerals which may be

discovered, if any) during the course of grading, excavation, and other ordinary and customary development processes for the Property, subject to the City's Future Laws including excavation, grading, and stormwater regulations and permitting requirements. Such natural materials shall only be used and processed on-site in the construction of infrastructure, homes, or other buildings or improvements located on the Property if such materials meet the City's Future Laws pertaining to the use for such purposes. The zoning for the Project shall not be construed to limit or restrict any such temporary development-related extraction, processing and hauling activities.

11.2 **Additional Requirements for Uses Off-Site.** Any excess materials not needed by the Project may also be sold and/or hauled off-site in locations outside the Project, provided that Master Developer: (1) obtains from the City permits for such operation, including but not limited to, a traffic plan, storm water pollution prevention plan, and a grading plan and permit (meeting the requirements of City Future Laws); and (2) complies with such approved permits in its extraction, processing and hauling activities.

11.3 **Limitation of Material Extraction, Processing and Uses.** The provisions of Sections 11.2 and 11.3 shall only allow the excavation and processing of materials pursuant to an active permit required by City Future Laws. The excavation and processing shall not extend beyond the boundaries of the approved grading plan. The Parties acknowledge that the provisions of Sections 11.1 and 11.2 are not intended to allow the Property to be used as a general gravel mining operation.

11.4 **Limitation on Use of Certain Roads.** Without limiting the generality of the foregoing, (a) any trucks hauling materials away from the Project shall not utilize any of the Harvest Hills Subdivision roads or other local roads, but rather, Master Developer shall construct

a temporary road connecting portions of the Property upon which such extraction and processing will occur to Redwood Road or other State Highway, for such hauling activities, (b) Master Developer shall use reasonable efforts to screen such excavation and processing activities from neighboring properties, and (c) Master Developer's extraction activities shall not include mining materials which are deeper under the ground than the grading plan included within the Community Plan and which are materials or minerals other than rock, sand, or gravel products. Further, Master Developer must obtain all applicable excavation, grading, and storm water permits and comply with all other applicable provisions of the City's Future Laws.

11.5 **Requirement of Approval of a Development Application.** Master Developer shall not commence any use permitted under this Section 11 until such time as a Development Application has been approved by City in accordance with the terms and conditions of this ARMDA and the City's Vested Laws.

12. **Rocky Mountain Power Corridor.** The Parties acknowledge that if Master Developer obtains the rights to use the Powerline Corridor for a park or trails for the Project then the area so used shall count as a partial credit against any open space requirements for the Project as specified in the City's Vested Laws including the requirement to provide amenities.

13. **Provision of Municipal Services.** The City shall provide all City services to the Project that it provides from time-to-time to similarly situated residents and properties within the City including, but not limited to, police, fire and other emergency services. Such services shall be provided to the Project at the same levels of services, on the same terms and at the same rates as provided to similarly situated residents and properties in the City.

14. **Default**.

14.1 **Notice**. If Owners, Master Developer or a Subdeveloper or the City fails to perform their respective obligations hereunder or to comply with the terms hereof, the Party believing that a Default has occurred shall provide Notice to all other Parties. If the City believes that the Default has been committed by a Subdeveloper then the City shall also provide a courtesy copy of the Notice to Owners and Master Developer.

14.2 **Contents of the Notice of Default**. The Notice of Default shall:

14.2.1 Specific Claim. Specify the claimed event of Default;

14.2.2 Applicable Provisions. Identify with particularity the provisions of any applicable law, rule, regulation or provision of this ARMDA that is claimed to be in Default;

14.2.3 Materiality. Identify why the Default is claimed to be material; and

14.2.4 Optional Cure. If the City chooses, in its discretion, it may propose a method and time for curing the Default which shall be of no less than thirty (30) days duration.

14.3 **Meet and Confer, Mediation, Arbitration**. Upon the issuance of a Notice of Default the Parties shall engage in the "Meet and Confer" and "Mediation" processes specified in Sections 5.5 and 5.7. If the claimed Default is subject to arbitration as provided in Section 5.8 then the Parties shall follow such processes.

14.4 **Remedies**. If the Parties are not able to resolve the Default by "Meet and Confer" or by mediation, and if the Default is not subject to arbitration then the Parties may have the following remedies, except as specifically limited in 15.9:

14.4.1 No Monetary Damages. Except for other remedies specified in this Section 14.4, any breach of this Agreement by either party shall not result in monetary damages but shall be limited to specific performance only.

14.4.2 Security. The right to draw on any security posted or provided in connection with the Project and relating to remedying of the particular Default.

14.4.3 Future Approvals. The right to withhold all further reviews, approvals, licenses, building permits and/or other permits for development of the Project in the case of a default by Master Developer, or in the case of a default by a Subdeveloper, development of those Parcels owned by the Subdeveloper until the Default has been cured.

14.5 **Public Meeting**. Before any remedy in Section 14.4 may be imposed by the City the party allegedly in Default shall be afforded the right to attend a public meeting before the City Manager and address the City Manager regarding the claimed Default.

14.6 **Emergency Defaults**. Anything in this ARMDA notwithstanding, if the City's Council finds on the record that a default materially impairs a compelling, countervailing interest of the City and that any delays in imposing such a default would also impair a compelling, countervailing interest of the City then the City may impose the remedies of Section 14.4 without the requirements of Sections 14.5. The City shall give Notice to Owners and Master Developer and/or any applicable Subdeveloper of any public meeting at which an emergency default is to be considered. Owners and Master Developer and/or any applicable Subdeveloper shall be allowed to address the City Council at that meeting regarding the claimed emergency Default.

14.7 **Extended Cure Period**. If any Default cannot be reasonably cured within thirty (30) days then such cure period shall be extended so long as the defaulting party is pursuing a cure with reasonable diligence.

14.8 **Default of Assignee**. A default of any obligations assumed by an assignee shall not be deemed a default of Owners or Master Developer.

15. **Notices**. All notices required or permitted under this ARMDA shall, in addition to any other means of transmission, be given in writing by certified mail and regular mail to the following address:

To the Master Developer:

Nate Shipp
Wildflower Developers, LLC
Exchange Place, Building B
14034 South 145 East, Suite 204
Draper, Utah 84020

With a Copy to:

Bruce R. Baird
Bruce R. Baird, PLLC
2150 South 1300 East, Suite 500
Salt Lake City, UT 84106

To the Owners and with Copies to as Shown on Exhibit "D":

To the City:

[_____]
[_____]
[_____]

With a Copy to:

[_____]
[_____]
[_____]

15.1 **Effectiveness of Notice**. Except as otherwise provided in this ARMDA, each Notice shall be effective and shall be deemed delivered on the earlier of:

15.1.1 Hand Delivery. Its actual receipt, if delivered personally or by courier service

15.1.2 Electronic Delivery. Its actual receipt if delivered electronically by email provided that a copy of the email is printed out in physical form and mailed or personally delivered as set forth herein on the same day and the sending party has an electronic receipt of the delivery of the Notice. If the copy is not sent on the same day, then notice shall be deemed effective the date that the mailing or personal delivery occurs.

15.1.3 Mailing. On the day the Notice is postmarked for mailing, postage prepaid, by First Class or Certified United States Mail and actually deposited in or delivered to the United States Mail. Any party may change its address for Notice under this ARMDA by giving written Notice to the other party in accordance with the provisions of this Section.

16. **Headings**. The captions used in this ARMDA are for convenience only and a not intended to be substantive provisions or evidences of intent.

17. **No Third-Party Rights/No Joint Venture**. This ARMDA does not create a joint venture relationship, partnership or agency relationship between the City, Owners and Master Developer. Further, the Parties do not intend this ARMDA to create any third-party beneficiary rights. The Parties acknowledge that this ARMDA refers to a private development and that the City has no interest in, responsibility for or duty to any third Parties concerning any improvements to the Property or the Project unless the City has accepted the dedication of such improvements at which time all rights and responsibilities—except for warranty bond requirements under the City's Vested Laws and as allowed by state law—for the dedicated public improvement shall be the City's.

18. **Assignability**. The rights and responsibilities of Owners and Master Developer under this ARMDA may be assigned in whole or in part, respectively, by Owners and Master Developer with the consent of the City as provided herein.

18.1 **Related Entity**. Owners' or Master Developer's transfer of all or any part of the Property to any entity "related" to Owners or Master Developer (as defined by regulations of the Internal Revenue Service in Section 165), Owners' or Master Developer's entry into a joint venture for the development of the Project or Owners' or Master Developer's pledging of part or all of the Project as security for financing shall also not be deemed to be an "assignment" subject to the above-referenced approval by the City unless specifically designated as such an assignment by the Owners or Master Developer. Owners or Master Developer shall give the City Notice of any event specified in this sub-section within ten (10) days after the event has occurred. Such Notice shall include providing the City with all necessary contact information for the newly responsible party.

18.2 **Notice**. Owners and Master Developer shall give Notice to the City of any proposed assignment and provide such information regarding the proposed assignee that the City may reasonably request in making the evaluation permitted under this Section. Such Notice shall include providing the City with all necessary contact information for the proposed assignee.

18.3 **Time for Objection**. Unless the City objects in writing within twenty (20) business days of notice, the City shall be deemed to have approved of and consented to the assignment.

18.4 **Partial Assignment**. If any proposed assignment is for less than all of Owners' or Master Developer's rights and responsibilities then the assignee shall be responsible for the performance of each of the obligations contained in this ARMDA to which the assignee succeeds. Upon any such approved partial assignment Owners and Master Developer shall not be released from any future obligations as to those obligations which are assigned but shall remain responsible for the performance of any obligations herein.

18.5 **Denial**. The City may only withhold its consent if the City is not reasonably satisfied of the assignee's financial ability to perform the obligations of Owners or Master

Developer proposed to be assigned or there is an existing breach of a development obligation owed to the City by the assignee or related entity that has not either been cured or in the process of being cured in a manner acceptable to the City. Any refusal of the City to accept an assignment shall be subject to the "Meet and Confer" and "Mediation" processes specified in Sections 5.5 and 5.7. If the refusal is subject to Arbitration as provided in Section 5.8 then the Parties shall follow such processes.

18.6 **Assignees Bound by ARMDA**. Any assignee shall consent in writing to be bound by the assigned terms and conditions of this ARMDA as a condition precedent to the effectiveness of the assignment.

19. **Binding Effect**. If Owner(s) sell(s) or conveys Parcels of lands to Subdevelopers or related Parties, the lands so sold and conveyed shall bear the same rights, privileges, and configurations as applicable to such Parcel and be subject to the same limitations and rights of the City when owned by Owners and as set forth in this ARMDA without any required approval, review, or consent by the City except as otherwise provided herein.

20. **No Waiver**. Failure of any Party hereto to exercise any right hereunder shall not be deemed a waiver of any such right and shall not affect the right of such party to exercise at some future date any such right or any other right it may have.

21. **Severability**. If any provision of this ARMDA is held by a court of competent jurisdiction to be invalid for any reason, the Parties consider and intend that this ARMDA shall be deemed amended to the extent necessary to make it consistent with such decision and the balance of this ARMDA shall remain in full force and affect.

22. **Force Majeure**. Any prevention, delay or stoppage of the performance of any obligation under this Agreement which is due to strikes, labor disputes, inability to obtain labor, materials,

equipment or reasonable substitutes therefor; acts of nature, governmental restrictions, regulations or controls, judicial orders, enemy or hostile government actions, wars, civil commotions, fires or other casualties or other causes beyond the reasonable control of the Party obligated to perform hereunder shall excuse performance of the obligation by that Party for a period equal to the duration of that prevention, delay or stoppage.

23. **Time is of the Essence**. Time is of the essence to this ARMDA and every right or responsibility shall be performed within the times specified.

24. **Appointment of Representatives**. To further the commitment of the Parties to cooperate in the implementation of this ARMDA, the City, Owners and Master Developer each shall designate and appoint a representative to act as a liaison between the City and its various departments and the Master Developer. The initial representative for the City shall be the City Administrator. The initial representative for Master Developer shall be Nate Shipp. The initial representative(s) for Owners shall be Nate Shipp. The Parties may change their designated representatives by Notice. The representatives shall be available at all reasonable times to discuss and review the performance of the Parties to this ARMDA and the development of the Project.

25. **Applicable Law**. This ARMDA is entered into in the City in the State of Utah and shall be construed in accordance with the laws of the State of Utah irrespective of Utah's choice of law rules.

26. **Venue.** Any action to enforce this ARMDA shall be brought only in the Fourth District Court for the State of Utah.

27. **Entire Agreement**. This ARMDA, and all Exhibits thereto, is the entire agreement between the Parties and may not be amended or modified except either as provided herein or by a subsequent written amendment signed by all Parties.

28. **Mutual Drafting**. Each Party has participated in negotiating and drafting this ARMDA and therefore no provision of this ARMDA shall be construed for or against any Party based on which Party drafted any particular portion of this ARMDA.

29. **Exclusion from Moratoria**. The Property shall be excluded from any moratorium adopted pursuant to Utah Code § 10-9a-504 unless such a moratorium is found on the record by the City Council to be necessary to avoid a physical harm to third parties and the harm, if allowed, would jeopardize a compelling, countervailing public interest as proven by the City with clear and convincing evidence.

30. **Estoppel Certificate.** Upon twenty (20) days prior written request by Owners, Master Developer or a Subdeveloper, the City will execute an estoppel certificate to any third party certifying that Owners, Master Developer or a Subdeveloper, as the case may be, at that time is not in default of the terms of this Agreement.

31. **Recordation and Running with the Land**. This ARMDA shall be recorded in the chain of title for the Property. This ARMDA shall amend, restate and replace the Original Development Agreement, and shall be deemed to run with the land. The data disks of the City's Vested Laws and the Master Utility Plan shall not be recorded in the chain of title. A secure copy of such data disks shall be filed with the applicable the City Recorder and each party shall also have an identical copy.

32. **Authority**. The Parties to this ARMDA each warrant that they have all of the necessary authority to execute this ARMDA. Specifically, on behalf of the City, the signature of the City Manager of the City is affixed to this ARMDA lawfully binding the City pursuant to Ordinance No. _____ adopted by _____ on _____, 2018;

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement by and through their respective, duly authorized representatives as of the day and year first herein above written.

MASTER DEVELOPER:

Wildflower Developers, LLC,
a Utah limited liability company

By: _____
Name: _____
Its: _____

MASTER DEVELOPER ACKNOWLEDGMENT

STATE OF UTAH)
:ss.
COUNTY OF SALT LAKE)

On the _____ day of _____, 2018, personally appeared before me _____, who being by me duly sworn, did say that he/she is the _____ of XXXX, LLC, a Utah limited liability company, and that the foregoing instrument was duly authorized by the company at a lawful meeting held by authority of its operating agreement and signed in behalf of said company.

_____
NOTARY PUBLIC

My Commission Expires: _____

Residing at: _____

_____, the holder of a mortgage on a portion of the Property, hereby consents to and agrees to be bound to, this ARMDA

[ ]:

_____
a _____

By: _____
Name: _____
Its: _____

MORTGAGE HOLDER ACKNOWLEDGMENT

STATE OF _____)
:ss.
COUNTY OF _____)

On the _____ day of _____, 2018, personally appeared before me _____, who being by me duly sworn, did say that he/she is the _____ of _____, a _____, and that the foregoing instrument was duly authorized by the company at a lawful meeting held by authority of its governing documents and signed in behalf of said company.

_____
NOTARY PUBLIC

My Commission Expires: _____

Residing at: _____

CITY

Saratoga Springs City,
a Utah political subdivision

By: _____
Name: _____
Its: _____

Approved as to form and legality:

_____
City Attorney

Attest:

_____
City Clerk

CITY ACKNOWLEDGMENT

STATE OF UTAH)
:ss.
COUNTY OF UTAH)

On the _____ day of _____, 2018 personally appeared before me _____who being by me duly sworn, did say that he/she is the _____ of Saratoga Springs City, a political subdivision of the State of Utah, and that said instrument was signed in behalf of the City by authority of its City Council and said _____ acknowledged to me that the City executed the same.

_____
NOTARY PUBLIC

My Commission Expires: _____

Residing at: _____

TABLE OF EXHIBITS

AFFP

47905-NOTICE

Affidavit of Publication

STATE OF UTAH } SS

COUNTY OF UTAH }

Jayne Dunn, being duly sworn, says:

That she is the Legals Billing Clerk of the Daily Herald, a newspaper of general circulation, printed and published in Provo, Utah County, Utah; that the publication, a copy of which is attached hereto, was published in the said newspaper on the following dates:

December 20, 2019

That said newspaper was regularly issued and circulated on those dates. Same was also published online at utahlegals.com, according to Section 45-1-101 – Utah Code Annotated, beginning on the first date of publication, for at least 30 days thereafter and a minimum of 30 days prior to the date of scheduled sale.

SIGNED:

Jayne Dunn

Subscribed to and sworn to me this 27th day of December 2019.

Willy Shaw

Willy Shaw, Notary Public, Utah County, Utah – My commission expires:
September 24, 2021

PUBLIC NOTICE

Notice is hereby given that the City Council of the City of Saratoga Springs, Utah, at their meeting of December 17th 2019, passed and adopted the following Ordinance:

1) Ordinance 19-40 (12-17-19) Approving a Master Development Agreement Amendment for Wildflower Development.

Copies of these Ordinances are on file in the office of the City of Saratoga Springs City Recorder and are available for review during City business hours. Legal Notice 47905 Published in The Daily Herald December 20. 2019.

WILLY SHAW
NOTARY PUBLIC-STATE OF UTAH
COMMISSION# 697006
COMM. EXP. 09-24-2021

CITY OF SARATOGA SPRINGS LEGAL
1307 N COMMERCE DR
SARATOGA SPRINGS UT 84045

Planning Commission Staff Report

Author: Gordon Miner, City Engineer
Subject: Revisions to the City's Std. Technical Specifications and Drawings
Date: May 14, 2020
Type of Item: Legislative Recommendation

A. Summary: The Engineering Department keeps a running list of minor and major changes that are needed to provide additional clarity and effectiveness, to remove inconsistencies, to reflect new "best practices" in Engineering, and to address changes in the community's needs, with the goal of adopting revisions every so often to keep the Standard Technical Specifications and Drawings current.

B. Funding Source: Not applicable.

C. Review: The proposed revisions have been reviewed by staff and it have been found to be acceptable and in legal form.

D. Recommendation and Alternatives: Staff recommends that the Planning Commission forward a positive recommendation to the City Council regarding the proposed revisions, with the following proposed motion:

Positive Recommendation

"I move to forward a **positive** recommendation to the City Council regarding these proposed revisions to the City's Standard Technical Specifications and Drawings."

Alternative Recommendation with Modifications

"I move to forward a **positive** recommendation to the City Council regarding these proposed revisions to the City's Standard Technical Specifications and Drawings with the following modifications:"

1. _____
2. _____
3. _____

Negative Recommendation

"I move to keep the City's Standard Technical Specifications and Drawings unchanged."

E. Attachments:

1. Proposed revisions to the City's Standard Technical Specifications and Drawings.

STANDARD
TECHNICAL SPECIFICATIONS
AND DRAWINGS
FOR
CITY OF SARATOGA SPRINGS, UTAH

UPDATED

July 16, 2019

CITY OF SARATOGA SPRINGS ENGINEERING DEPARTMENT
1307 N. Commerce Drive, Suite 200
Saratoga Springs, Utah 84045
Phone: (801) 766-9793
Fax: (801) 766-9794

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STANDARD LANDSCAPING DETAILS

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STANDARD STREET IMPROVEMENT DETAILS

DEFINITIONS

ACCEPTABLE EQUAL or ACCEPTED EQUAL: In order to establish a basis of quality and specificity for some items mentioned in the Work, certain processes, types of machinery and equipment, brands, or kind of material may be mentioned on the Accepted Plans by designating a manufacturer by name and referring to his brand or model numbers. Such mention is not intended to exclude Materials wherever in the Specifications a manufacturer's name, brand or model is mentioned, it is to be understood that the phrase "acceptable equal" is assumed to follow thereafter whether or not it does in fact follow.

ADDENDA: Written or graphic documents issued and signed or initialed by the Engineer, that clarify, correct or change the Contract Documents.

AGREEMENT: The duly executed written agreement between two parties. Other Contract Documents may be attached to or referred to in the Agreement and made a part thereof as provided therein. The Agreement shall include those documents specifically referred to in the signed document between the parties.

ACCEPTANCE: Acknowledgement by the City that documents stamped “Accepted” are in general compliance with the City’s preparation requirements of those documents. It is not an acceptance of responsibility or liability for the completeness and accuracy of those documents. Responsibility and liability for engineering documents resides with the licensed professionals and the professional firms who prepare them.

APPROVED EQUAL: Equipment or material which, in the opinion of the City’s Representative, is equal in quality, durability, appearance, strength, design, performance, physical dimensions, and arrangement to the equipment or material specified, and will function adequately in accordance with the general design.

AS-BUILT DRAWINGS: Drawings which show the Project as actually constructed, and which include any and all changes made to the construction plans before and during construction.

BEST MANAGEMENT PRACTICE (BMP): One of potentially several acceptable practices that could be implemented to protect water quality and promote soil conservation.

CHANGE ORDER: A document, which is signed by authorized representatives of the Contractor and the City and which authorizes an addition, deletion or revision in the Work, or an adjustment in the sum due the Contractor, or the Project completion time, issued on or after the date of the Agreement.

CITY INSPECTOR: The authorized representative of the City or Engineer assigned to make detailed inspections of the Work performed, or of materials furnished by the Contractor.

CITY/OWNER: Wherever, in the Contract Documents the word "City" or "Owner" appears, it shall be interpreted to mean "City of Saratoga Springs", unless otherwise denoted.

CONSTRUCTION ACTIVITIES: Clearing, dredging, excavating, and grading of land and other activities associated with buildings, structures or other types of real property such as utilities, bridges, dams and roads. Includes mobilization/demobilization and any other activity that occurs on site.

CONTAMINATION. The intentional or negligent placement or release upon real property of Hazardous Materials; the presence of an unwanted constituent, contaminant or impurity in a material.

CONTRACT DOCUMENTS: The written agreement between the City and the Contractor by which the Contractor agrees to perform the Work and furnish the labor, materials, tools, and equipment in the performance of the Work. The Contract Documents shall include, but not be limited to (unless the context clearly indicates otherwise), the Saratoga Springs City Specifications, Notice to Contractors, Request for Bids, the Contractor's Bid, Accepted Plans and Specifications, Special Conditions and Contract Bonds, and attached Exhibits; also any and all supplemental agreements amending or extending the Work contemplated. Supplemental agreements are written agreements covering alterations, amendments or extensions to the contract, and include contract Change Orders.

CONTRACTOR: The Contractor is the individual, person, or organization responsible for doing the Work. The Contractor is further defined as the individual, firm, co-partnership or corporation, and his, or its heirs, executors, administrators, successors and assigns, or the lawful agent of any such individual firm, partnership, or corporation, or its surety under the contract bond, which constitutes one of the principals to the contract and undertaking to perform the Work herein specified. Where any pronoun is used as referring to the word "Contractor" it shall mean the Contractor as defined above.

DATE OF PROJECT: The date of final Acceptance.

DAYS: Unless otherwise designated, days as used in the Specifications will be understood to mean calendar days including weekends and holidays.

DRAWINGS: The drawings, profiles section and details, or accurate reproductions thereof, accepted by the Engineer, which show the location, character, dimensions and details of the Work.

EMERGENCY: Any unforeseen circumstance or occurrence for which adequate preparations could not reasonably have been made to prevent such occurrence or circumstance, the occurrence of which constitutes a clear and immediate danger to persons and/or property, or which causes a substantial interruption of utility services, or any act of God, war, insurrection, invasion, tumult, riot, or public disaster, or imminent danger of any of these, civil commotion, conflagration, or other similar occurrence resulting in a clear and immediate danger to persons and/or property.

ENGINEER: The City Engineer, or his or her representative.

FINAL ACCEPTANCE OF PUBLIC INFRASTRUCTURE: The date specified in writing by the Engineer when all work, including all punch list work designated by the Engineer, is complete and accepted by the City after the completion of the warranty period following the Project Acceptance for Maintenance.

HAZARDOUS MATERIALS. (a) Any substances defined, regulated or listed (directly or by reference) as "hazardous substances," "hazardous materials," "hazardous wastes," "toxic waste," "pollutant," "contaminant" or "toxic substances" or similarly identified as hazardous to human health or the environment, in or pursuant to any of the following statutes: (i) the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. §9601 et seq. ("CERCLA"); (ii) the Hazardous Materials Transportation Act, 49 U.S.C. §1802, et seq.; (iii) the Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq.; (iv) the Clean Water Act, 33 U.S.C. §1251 et seq.; (v) the Clean Air Act, 42 U.S.C. §7401 et seq.; (vi) the Toxic Substances Control Act, 15 U.S.C. §2601 et. seq.; (vii) the Utah Air Conservation Act, U.C.A. §26-13-1 et. seq.; (viii) the Utah Water Pollution Control Act, U.C.A. §26-11-1 et. seq.; (ix) the Utah Safe Drinking Water Act, U.C.A. §26-12-1 et. seq.; (x) the Utah Solid and Hazardous Waste Act, U.C.A. §26-14-1 et. seq.; (xi) the Utah Hazardous Substance Mitigation Act, U.C.A. §19-6-301 et. seq.; (xii) the Utah Underground Storage Tank Act, §19-6-401 et. seq.; and/or (xiii) any amendments to such enumerated statutes or acts; and (b) Any other hazardous or toxic substance, material, chemical, waste, contaminant or pollutant identified as hazardous or toxic or regulated, under any other applicable federal, State or local environmental laws, including, without limitation, friable asbestos, polychlorinated biphenyl ("PCBs"), petroleum, natural gas and synthetic fuel products and by-products.

INSPECTED AND ACCEPTED or ACCEPTANCE: City recognition of conformance to all applicable City Standards.

LAND SURVEYOR: One who is duly and lawfully registered with the State of Utah Division of Occupational and Professional Licensing to perform land surveying within the State.

LAW: Any applicable City, County, State, or federal statutes or regulations governing anything relating to the Work embodied in the Agreement.

LOW-IMPACT DEVELOPMENT (LID): A development approach that promotes the implementation of BMPs that allow storm water to infiltrate, evapotranspire, or harvest and use storm water on site to reduce runoff from the site and protect water quality.

MATERIALS: The term “Materials” when used herein shall include the supply items and machinery and equipment required or used in the Work.

NOTICE OF AWARD: The written notice by the City to the apparent successful bidder stating that Contract Documents will be forthcoming for signature upon compliance with the conditions enumerated therein.

PAVEMENT: The uppermost layer of bituminous or Portland-cement concrete material placed on the traveled way or shoulders for a riding surface, whether rigid or flexible in composition. This term is used interchangeably with “surfacing.”

PAYMENT BOND, PERFORMANCE BOND: The accepted form of security furnished by the Contractor and its surety, as required in the Contract Documents guaranteeing respectively, payment and completion of Work.

PROFESSIONAL ENGINEER: A registered engineer who is licensed to practice in the State of Utah.

PROJECT MANUAL: The bound document package prepared for bidding and constructing the Project.

REFERENCE: Those bulletins, standards, rules, methods of analysis or test codes and specifications of other agencies, engineering societies, or industrial associations referred to in the Contract Documents. Unless otherwise indicated, these refer to the latest edition, including amendments in effect and published at the time of advertising the Project for bid or issuing the permit, unless specifically referred to by edition, volume or date.

RIGHT-OF-WAY (ROW): All public rights-of-way and easements, public footpaths, walkways and sidewalks, streets, roads, highways, alleys, and water or drainage ways. It does not, however, include Public Utility easements not within Public Ways of the City.

SHOP DRAWINGS: Drawings, diagrams, illustrations, schedules, brochures, standards performance charts, instructions, or other information prepared by or for the Contractor and submitted to the City to illustrate what materials, equipment or work is to be performed for any portion of the Agreement.

SPECIFICATIONS: Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

STANDARD DETAILS OR PLANS: The illustrative and extended treatment of or attention to particular items which accompany the Construction Specifications.

STANDARD SPECIFICATIONS: The Standard Technical Specifications and Drawings for the City of Saratoga Springs.

STREET. The entire width between the boundary lines of the road or way which is owned, maintained and open to the use of the public for use as a thoroughfare, or which is the principal means of access to abutting property; the entire width of every way defined as a public street or highway by the laws of this City or State.

STRUCTURAL BEST MANAGEMENT PRACTICE: A best management practice that can be physically installed.

SUBCONTRACTOR: The individual, firm, partnership or corporation to which the Contractor subcontracts any part of the Work covered by the Contract Documents.

SUBGRADE: That portion of the roadbed surface which has been prepared, as specified, and upon which a layer of specified roadbed material or base, or sub-surfacing, or pavement is to be placed.

SUBSTANTIAL COMPLETION: The point at which, in the opinion of the Engineer as evidenced by Engineer’s written notice to the Contractor, the Work (or specified part thereof) has progressed to where it is in a state of completion in accordance with the Contract Documents and Standard Specifications, so that the City can reasonably and safely utilize the facility for the purpose for which it is intended, and only insubstantial services and material are required to correct the unfinished or defective portions of the work, and the remaining work will not interfere with the facility’s intended use or occupancy.

SURFACE OR SURFACING: The uppermost layer of material placed on the traveled way or shoulders, and is usually of asphalt or concrete. This term is used interchangeably with “pavement.”

WORK: The construction services performed including materials on a City Public Works project and includes all labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor’s obligations to construct a project under these General Conditions. The term also includes the supervision, inspection, and other on-site functions incidental to the actual construction.

WORKMANSHIP: The level of quality of work accomplished on the project through: a) The Contractor’s maintenance of performance control and supervision over subcontractors, suppliers, manufacturers, products, services, and site conditions to produce work in accordance with Contract Documents. b) Compliance with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise skill and craft. c) Providing suitable qualified personnel to produce specified quality.

DIVISION 00

DESIGN STANDARDS

SECTION 00500

DESIGN STANDARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Codes and Standards

B. Design Standards

C. Construction Drawing Requirements

1.2 RELATED SECTIONS

A. Section 00620 - Documentation

1.3 SUBMITTALS

A. Construction Drawings

1. One copy of Construction Drawings shall be submitted to the City Engineer for preliminary review.
2. Two copies of Construction Drawings shall be submitted to the City Engineer for final acceptance with exhibit illustrating incumbent property. Requirements for Construction Drawings can be found in Part 2.03 of this section.
3. Five full size copies of Construction Drawings shall be submitted to the City Engineer before start of construction. These drawings shall be stamped by the City Engineer and distributed as required.

B. Easements and Land Acquisition

1. All easements and land acquisitions shall be submitted on the City's standard easement form and shall be included on the recorded subdivision plat.
2. All easements shall be accompanied by an exhibit illustrating encumbered property that is stamped, signed, and dated by a Utah-licensed professional land surveyor.
3. One copy of all necessary easement forms shall be submitted to the City Engineer for review.
4. One signed copy of all necessary easement forms, including exhibits, shall be submitted to the City Engineer for acceptance and recordation.
5. All necessary permits shall be submitted to the City Engineer for acceptance. Required permits include, but are not limited to: State and County utility line permits, canal crossing permits, railroad crossing permits, UPDES permits, Army Corp. of Engineer permits, encroachment, excavation, and grading permits, etc.
6. All necessary permits and easements must be submitted prior to acceptance being granted by the City.
7. Right-of-entry easements shall be provided for all storm drains, storm water devices, and grease traps.

1.4 CITY ENGINEER'S AUTHORITY

A. The City Engineer has authority to review submitted Construction Drawings for compliance to these Design Standards and Construction Specifications.

B. The City Engineer shall note any changes to Construction Drawings, required to bring Construction Drawings into compliance with these Design Standards and Construction Specifications.

C. Required changes shall be made to Construction Drawings and returned to the City Engineer for final acceptance. Requirements for Construction Drawings can be found in Part 2.03 of this section.

D. The City Engineer shall have additional authority such as is stated in these Design Standards and Construction Specifications.

PART 2 EXECUTION

2.1 CODES AND STANDARDS

A. Design for each category shall be based on the following Codes and Standards:

1. Sanitary Sewer Systems.
    a. ASCE Manual and Reports on Engineering Practice No. 60, Gravity Sanitary Sewer Design & Construction;
    b. Utah State Department of Health Code of Waste Disposal Regulations;
    c. Utah Division of Water Quality Administrative Rules for Design Requirements for Wastewater Collection, Treatment and Disposal Systems;
    d. Currently Adopted Plumbing Code; and
    e. National Electrical Code.
2. Drinking and Secondary Water Systems.
    a. State of Utah Administrative Rules for Public Drinking Water Systems;
    b. Currently Adopted Plumbing Code; and
    c. National Electrical Code.
3. Storm Drainage Systems.
    a. City's Standards and Technical Specifications, Storm Water Management Plan, and ~~Chapter 18.06~~ the Storm Water Regulations of the City Code.
    ~~a.~~b. All work not specifically-described in the City's Standards and Technical Specifications, Storm Water Management Plan, and the Storm Water Regulations of the City Code shall conform to the Mile High Flood District Urban Storm Drainage Criteria Manual.
4. Transportation System
    a. Guidelines, procedures and design criteria as defined by AASHTO, ITE, MUTCD, and ADA.

B. All Work not specifically-described in these design Standards and Technical Specifications shall conform to the APWA "Manual of STANDARD SPECIFICATIONS" as published by the Utah Chapter of the American Public Works Association. The latest edition at the time of the work shall be used.

~~B.~~ C. All Work not specifically-described in these design Standards and Technical Specifications or the APWA "Manual of STANDARD SPECIFICATIONS" shall conform to recognized and generally-accepted good engineering practices.

2.2 DESIGN STANDARDS

A. Infrastructure designs shall conform to the most recent City of Saratoga Springs current Capital Facilities and Master Plans; and to these design Standards and Technical Specifications.

1. These Design Standards are design guidelines. The City's design standards do not relieve the developer's engineer from being responsible for examining and understanding local project conditions, confirming the correlation of all design standards with the techniques of construction, coordination of the standards with that of all other industry standards, and for the complete and satisfactory design of the project.

B. SANITARY SEWER SYSTEMS:

1. The impact of any proposed sewer system, on the existing sewer system, will be reviewed by the City Engineer. The developer may be required to add additional off-site sewer systems in order to provide adequate sewer service to his development.
   a. Areas that will be serviced through the proposed development will be considered and the method of service to those areas will be determined by the City Engineer. Increased system size may be required by the City Engineer for future development.
   ~~a.~~b. Sewer lift stations are prohibited. Because the operation of a sewer lift station is a significant, long-term cost for the City and will affect the City budget long term, any exceptions to this prohibition must be specifically authorized by the City Council pursuant to its legislative discretion.
2. The minimum size of sewer main line shall be 8-inch diameter.
3. All sewer pipes shall be sized to a maximum 80% capacity.
4. Sewer lines shall be designed to maintain a minimum velocity of two feet per second (2 fps). The design flow shall be calculated based on equivalent residential connections in addition to a peaking factor depending on the size of sewer pipe. For 8-inch pipe, the peaking factor shall be 4.0. For pipe larger than 8-inches but less or equal to 15-inches, the peaking factor shall be 2.5. For all pipe larger than 15-inches, the peaking factor shall be 2.0.
5. The minimum sewer slopes shall be as follows:
   a. 8-inch sewer lines – 0.00334 foot/foot
   b. 10-inch sewer lines – 0.00248 foot/foot
   c. 12-inch sewer lines – 0.00194 foot/foot
   d. 15-inch sewer lines – 0.00144 foot/foot
   e. 18-inch sewer lines – 0.00113 foot/foot
   f. 21-inch sewer lines – 0.00092 foot/foot
   g. 24-inch sewer lines – 0.00077 foot/foot
   h. Larger than 24-inch per City Engineer's recommendation
6. The minimum sewer depth shall be 13.0 feet under normal conditions.
   a. In areas of shallower sewer, the following note shall be added to the development plat: "Shallow Sewer Depths! Contractor shall verify sewer depths before excavating for basement. Home(s) with basement may not have sewer

service available for basement."

b. The City Engineer may increase the minimum sewer depth if required to meet overall system requirements.

7. A minimum of three feet of cover shall be required over all sewer lines, where acceptable to the City Engineer.

8. Sewer shall be located at 10-foot minimum horizontal distance from drinking waterlines.

9. Where possible, sewer shall be located at 10-foot minimum horizontal distance from all other public utilities, including but not limited to storm drains, and secondary water lines.

~~9.~~10. State approval is required before sewer mains or laterals can be constructed over the top of culinary lines.

~~10.~~11. Sewer main lines shall be extended to property lines to service future Development and end with manhole.

~~11.~~12. In the locations where the sewer leaves the public right-of-way a twenty-foot wide sanitary sewer easement will be required. This easement shall be centered on the sewer line. Sewer easements shall extend ten feet beyond dead end manholes. Show easements on the development plat and on the City's Standard Easement forms, which grant the easements to the City. Easements must be executed and returned to the City Office prior to acceptance being granted.

~~12.~~13. No plugged ends of sewer main lines will be allowed. Manholes must be constructed at the ends of sewer lines.

~~13.~~14. The minimum size manhole shall be 4-foot diameter.

~~14.~~15. 5-foot diameter manholes shall be used in the following situations:

a. At all intersections of three or more 8-inch or larger pipe lines.
b. Where the deflection angle of the pipe line exceeds 90 degrees.
c. When both items "a" and "b" are designed in the same manhole, a six-foot manhole is required.

~~15.~~16. A 12 foot paved access road shall be constructed to all manholes and shall be capable of supporting H-20 loading. Where future development renders the vertical alignment of an access road uncertain, the pavement requirement can be postponed until the adjacent land develops. However, the developer shall be required to post a cash only bond with the City to guarantee completion of such pavement with an automatic escalation clause to account for inflation and cost increases.

~~16.~~17. Where new sewer lines are connected to existing sewer lines, a 5-foot diameter manhole shall be constructed over the existing sewer line.

~~17.~~18. Manhole Spacing:

a. The maximum manhole span shall be 400 feet, as measured from center to center of manholes.
b. When sewer line depth is between 20' and 29', decrease the manhole span to 350'. When depths of greater than 30' are encountered, decrease the span to 300'.

~~18.~~19. Unless otherwise approved by the City Engineer, the minimum drops through manholes shall be as follows:

i. Greater than 90° - 0.3 foot drop
ii. 75° - 90° manholes – 0.2 foot drop
iii. 25° - 74° manholes – 0.1 foot drop
iv. 0° - 24° manholes – the grade through the manhole shall be equal to the incoming pipe slopes with a maximum drop of 0.20 feet across the manhole.

~~19.~~20. Where pipes of different diameters melding laterals connect into a manhole, the inside top of the smaller pipe shall match the inside top of the larger pipe.

~~20.~~21. Where incoming slopes at manholes are greater than or equal to 5 percent and the deflection angle within the manhole is greater than or equal to 45 degrees but less than 90 degrees, a five-foot manhole with an extra deep trough is required.

a. Where incoming slopes at manholes are greater than or equal to 5 percent and the deflection angle within the manhole is greater than 90 degrees, a six-foot manhole with an extra deep trough is required.

~~21.~~22. The benching of the extra deep trough shall be located 25% higher than the diameter of the incoming pipe. The minimum lateral size shall be 4-inch for residential connections; and 6-inch for commercial and industrial connections.

a. Sewer lateral shall have a minimum slope of 2%.

~~22.~~23. Sewer laterals shall tie directly into manholes in cul-de-sacs and at dead end manholes.

~~23.~~24. Sewer laterals may tie directly into manholes wherever possible and practical.

~~24.~~25. Sewer laterals shall conform to the requirements of the Utah State Department of Health Code and the currently adopted plumbing code; with cleanouts at not more than 100-foot spacing; and no more than two bends in excess of 45 degrees without a cleanout.

~~25.~~26. Each building and/or unit of separate ownership shall require a separate sanitary sewer lateral.

~~26.~~27. Grease traps shall be required on all commercial development where food service uses are anticipated.

a. Sampling manholes shall be installed downstream of all grease traps.
b. Sampling manhole & grease trap shall be constructed as per TSSD Standards & Specifications and it shall be accepted and inspected by the Timpanogos Special Service District.
c. Sampling manhole and grease trap must inspected and maintained per the Utah Health Code and Utah County Health Department regulations.

~~27.~~28. Force main discharge manholes shall be epoxy lined or acceptable equal.

~~28.~~29. Sewer Mains shall be located as indicated on the City's Standard drawings and shall be located in ROW or dedicated open spaces.

C. DRINKING WATER SYSTEMS:

1. The State of Utah Administrative Rules for Public Drinking Water Systems, R309-510, provide minimum sizing requirements for drinking water facilities. All pipe and appurtenances shall be ANSI/NSF 61 certified.
2. Water systems shall be sized as described in the City's Capital Facilities & Master Plans and shall be a minimum of 8" in public right-of-way.
3. The minimum fire flow shall be as per state standards. The fire flow may be increased as determined by the City Fire Marshal.
4. The minimum operating pressure in all parts of the system during peak day demand is to be 40 psi.

5. The maximum operating pressure is to be 100 psi. Higher pressures can be used with acceptance from the City Engineer, based on pipe strength, the presence and nature of service connections, and the potential for transient pressure surges in the subject area of the system.
6. Water systems shall be designed so that pressures conform to the pressure zones shown in the City's Capital Facilities Plan.
7. The construction drawings shall show pipe sizes, types, and classifications.
    a. All water system appurtenances shall be labeled
8. Individual home booster pumps are not allowed.
9. The impact of any proposed water system on the existing water system will be reviewed by the City Engineer. The developer may be required to add additional off-site infrastructure in order to provide adequate water supply to his development.
    a. Areas that will be supplied through the proposed development will be considered and the method of service to those areas will be determined and accepted by the City Engineer. Increased system size may be required for future development as outline in the City's Drinking Water Master Plan and as dictated by the City's water modeling.
    b. The City Engineer shall consider and accept the system storage requirements for each development.
10. The minimum cover over top of water lines is to be 48 - 72-inches.
11. Water lines up to and including 24 in diameter shall be AWWA C900 DR 18. Water lines larger than 24 in. shall be ductile iron Class 250. Pipeline pressure class and /or design ratio may need to be increased as directed by the City Engineer depending on hydraulic surge, depth of cover, or transient pressures.
12. Valves 12 inches or larger shall be butterfly valves; Valves smaller than 12 inches shall be gate valves.
13. Water lines shall be placed in the park strips as required by the City Standards.
    a. Location shall be on the east side of north/south streets.
    b. Location shall be on the north side of east/west streets.
14. Valve placement:
    a. Valves shall be placed at the point of curvature of the curb and gutter radius sections.
    b. Valves shall be placed at intervals not to exceed 800 feet.
    c. At intersections, valves shall be placed on at least three branches of the system.
    d. Valves shall be placed within 10 feet of the upstream and downstream ends of casing pipes.
    e. Valve nut elevation shall not exceed 4 feet below finished grade without extension.
    f. Valves shall be placed at connections to existing infrastructure.
15. Blow-offs shall be placed at the ends of water lines, at low points in the system, and at other locations as shown on the City's Standard drawings. Alternatively, fire hydrants may be used to fulfill this requirement.
16. Fire Hydrants:
    a. Fire hydrants shall have a maximum spacing of 500 feet in residential areas; and a maximum spacing of 300 feet in commercial and industrial areas.
    b. Fire hydrants shall be placed at the end of cul-de-sac pipe lines, the end of dead

end streets, and every 1,000 feet on offsite transmission lines. Temporary hydrants may not be considered as fire protection hydrants; but shall be used for flushing and maintaining lines.

c. Fire hydrant spacing shall be accepted by the City Fire Chief; additional fire hydrants may be required by the City Fire Chief.

17. Air-Vacuum Valve Stations:

    a. Air-vacuum valve station venting shall be located in a landscaped area near the edge of the right-of-way (ROW).

    b. Air-vacuum valve stations shall be placed at high points on transmission lines and at other locations as required for proper system operation.

    c. Air-vacuum valve stations shall be constructed as indicated on the drawings.

18. Water Service Connections shall include the corporation stop at the main line, CTS Poly service line to the meter yoke, an angle stop, back-flow angle valve, PVC meter box, and cast iron frame and cover, as shown on the City Standard drawings.

19. In the locations where the water lines leave the public right-of way a ten-foot wide easement will be required. This easement shall be centered on the water line. Water easements shall extend ten feet beyond dead ends and hydrants. Show easements on the development plat and on the City's Standard Easement forms, which grant the easements to the City. Easements must be executed and returned to the City Office prior to final acceptance being granted.

20. Each building and/or unit of separate ownership shall require a separate water service line.

21. PRESSURE REGULATING STATIONS shall be constructed, where required to provide water supply between pressure zones, as indicated on the City Standard drawings.

    a. The station plumbing shall consist of a main line and a by-pass line. The combined capacity of the main line and by-pass plumbing shall equal the capacity of the incoming pipe line. The main line will normally be one pipe size smaller than the incoming line and the by-pass line will be sized as required.

    b. Plumbing will include pressure regulating valves on each line, isolation valves on each side of each regulating valve, and all appurtenant plumbing items, as indicated on the standard drawings.

22. Drinking water main lines shall be extended to property lines to service future development and shall end with blow-off or hydrant.

23. Dead-end mains shall not exceed 600 feet in length.

24. The maximum allowable deflection of pipe joints shall be less than or equal to half of the manufacturer recommended maximum deflection.

D. SECONDARY WATER SYSTEMS:

1. Secondary Water systems shall be sized as described in the City's Capital Facilities Plan and shall be a minimum of 6" in public right-of-way.

2. The normal minimum operating pressure in all parts of the system during peak day demand shall be 30 psi.

3. The maximum operating pressure is to be 90 psi. Higher pressures can be used with acceptance from the City Engineer, based on pipe strength, the presence and nature of service connections, and the potential for transient pressure surges in the subject area of the system.

4. The maximum pipe line flow velocities will be 6 feet per second.

5. The impact of any proposed water system on the existing water system will be reviewed by the City Engineer. The developer may be required to add additional off-site infrastructure in order to provide adequate water supply to his development.
6. Areas that will be supplied through the proposed development will be considered and the method of service to those areas will be determined by the City Engineer. Increased system size may be required for future development as outlined in the City's Secondary Water Master Plan and as dictated by the City's water modeling.
7. The City Engineer shall consider and accept the system storage requirements for each development.
8. The minimum cover over top of water lines is to be 36 – 72-inches.
9. Secondary water lines shall be placed in the park strips as required by the City Standards.
    a. Location shall be on the west side of north/south streets.
    b. Location shall be on the south side of east/west streets.
    c. Location shall be on the opposite side of the street from drinking water lines.
10. Water lines up to and including 24 inches in diameter shall be AWWA C900 DR 18 purple in color. Water lines larger than 24 in. shall be ductile iron Class 250. Pipeline pressure class and/or design ratio may need to be increased as directed by the City Engineer depending on hydraulic surge, depth of cover, or transient pressures.
11. Valve placement:
    a. Valves shall be placed at the projection of the end of curb and gutter radius sections at the point of curvature.
    b. Valves shall be placed at intervals not to exceed 800 feet.
    c. At intersections, valves shall be placed on at least three branches of the system.
    d. Valves shall be placed within 10 feet of the upstream and downstream ends of casing pipes.
    e. Valves shall be placed at connections to existing infrastructure.
12. Blow-offs shall be placed at the ends of water lines at the low points in the system, and at other locations as shown on the City's Standard drawings.
13. Water Service Connections shall be constructed as shown on the City Standard drawings.
14. In the locations where the water lines leave the public right-of way a ten-foot wide easement will be required. This easement shall be centered on the water line. Water easements shall extend ten feet beyond dead ends. Show easements on the development plat and on the City's Standard Easement forms, which grant the easements to the City. Easements must be executed and returned to the City Office prior to acceptance being granted.
15. Each building and/or unit of separate ownership shall require a separate water service line.
16. PRESSURE REGULATING STATIONS shall be constructed, where required to provide water supply between pressure zones, as indicated on the City Standard drawings.
    a. The station plumbing shall consist of a main line and a by-pass line. The combined capacity of the main line and by-pass plumbing shall equal the capacity of the incoming pipe line. The main line will normally be one pipe size smaller than the incoming line and the by-pass line will be sized as required.
    b. Plumbing will include pressure regulating valves on each line, isolation valves on each side of each regulating valve, and all appurtenant plumbing items, as

indicated on the standard drawings.

17. Air-Vacuum Valve Stations:
    a. Air-vacuum valve station venting shall be located in a landscaped area near the edge of the right-of-way (ROW).
    b. Air-vacuum valve stations shall be placed at high points on transmission lines and at other locations as required for proper system operation.
    c. Air-vacuum valve stations shall be constructed as indicated on the drawings.
18. Drains shall be installed at all low points on pressure irrigation lines.
19. Secondary water main lines shall be extended to property lines to service future Development and end with blow-off.
20. Permanent dead-end mains shall not exceed 600 feet in length.
21. The maximum allowable deflection of pipe joints shall be less than or equal to half of the manufacturer recommended maximum deflection.

E. STORM DRAIN SYSTEMS:

1. The impact of any proposed storm drain system on the existing drainage system will be reviewed by the City Engineer. The developer may be required to add additional off-site storm drain systems in order to provide adequate drainage control for his development.
2. Areas that will be drained through the proposed development will be considered and the method of drainage for those areas will be determined by the City Engineer. Increased system size may be required by the City Engineer for future development.
~~2.~~3. Public and private storm drainage shall not be comingled unless the private property owners choose to accept public storm drainage onto their property, grant an easement to the City accepting the drainage as theirs, and release and indemnify the City from potential liabilities associated with it.
~~3.~~4. Physical parameters of a drainage basin, such as drainage basin area, length, and slope shall be obtained using a current topographic map and existing storm drain facilities. In areas of proposed development, physical parameters shall be obtained from the development concept.
~~4.~~5. For storm drain design, rainfall depth and intensity shall be defined as shown in the Table 1.

Table 1. Precipitation Frequency Estimates with 90% Confidence Intervals (inches)

Duration	Average Recurrent Interval		
	2-yr	10-yr	100-yr
5-min	0.15	0.26	0.51
10-min	0.23	0.40	0.78
15-min	0.28	0.49	0.96
30-min	0.38	0.66	1.29
60-min	0.47	0.82	1.60
2-hr	0.57	0.92	1.73
3-hr	0.64	0.98	1.74
6-hr	0.81	1.16	1.84
12-hr	0.98	1.39	2.06
24-hr	1.10	1.51	2.11

~~5.~~6. There are two standard methods that are acceptable for estimating the peak runoff and volumetric runoff: the Federal Aviation Administration (FAA) Method and a dynamic hydrograph simulation model.

a. The FAA Method:

i. Peak Runoff Equation – [Q=CIA] where,

Q = Instantaneous Peak Runoff (cfs)
C = Runoff Coefficient (see Table 2)
I = Average Intensity (inches/hour)
A = area (acres)

ii. Time of Concentration – defined as the time to peak discharge. Time of concentration shall be calculated using the method found in the Natural Resources Conservation Service Technical Release 55, June 1986 (TR-55). TR-55 contains a sample worksheet (Worksheet 3), which can be used to calculate the time of concentration. The minimum allowable time of concentration to be used in runoff calculations shall be 5 minutes. Careful consideration should be given to each subbasin, including separate consideration of subbasin portions (such as paved areas) that have the potential of producing a higher peak runoff than the whole basin.

iii. Rainfall Intensity – The rainfall intensity shall be calculated from the precipitation-frequency table in Table 1. The duration is assumed to equal the time of concentration. The required design storm frequency is also defined in from Table 1.

iv. The runoff coefficients in Table 2 shall be used.

Table 2. Runoff Coefficient for Rational Method

Surface	2-yr	10-yr	100-yr
Landscaping	0.01	0.07	0.44
Roofs	0.74	0.78	0.84
Paved	0.84	0.86	0.89

v. For volumetric runoff, this method may only be used when considering a single detention basin. Detention basins that operate in-series (cascading), must be analyzed using a dynamic hydrograph simulation model.

vi. This method is not acceptable for a catchment greater than 50 acres.

b. Dynamic Hydrograph Simulation Model

i. The following constitute an acceptable list of softwares: AutoDesk® SSA, HEC-HMS, and SWMM.

ii. Acceptable hydrology methods within AutoDesk® SSA include HEC-1, EPA SWMM, and TR-55. If using TR-55, separate subbasins for pervious and impervious areas shall be created to be in compliance with the requirements described below. Use of other hydrology methods is not allowed.

iii. There are four main input categories in a dynamic hydrograph simulation model, which are: design storm, loss method, transform method, and routing method. The design storms shall be obtained using the procedure described below. For the loss, transform and routing methods, there are often multiple options that can be selected within a given model. Below is a description of approved methods.

(a). Design Storm Distribution and Duration – Cloudburst rainfall events in Utah typically have durations ranging from a few

minutes to three hours. Storms producing widespread rainfall over longer periods are rare, and are typically associated with slower-moving tropical storm remnants. Table 3 shall be used for sizing drainage and storm water facilities.

Table 3. Design Storm Distributions (inches)*

Time (min)	Return Period		
	2-yr	10-yr	100-yr
0	0.0000	0.0000	0.0000
5	0.0073	0.0067	0.0058
10	0.0073	0.0067	0.0058
15	0.0073	0.0067	0.0058
20	0.0073	0.0067	0.0058
25	0.0073	0.0067	0.0058
30	0.0073	0.0067	0.0058
35	0.1342	0.2337	0.4560
40	0.1060	0.1845	0.3600
45	0.0739	0.1287	0.2512
50	0.0471	0.0820	0.1600
55	0.0283	0.0492	0.0960
60	0.0217	0.0377	0.0736
65	0.0160	0.0279	0.0544
70	0.0122	0.0213	0.0416
75	0.0094	0.0164	0.0320
80	0.0085	0.0148	0.0288
85	0.0075	0.0131	0.0256
90	0.0061	0.0107	0.0208

Table 3. Design Storm Distributions (inches)*

Time (min)	Return Period		
	2-yr	10-yr	100-yr
95	0.0073	0.0067	0.0058
100	0.0073	0.0067	0.0058
105	0.0073	0.0067	0.0058
110	0.0073	0.0067	0.0058
115	0.0073	0.0067	0.0058
120	0.0073	0.0067	0.0058
125	0.0073	0.0067	0.0058
130	0.0073	0.0067	0.0058
135	0.0073	0.0067	0.0058
140	0.0073	0.0067	0.0058
145	0.0073	0.0067	0.0058
150	0.0073	0.0067	0.0058
155	0.0073	0.0067	0.0058
160	0.0073	0.0067	0.0058
165	0.0073	0.0067	0.0058
170	0.0073	0.0067	0.0058
175	0.0073	0.0067	0.0058
180	0.0073	0.0067	0.0058

*These design storms capture the critical elements of shorter-duration storms that often control in subbasins with short times of concentration.

(b). Loss Method – The NRCS Curve Number Loss Method shall be used. The primary input parameter for this method is the runoff Curve Number (CN). As described below, for developed areas, the percent of impervious area is also entered. The initial abstraction is typically left blank. The program will calculate the initial abstraction based on the CN using the equation documented in TR-55.

(i) CN for Pervious Areas – Table2-2a-d in TR-55 shall be used to determine CNs. A composite CN may be used to estimate runoff from areas with pervious surfaces.

(ii) Soil Classification – In order to estimate the CN, the hydrologic soil group classification for the drainage basin must be determined. The hydrologic soil groups shall be obtained as defined in Section 2.2.

(iii) Modeling Impervious Areas – The directly-connected impervious area (DCIA) should be used when modeling developed areas. When modeling a developed subbasin to estimate storm water runoff, the pervious and impervious areas must be modeled using separate subbasins. Some methods, including TR-55, suggest that a composite CN can be selected that will account for impervious area. However, in western areas of the country including Utah, those methods tend to underestimate the runoff potential for the impervious areas and may not be used. As described above, most dynamic hydrograph simulation models are capable of modeling DCIAs by simply entering a percentage of a subbasin that is DCIA. Other models/software may require that two separate subbasins be modeled, one for the pervious area, and one for the DCIA. Regardless of the model or method selected, the final results must be based on separate consideration of pervious and impervious drainage and may not use a composite CN for these two drainage types.

(c). Transform Method – The NRCS Unit Hydrograph Transform Method shall be used. This method requires the input of a single variable: lag time.

(i) Lag Time for Natural Watersheds - The U.S. Army Corps of Engineers version of Snyder's equation shall be used to calculate the lag time for natural watersheds (USBR, 1989) as shown below:

$$\text{Lag Time} = C_t \left(\frac{LL_{ca}}{S^{0.5}} \right)^{0.33}$$

C_t = 1.6
L = Length, in miles, of the longest watercourse
L_{ca} = Length, in miles, along L to the centred of the basin
S = Overall drainage basin slope, in feet/mile.

(ii) Lag Time of Urban Areas - The lag time for small urban areas should be assumed to be equal to the time of concentration. TR-55 contains a sample worksheet (Worksheet 3) that can be used to calculate the time of concentration.

(d). Routing Method - The Muskingum-Cunge method shall be used for routing runoff hydrographs. This method uses "reaches" to connect subbasins. Examples of reaches in the real world include open channels and pipes. This method requires that the following parameters be input:

(i) Length – Total length of the reach element.

(ii) Slope – Average slope for the entire reach.

(iii) Invert – Optional. Typically not used.

(iv) Cross Section Shape – Multiple cross sections are available to select from. Depending on the cross section chosen, additional information is required (i.e. diameter, side slope).

(v) Manning's "n" – Average value for the entire reach. Typical values for Manning's "n" used for storm drain conveyance facilities area shown in Table 4.

Table 4. Values of Manning's Coefficient (n) for Channels and Pipes

Conduit Material	Manning's n
Plastic pipe	0.012
Steel/cast iron pipe	0.013
Concrete pipe	0.013
Corrugated metal pipe	0.025
Concrete-lined channel	0.015
Excavated or Dredge Channels	
Earth channel - straight and uniform	0.025
Earth channel - winding, fairly uniform	0.03
Rock	0.04
Unmaintained	0.065
Natural Channel	
Fairly regular section	0.06
Irregular section with pools	0.07

~~6.~~7. Storm drain facilities, consisting of drainage channels, bridges, streets, culverts, storm drain pipe lines, and appurtenant structures, shall be designed to convey the anticipated storm water discharge:

a. The drainage system shall be capable of passing the storm runoff from a 100-year event without flooding buildings.

b. Bridges shall be designed to convey a 100-year storm event.

c. Culverts shall be designed to convey a 100-year storm event.

d. Streets shall be designed to convey the 100-year discharge from upstream to downstream (i.e. avoid local street sags or low points).

e. Storm drain lines shall be designed to convey 10-year storm event and shall not be pressurized. Where a flood control detention pond is required, storm drain lines and inlets shall be upsized as necessary to ensure that 100-year flows are conveyed to that detention pond.

f. Drainage channels shall have a minimum of 2' of free board above the 100-year high water elevation.

g. Drainage channels shall be designed to convey the 100-year storm event.

h. Drainage channels shall be designed to prevent erosion, according to Federal Highway Administration Hydraulic Engineering Circular (HEC) Number 15.

~~7.~~8. Drainage structures shall be constructed as indicated on the City Standard drawings.

~~8.~~9. Cleanout boxes shall be located at every change in alignment or slope and at junctions with other lines.

~~9.~~10. Inlet boxes shall be placed as follows:

a. Spaced at no more than 400 feet apart to collect sheet flow of storm water.
b. Located at the uphill end of curb returns, unless one is already needed on the downhill side due to slope constraints
c. On lot lines, where practical.

~~10.~~11. Maximum spans between structures shall be 400 feet from center to center of structures.

~~11.~~12. All storm drains under pavement or curb shall be constructed with reinforced concrete pipe; with minimum size of 15-inch diameter.

~~12.~~13. Storm drain lines shall be designed such that the maximum velocity does not exceed 20 ft/sec and that the minimum velocity is at least 3 ft/sec.

~~13.~~14. The minimum pipe slopes shall be per Table 5:

Table 5. Minimum Pipe Slopes in Concrete Storm Drains

Pipe Size (in)	Full Pipe Flow (cfs)	Minimum Slopes (ft/ft)
8	1.1	0.0075
10	1.6	0.0056
12	2.4	0.0044
15	3.7	0.0032
18	5.3	0.0026
21	7.2	0.0021
24	9.4	0.0017
27	11.9	0.0015
30	14.7	0.0013
33	17.8	0.0011
36	21.2	0.0010
42	28.9	0.0008
48	37.7	0.0007
54	47.7	0.0006
60	58.9	0.0005
66	71.3	0.0005
72	84.8	0.0004

~~14.~~15. Minimum cover shall be as per manufacturer's recommendation over all reinforced concrete drain lines.

~~15.~~16. Storm drains shall be located as indicated on the City's Standard drawings and shall be located in ROW or dedicated open spaces.

~~16.~~17. Where pipes of different diameters connect into a drainage structure, the inside top of the smaller pipe shall match the inside top of the larger pipe.

~~17.~~18. A 12 foot paved access road shall be constructed to all manholes and shall be capable of supporting H-20 loading. Where future development renders the vertical alignment of an access road uncertain, the pavement requirement can be postponed until the land develops. However, the developer shall be required to post a cash only bond with the City to guarantee completion of such pavement with an automatic escalation clause to account for inflation and cost increases

~~18.~~19. Sump manholes designed to infiltrate water are not permitted.

~~19.~~20. Storm drain lines shall be extended to property lines to accommodate future development and shall end at a manhole.

~~20.~~21. In the locations where the storm drain leaves the public right-of-way a twenty-foot wide drainage easement will be required. This easement shall be centered on the drain line. Drainage easements shall extend ten feet beyond dead end structures. Show easements on the development plat and on the City's Standard Easement forms, which grant the easements to the City. Easements must be executed and returned to the City Office prior to final acceptance being granted.

~~21.~~22. Storm Water Treatment Systems shall be constructed at all new points of connection to the City's Storm Drain System and prior to any discharge to a drainage, river, or lake. Treatment systems shall meet the following criteria:

a. Treatment systems shall be designed to treat all of the flow from developed areas with no bypass into the City storm water system of the treatment design storm parameters.
b. Treatment systems shall be designed to 80% of the total suspended solids (TSS) 110 microns or larger from the storm water.
c. Treatment systems shall be designed to remove the discharges of oil that cause a film or sheen upon or cause discoloration of the surface of the water.
d. Treatment systems shall be designed to remove all floatables from the storm water.
e. Treatment systems shall be sized to treat 100 percent of the first flush (2-year storm event) and to pass the 100 year peak flow with no washout of stored pollutants.
f. Only products that have been approved for pretreatment by the Washington Department of Ecology under general use level designation (GULD) or conditional use level designation (CULD) shall be allowed.

~~22.~~23. Energy dissipation is required at all enclosed-to-open-channel and open-to-enclosed-channel transitions and shall be designed according to ~~Urban Drainage and~~the Mile High Flood ~~Control~~ District Urban Storm Drainage Criteria Manual.

~~23.~~24. Detention and Retention Systems.

a. The capacity of all detention systems shall be sufficient to contain the anticipated runoff volume from the 100-year storm event, using the methods previously described, over those portions of the gross aggregate area under design; with a maximum release of 0.2 cfs/acre. A lesser release rate may be required based on system capacity in the subject area of the system.
b. Public and private systems shall be constructed as described and as shown in the City's Standards.
c. Flood control detention is not required when there is a surface runoff route directly to Utah Lake or the Jordan River, excluding all tributary channels that might receive flow downstream of the subject area.
d. A pipeline is required under ponds, or a concrete-lined low-flow channel through

the bottom of ponds, to convey flows that are less than the capacity of the outlet.

e. Detention system capacity may not be reduced due to evaporation.

f. Ponds are to be landscaped per City's Standards except for above-ground detention in private parking lots.

g. Provide access roads to all inlet/outlet structures with a maximum slope of 15 percent.

h. All ponds, except for above-ground detention in private parking lots that spill to a street, shall have a minimum of 1' of free board above the 100 year high water elevation. However, above-ground detention ponds in private parking lots shall provide 1' of freeboard to the finished floor of habitable structures.

i. Above-ground detention ponds in private parking lots shall have a maximum ponded depth of 8 inches in parking stalls.

j. Maximum interior and exterior slopes shall be 3:1.

k. Detention ponds may not be located within residential lots except for a single-phase subdivision. Detention ponds on residential building lots shall be designed pursuant to City Standards. The property owner of the residential lot on which a detention pond is located shall be responsible to maintain all surface improvements. This responsibility shall be noted on the subject lot on the plat, and easements shall be granted to the City for all underground improvements. The City shall maintain underground improvements.

l. A structural BMP must be placed upstream of the orifice plate to catch trash/debris.

m. Orifice plates must be located such that they can be cleaned off when the pond is full. The minimum size of orifice opening shall be 3.14 square inches. Every effort shall be made by the engineer to minimize the head over the minimum size orifice.

n. ~~If allowed by the City, retention~~LID systems shall be privately-owned-and operated.

o. Underground storage systems that are not designed to infiltrate water into the ground shall be lined with a durable impermeable barrier. Geomembrane systems shall include a PVC or HDPE liner that is at least 140 mils thick with a needle-punched non-woven geotextile protective layer.

p. ~~Retention~~ LID systems are ~~allowed~~ required and must ~~if they~~ retain ~~no more than~~at least ~~0.50~~0.41 inches of rain ~~if they and~~ are shown to be feasible using the City's outline for "~~Storm Water Retention and Infiltration~~ Low-Impact Development Systems Feasibility Study," which shall include the following content:

   i. General

      (a). Description of Location. The report must clearly identify the location of the development site by address. Latitude and Longitude coordinates are to be provided if an address is not available or applicable. The report must include an aerial image of the site showing property boundaries, adjacent developments or reference points including roads, and the locations of the infiltration site(s).

      (b). Topography. The report must describe the pre and post-development site topography including vegetative types and land surface contours at a minimum of 1-foot intervals.

      (c). ~~Maximum~~Minimum Allowable Retention Volume. The ~~maximum~~minimum allowable retention volume shall be ~~0.55~~0.41 inches across the subject area, which is the ~~90~~80th percentile storm depth for the Saratoga Springs vicinity.

ii. Control through Ground Water Infiltration

(a). Subsurface Testing and Analysis

(i) A geotechnical study is to be completed on the site that evaluates the applicability and feasibility of storm water retention and infiltration. The study must include a site investigation sufficient to evaluate and address the following issues.

(ii) Test Pits or Borings. Test pits or borings must obtain samples sufficient to provide representative samples from infiltration site(s). Samples must be taken at appropriate depths for the proper design of the development per the recommendation of a geotechnical engineer.

(iii) Soil profile descriptions. Test pit or boring data are to be used to prepare a description of the soil profile throughout the depth required for the development. Analyses shall include soil type and soil permeability.

(iv) High Water Table. The historic high water table is to be determined based on local ground water data (if available) and test pit(s) or boring(s). The data is to be used to evaluate any negative historic or potential impacts on the development through ground water infiltration.

(v) Bedrock. Test pit(s) or boring(s) are to identify bedrock encountered and evaluate the potential impact bedrock may have from the infiltration of storm water runoff.

(vi) One-Dimensional Oedometer Test. This test commonly referred to as the consolidation test is to be performed under the direction of a geotechnical engineer and used to evaluate the compression or swelling potential of the soil. The geotechnical engineer shall document the results of this test on all samples and determine the effect of infiltration at the site(s) on the proposed development or adjacent development(s).

(vii) Field and/or Lab testing data summary. All field observation and laboratory testing data must be summarized with appropriate statements interpreting and clarifying conclusions from the data.

(viii) Calculation of Infiltration rate(s). Data collected as part of A(b)i and A(b)ii above will be used by the geotechnical engineer to calculate the infiltration rate of the soil at the proposed infiltration site(s). The engineer shall make a statement regarding the feasibility of on-site infiltration.

(ix) BMPs for Infiltration Practice. If on-site infiltration is found to be viable at the site(s), the engineer will provide a recommendation regarding appropriate method(s) for the infiltration of storm water runoff using best management practices.

iii. Hydrogeologic Conditions

(a). A graphical cross-section soil profile is to be provided that

identifies the nature of subsurface materials encountered. The cross-section must show any zones that could hinder or promote water infiltration.

(b). Impact on Adjacent Developments. Subsurface conditions must be investigated to demonstrate little or no impact on adjacent developments resulting from the installation of an infiltration system. At a minimum, negative impacts resulting from flooding due to increased water levels, water moving through highly permeable subsurface channels, and/or the expansion or collapse of soils promulgated by the addition of the infiltrated water must be considered.

~~(c).~~ Long-Term Storm Water Management ~~Operation and Maintenance~~ Plan. Provide a plan, using the Utah Storm Water Advisory Committee template~~,~~ as modified by the City of Saratoga Springs, ~~An Operation and Maintenance Plan is to be provided that~~ that will ensure the long-term viability of the storm water infiltration facilities. ~~includes the following:~~

~~(i) An inventory of the facilities to be used for storm water infiltration.~~

~~(ii) A description of the routine maintenance required for each storm water infiltration facility.~~

~~(iii) A schedule of maintenance for each storm water infiltration facility.~~

~~(iv)~~(c). ~~Inspection requirements for each storm water infiltration facility.~~

iv. Control Through Rain Harvesting

(a). ~~The Utah State law currently allows the permitting, capture and storage of up to 2,500 gallons of rainwater at any given site. The engineer is to analyze and document the ability and feasibility of the development to practically capture, store and use rainwater on-site derived from the 90th percentile storm.~~ Since 2010, rainwater harvesting is legal in the State of Utah so long as the requirements of Utah Code § 73-3-1.5 are met and, if required by such section, the property owner registers with the State of Utah. The Engineer must analyze and document the ability and feasibility of the development to practically capture, sort, and use rainwater on site. Depending on the volume of rainwater collected and stored for beneficial use, the new or redevelopment must register with and meet the requirements of the Utah Division of Water Rights to harvest rainwater, found on their website: http://waterrights.utah.gov/forms/rainwater.asp.

v. Control Through Evaporation

(a). The engineer is to evaluate and document the ability of the development to practically and feasibly capture, store, and evaporate rainwater on site.

vi. Summary and Conclusions

(a). The report will include a summary and concluding statement from a qualified individual regarding the feasibility of on-site retention of storm water as required by the State General Permit via infiltration, rain harvesting, and evaporation. This individual is considered qualified if he or she:

(i) Is located in Utah.

(ii) Has a bachelor's degree in civil engineering or geology.

(iii) Has specialized education in surface and ground water.

(iv) Has specialized experience with retention and infiltration.

(v) Has minimum 10 years' experience.

~~(vi) Has minimum of 3 relevant infiltration feasibility studies or investigations within the last 5 years.~~

~~(vii) Has minimum of 3 ground water model investigations within Utah in the last 5 years.~~

(b). The conclusions and recommendations shall take into account and consider all data and issues presented within the report as well as the general experience and expertise of the engineer.

(c). If meeting the retention standard is infeasible, a rationale shall be provided for the use of alternative design criteria. The new or redevelopment project must document and quantify that infiltration, evapotranspiration, and rainwater harvesting have been used to the maximum extent feasible and that full employment of these controls are infeasible due to constraints~~.~~ ~~LID infeasibility may be~~ such as ~~due to one or more of the following conditions:~~ high groundwater, drinking water source protection areas, soil conditions, slopes, accessibility, excessive costs, or others.

vii. Engineer's Certification

(a). "I hereby certify that this report for the onsite retention and infiltration of storm water of this development was prepared by me (or under my direct supervision) according to good engineering practices and applicable engineering standards. I understand that the City assumes no responsibility or liability whatsoever for the feasibility and long-term viability of the facilities addressed herein."

25. Redevelopment projects that disturb greater than or equal to one acre, including projects less than an acre that are part of a larger common plan of development or sale which collectively disturbs land greater than or equal to one acre must provide a site-specific and project-specific plan aimed at net gain to onsite retention or a reduction to impervious surface to provide similar water quality benefits. If a redevelopment project increases the impervious surface by greater than 10 percent, the project shall manage rainfall on-site, and prevent the off-site discharge of the net increase in the volume associated with the precipitation from all rainfall events less than or equal to the 80th percentile rainfall event. This objective must be accomplished by the use of LID practices.

~~24.~~26. Install fabricated galvanized steel trash grates over the ends of all exposed pipes, 15-inch and larger.

~~25.~~27. The minimum size manhole shall be 4-foot diameter.

~~26.~~28. 5-foot diameter manholes shall be used in the following situations:

a. At all intersections of three or more 8-inch or larger pipe lines.

b. Where the deflection angle of the pipe line exceeds 90 degrees.

c. When both items "a" and "b" are designed in the same manhole, a six-foot manhole is required.

~~27.~~29. Land that lies within a drainage corridor or natural drainage course shall be left in its natural state whenever possible. The ability of the land to naturally channel, retain and drain storm water shall be maintained and enhanced in ways that augment the existing natural system.

a. No subdivision or site design will be permitted that would create a flood or flooding hazard to adjoining or nearby properties including public roads and property.
b. The widths of a constructed waterway shall be sufficiently large to adequately channel runoff from a 100-year storm event with at least 2' of freeboard. Adequacy shall be determined by the expected runoff when full development of the drainage area is reached.
c. No fences or structures shall be constructed across the waterway that will reduce or restrict the flow of water.
d. The banks of the waterway shall be protected with permanent vegetation. If vegetation will not function properly, rip-rap shall be used.
e. The banks of the waterway ~~should~~shall not exceed three (3) feet horizontal to one (1) foot vertical in gradient.
f. The gradient of the waterway bed should not exceed a grade that will result in a velocity that will cause erosion of the banks of the waterway.
g. The bed of the waterway should be protected with turf, sod, or rip-rap. If turf or sod will not function properly, rip-rap shall be used.
h. If the flow velocity in the waterway is such that erosion of the turn side wall will occur and said velocity cannot be decreased by velocity control structures, then rip-rap shall replace turf on the side walls.

F. STREET SYSTEMS:

1. Streets systems, consisting of curb and gutter, sidewalks, ADA ramps, street pavement, and appurtenant items shall be designed as described below, as shown in Tables 4 - 8, and as shown in the City Standards.

a. Table 6 shows the ROADWAY DESIGN STANDARDS; including right-of-way widths, pavement widths, street grades, and appurtenant design criteria.
b. Table 7 shows the access management standards for all roadway types.
c. Table 8 shows the subgrade protection layer required to be placed to protect subgrade soils. Prior to placement of any typical pavement section, a subgrade protection layer must be placed. Directions for this are outlined on Table 8.
d. Table 9 shows the typical pavement sections required for the different categories of traffic. Different options are provided for some of the sections.
e. Table 10 shows the Geosynthetic Requirements for Type 1 and 2 geogrids if those options are utilized.

2. Streets shall be constructed with asphaltic concrete, untreated base course, and granular borrow material for sub-base and/or subgrade protection, and a geotextile as required.

a. Thickness of each course shall be determined based on the subgrade and pavement classification. Table 6 outlines the standard design standards. Table 8 outlines the required subgrade protection based on the design CBR of the subgrade. Table 9 outlines the required pavement section based on classification of the roadway.
b. Thickness may need to be increased beyond the City Standards if recommended by a geotechnical engineer, but must be accepted by the City Engineer.

3. No new street pavement will be cut into for three years after acceptance of pavement.

4. Street light locations shall be at intersections and every 300 feet, placed on alternating sides of streets, or 600 feet on the same side of the street:

    a. At every intersection, corner, and any bends greater than 30 degrees in the road. The spacing requirements shall be met accordingly once these areas are developed.
    b. Shall be installed at property lines where attainable.
    c. Shall be a minimum of 5 feet from any tree. Branches may need to be pruned as determined by the engineering inspector in the field at the time of installation
    d. Shall not be installed within 5 feet from the edge of any driveway.
    e. Any structure such as block walls, fences, retaining walls, etc., shall leave a minimum of eighteen (18) inches to the face of the street light pole on all sides.
    f. Wherever there is an overhead utility that may conflict with the installation of the street light circuits and/or street light poles, those conflicts must be resolved between the developer and the utilities involved before the street light bases are constructed at no expense of the City or Rocky Mountain Power. The resolution must be approved by the City and Rocky Mountain Power.

~~f.~~5. Fiber optic/communication conduit is required on streets categorized as arterial and collector per City standards drawings and specifications.

~~5.~~6. Type 2 slurry seal shall be placed on all streets upon completion of paving.

~~6.~~7. Because preference is given to pedestrians, a driveway approach is required for all private accesses (APWA Plan 225 for commercial accesses and private streets, and City Standard DWG ST-4A for single-family residential accesses) unless recommended otherwise by the City Engineer, based on site-specific considerations, such as:

    a. Speed, slope, and width of the adjacent street
    b. Width of the proposed access
    c. Volume across the proposed access
    d. Drainage.

~~7.~~8. Curb returns adjacent to ADA ramps shall have a maximum slope of 2% where possible. Where the base of the curb ramp or the edge of the flush landing must join an intersection of two streets with running grades greater than 2 percent, the base of the curb ramp or the edge of the flush landing may be warped to meet the street running grade. Every effort shall be made to minimize this grade by warping the street cross slope plus or minus 4~~2~~% on both legs of the intersection.

~~8.~~9. The following table serves as a guide to design professionals by providing a summary of the City of Saratoga Springs Street Design Standards. These Standards are required unless specifically accepted otherwise by the City of Saratoga Springs City Council. In the absence of standards specified by the City, street design shall conform to the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) “A Policy on Geometric Design of Highways and Streets.” Other published professional standards, i.e. ITE, ASCE, may be considered at the sole discretion of the City Engineer.

TABLE 6

Roadway Design Standards				
DESIGN ELEMENT	LOCAL (Class I)	COLLECTOR (Class II)	MINOR ARTERIAL (Class III)	MAJOR & PRINCIPLE ARTERIAL (Class IV)
Posted Speed	25	30	40	55
Typical Section Elements				
ROW Width	59'	77'	95'	180'
Pavement Width	29'	44'	44'	82’ – 106’
Number of Lanes	2	3	3	5 & 7
Side Cut/Fill Slopes	3:1 up to 5 feet high and 2:1 above 5 feet high			
20 Year ESAL Requirement	60,000	250,000	700,000	2,000,000
Vertical Design Elements				
Vehicle Design	Passenger, School Buses, Delivery trucks, dump Trucks	Passenger, School Buses, Delivery trucks, Dump/Concrete Trucks	Passenger, School Buses, Delivery Trucks, Dump / Concrete Trucks	Passenger, School Buses, Delivery Trucks, Dump/Concrete Trucks, Semi Loads
Minimum Centerline Grade	0.5%			
Maximum Centerline Grade	12%*	8%	7%	5%
Maximum Centerline Grade Across Designated Crosswalks	5%	4%		
Maximum Grade in Cul-de-Sacs	5%	Not Allowed		
Maximum Centerline Grade Break w/o Vertical Curve	1%	0.5%	0.25%	
Maximum TBC Grade Break w/o a Vertical Curve**	2%	2%	2%	
Minimum Crest Vertical Curve "K" Value	19	Varies with design speed		
Minimum Sag Vertical Curve "K" Value	37	Varies with design speed		
Minimum Length of a Vertical Curve	60'	3 times the design speed		
Horizontal Design Elements				

Minimum Mid-Block Centerline Curve Radius	100'	Varies with design speed and superelevation		
Maximum Superelevation Rate	2%	~~6~~4%		
Intersections				
Intersection Sight Distance	Refer to AASHTO: A Policy on Geometric Design of Highways and Streets, Latest Edition			
Minimum Signalized Intersection Spacing	N/A	1,320’	2640’	2,640’
Corner Curb Radius	25	25	35	40
Minimum Angle of Intersection	60°	80°		
Minimum Offset Between Intersections	150'	Study Required		
Maximum Centerline Offset	5'	2’		
Maximum Centerline Grade***	5%	4%		
Minimum Corner Radius at TBC	25'	30'		
Vertical Tie-In	Lower streets shall match the centerline crowns in an intersection. Higher streets shall tie in 10’ off the centerline of local streets and at the edge of the outside travel lane of other streets.			

*A maximum running slope of 15% is allowed in purely-residential areas. It must be shown how bus service is provided to areas with streets greater than 10%.
**Maximum grade break of 2% along TBC with Minimum length of 25 feet between breaks.
***Grade must extend to the PC/PT of the intersecting street.

Table 7: City of Saratoga Springs Access Management Standards

Functional Classification	Minimum Driveway Spacing (feet)[1,2,3,4]			Street Unsignalized Intersection Spacing (feet)	Geometric Design of Driveway Access[6]						Minimum Signal Spacing (feet)
					Residential Driveways			Commercial, Retail, or Multi-family Driveways			
	Upstream and Downstream (Desirable feet)	Opposing Upstream (feet)	Opposing Downstream (feet)		Approach Width (feet)[6]	Edge Clearance (feet)[7]	Curb Return Radius (feet)	Approach Width (feet)[6]	Edge Clearance (feet)[7]	Curb Return Radius (feet)	
Principal Arterial/Freeway Interchange Areas	State of Utah Highway Access Management Standards Apply (see Tables 9 & 10)				State of Utah Highway Access Management Standards Apply (see Tables 9 & 10)						
Major Arterial w/o Median Barrier	350	175	160	660	12 min – 30 max	6 min	10 min – 15 max	Two Way: 25 min – 40 max; One Way: 16 min – 30 max	20 min	30 min – 60 max	2640
Major Arterial w/ Median Barrier	200	130	160	660							2640
Minor Arterial w/o Median Barrier	200	115	105	660							1320
Minor Arterial w/ Median Barrier	200	65	105	660							1320
Collector w/o Median Barrier	150	105	90	660							1320
Collector w/ Median Barrier	150	50	70	660							1320
w/o Median Barrier	85	105	90	660							1320
Local Collector w/ Median Barrier	85	50	70	660							1320
Local w/ or w/o Median Barrier	-	-	-	150							N/A

1. Driveway spacing is measured as shown in Figure 1.
2. Corner clearance requirements for access points should meet or exceed the minimum driveway spacing requirements. Curb cuts on major arterials should be spaced at distances greater than 230 feet apart, measured from face of curb to face of curb, with the preferred distance being 300 feet.
3. For corner properties, access to public streets should be provided from the lesser (lowest functional classification) street.
4. Driveways in right-turn lane transition areas should be discouraged.
5. For the benefit of traffic safety and flow, access points may be required to be designed to prohibit certain types of turning movements.
6. Wider driveway widths may be permitted to accommodate additional turning and/or acceptance lanes.
7. Distance between side property line and edge nearest drive as measured along traveled way.

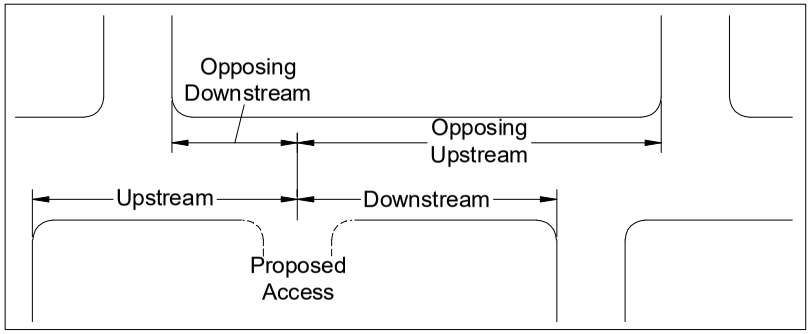

Figure 1: Measurements for Minimum Access Spacing Standards

TABLE 7

TABLE 8

(Subgrade protection layer must be placed over the subgrade soils prior to placement of the pavement section. A design CBR must be determined by a geotechnical engineer. Based on this CBR value, the chart below provides how much Granular Borrow must be placed to adequately support the typical sections referenced in Table 6. If the in-situ CBRs of the subgrade are found to be softer than the design value, those values should be used.)

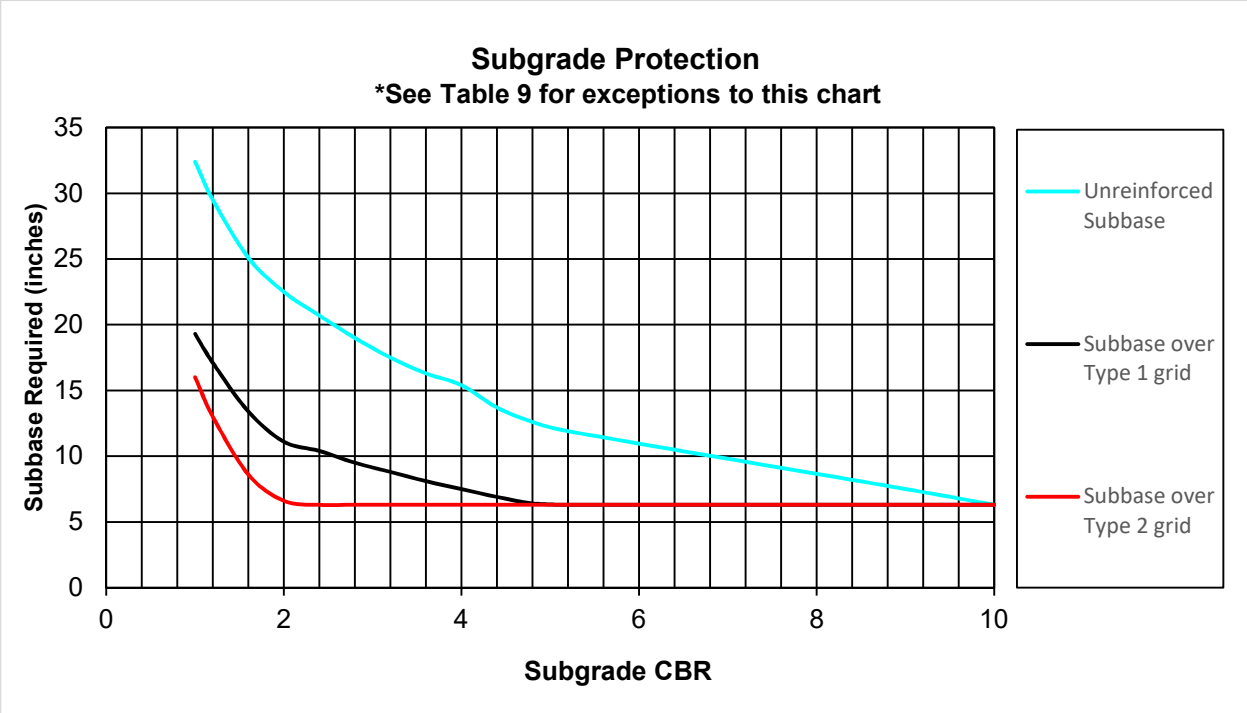

TABLE 9

Minimum Pavement Sections Based on Classification

(The following section(s) must be placed on top of the subgrade protection layer outlined in Table 8)

Residential Typical Section (Class I)		
3" AC (Asphalt Concrete) 8" UTBC (Untreated Base Course) Properly-Prepared Subgrade (for CBR values greater than 7%, subgrade protection not required)		
Collector Typical Section Options (Class II)		
4" AC 8" UTBC Properly-Prepared Subgrade (for CBR values greater than 10%, subgrade protection not required)	3" AC 8" UTBC Type 1 Geogrid Properly-Prepared Subgrade (for CBR values greater than 6%, subgrade protection not required)	
Minor Arterial Typical Section Options (Class III)		
5" AC 8" UTBC Properly-Prepared Subgrade (for CBR values greater than 10%, subgrade protection not required)	4" AC 8" UTBC Type 1 Geogrid Properly-Prepared Subgrade (for CBR values greater than 7%, subgrade protection not required)	
Major & Principle Arterial Road Typical Section Options (Class IV)		
5" AC 6"UTBC 9" GB (Granular Borrow) (for CBR values greater than 9%, 9" GB is not required) Properly-Prepared Subgrade Protection Layer (for CBR values less than 30%, subgrade protection layer not required)	5" AC 8" UTBC Type 1 Geogrid Properly-Prepared Subgrade Protection Layer (for CBR values greater than 9%, subgrade protection layer not required)	4" AC 6" UTBC Type 1 Geogrid 9" GB (for CBR values greater than 7%, 9" GB not required) Properly-Prepared Subgrade (for CBR values greater than 19%, subgrade protection layer not required)

(a) Road classification and structural design must be submitted by a licensed and qualified engineer.
(b) Roadway structural design must take into consideration construction loads due to the construction of adjacent development phases.
(c) All traffic classifications require a 1/2" mix HMA design
(d) If collapsible soils are identified in the initial soils investigation or during construction, the subgrade soil shall be over-excavated and re-compacted a minimum of 18-inches or deeper unless otherwise directed by a licensed and qualified geotechnical engineer. This determination will be made on a case-by-case basis, depending on the facts and circumstances.

TABLE 10

Structural Geogrids for Typical Pavement Sections

Alternate products to Type 1 and Type 2 Geogrids used for subgrade protection will need to provide the full-scale calibration and validation of their methodology, as outlined by Giroud-Han. Alternate products to Type 1 geogrid used within a typical pavement section will need to provide full-scale Accelerated Pavement Testing, as outlined in NCHRP Report 512, validating their design methodology. Testing submitted for Type 1 geogrids must be performed on paved sections with at least 100,000 passes of a dual wheel tandem loading.

Biaxial Type 1 Geogrid Quality Control Values			
Geogrid Properties	Test Method	MD	CMD
Type of Geogrid		Punched and Drawn	
Rib Shape	Observation	Rectangular or Square	
Rib Thickness	Nominal Dimensions	Minimum 0.05 in	
Nominal Aperture Size	I.D. Callipered	1.0 to 1.5 inches	
Flexural Stiffness	ASTM D-5732-95	Minimum 750,000 mg-cm	NA
Minimum True Initial Modulus in Use	ASTM 6637-01	Minimum 27,420 lb/ft	Minimum 44,550 lb/ft
Junction Efficiency	GRI-GG2-87	93%	
Aperture Stability Modulus at 20 cm-kg	Kinney-01	0.65 m-N/deg	NA
Resistance to Long Term Degradation	EPA 9090 Immersion Testing	100%	

Biaxial Type 2 Geogrid Quality Control Values			
Geogrid Properties	Test Method	MD	CMD
Type of Geogrid		Punched and Drawn	
Rib Shape	Observation	Rectangular or Square	
Rib Thickness	Nominal Dimensions	Minimum 0.07 in	
Nominal Aperture Size	I.D. Callipered	1.0 to 1.5 inches	
Flexural Stiffness	ASTM D-5732-95	Minimum 2,000,000 mg-cm	NA
Minimum True Initial Modulus in Use	ASTM 6637-01	Minimum 27,420 lb/ft	Minimum 44,550 lb/ft
Junction Efficiency	GRI-GG2-87	93%	
Aperture Stability Modulus at 20 cm-kg	Kinney-01	0.75 m-N/deg	NA
Resistance to Long Term Degradation	EPA 9090 Immersion Testing	100%	

Triaxial Type 1 Geogrid Quality Control Values					
Geogrid Properties	Test Method	Longitudinal	Diagonal	Transverse	General
Type of Geogrid					Punched and Drawn
Rib Pitch	Nominal Dimensions	1.6	1.6		

Mid-rib depth	Nominal Dimensions		0.05	0.05	
Mid-rib width	I.D. Callipered		0.04	0.04	
Rib Shape	ASTM D-5732-95				Rectangular
Aperture Shape	ASTM 6637-01				Triangular
Radial Stiffness	ASTM 6637-01				15,430 lb/ft @ 0.5% strain
Junction Efficiency	GRI-GG2-87				93%
Resistance to Long Term Degradation	EPA 9090 Immersion Testing				100%
Triaxial Type 2 Geogrid Quality Control Values					
Geogrid Properties	Test Method	Longitudinal	Diagonal	Transverse	General
Type of Geogrid					Punched and Drawn
Rib Pitch	Nominal Dimensions	1.6	1.6		
Mid-rib depth	Nominal Dimensions		0.07	0.06	
Mid-rib width	I.D. Callipered		0.04	0.05	
Rib Shape	ASTM D-5732-95				Rectangular
Aperture Shape	ASTM 6637-01				Triangular
Radial Stiffness	ASTM 6637-01				29,500 lb/ft @ 0.5% strain
Junction Efficiency	GRI-GG2-87				93%
Resistance to Long Term Degradation	EPA 9090 Immersion Testing				100%

G. SPECIAL SOILS DESIGN:

1. There are many areas within the City where collapsible soils exist. Where these collapsible soils exist within a proposed development, the soil's bearing capacities shall be determined by an accepted geotechnical engineer. The foundations for all facilities to be constructed on these soils shall be designed by the geotechnical engineer to support the facilities as required. These facilities shall include utility lines, roadways, structures and appurtenant items.
2. The City Engineer may designate areas where known collapsible soils exist. Soils reports done for a proposed development shall also be used to define if and where any areas of collapsible soils may exist. Where these areas exist, special care shall be taken with all construction, as described herein.

H. RESTORATION OF SURFACES:

1. All improved surfaces shall be restored to match original conditions, as acceptable to the City Engineer.
2. Paved surfaces shall be restored to the thickness plus 1"and types as required to match adjacent paved surfaces; conforming to City standards.

3. Landscaped areas shall be restored to match adjacent areas, conforming to the City Standards and as acceptable to the City Engineer. Landscape materials shall conform to adjacent materials.
4. Cultivated areas shall be restored to match adjacent areas, conforming to the City Standards and as acceptable to the City Engineer. These areas shall be seeded with material conforming to adjacent materials.
5. All disturbed areas, not improved, shall be restored with native grasses to match adjacent areas, conforming to the City Standards and as acceptable to the City Engineer. These areas shall be seeded with material conforming to adjacent materials, as acceptable. Restored area shall achieve 70% plan coverage prior to acceptance.

2.3 DRAWINGS

A. Preliminary Construction Drawings shall include at a minimum, the following information:

1. Cover Sheet that includes:
    a. Project Name;
    b. Sheet index;
    c. Vicinity Map;
    d. Legend;
    e. Contact information for key contacts including developer, engineer, utility companies, and City;
    f. Data Table for Overall project and for each phase that lists in SF, Acers, and by percent of total;
        i. Total Area
        ii. Total Impervious Area
        iii. Total Lot or Building Pad Area
        iv. Total Landscape Area
        v. Total ROW area; and
        vi. Total Number of Lots
    g. City Standard notes:
        i. Contractor shall field verify locations and invert elevations of existing manholes and other utilities before staking or constructing any new sewer lines.
        ii. Contractor shall field verify locations and invert elevations of existing storm drain structures and other utilities before staking or constructing any new storm drain lines.
        iii. All construction shall comply with the Standard Technical Specifications and Drawings for the City of Saratoga Springs, Utah.
        iv. Existing Utilities have been noted to the best of Engineers knowledge, however it is owner's and contractor's responsibility to locate utilities in field and notify City Engineer and City if discrepancies exist prior to continuing any construction.
        v. Post-acceptance alterations to lighting plans or intended substitutions for accepted lighting equipment shall be submitted to the City for review and acceptance.
        vi. The City reserves the right to conduct post-installation inspections to verify compliance with the City's requirements and accepted Lighting Plan commitments, and if deemed appropriate by the City, to require remedial action at no expense to the City.
        vii. All exterior lighting shall meet IESNA full-cutoff criteria.

2. Existing/Demolition Plan Sheet that includes:
    a. Existing topography;
    b. All existing features in and adjacent to project including;
        i. Roads,
        ii. Sidewalks and curb and gutter,
        iii. Utilities both underground and overhead and existing pole locations,
        iv. Existing striping including lane configurations and crosswalk locations,
        v. Existing Buildings,
        vi. Wells and septic systems,
        vii. Trees,
        viii. Street Lights, and
        ix. Utility pedestals and transformers.

            (a). Plans for the removal or relocation of existing infrastructure as needed for project;
            (b). Areas classified as sensitive lands including 100-yr flood plains, natural drainages, water bodies, rivers, wetlands, and 30% + slopes; and
            (c). Existing easements or other encumbered areas.

3. Overall Site Plan Sheet that includes:
    a. Street names and widths;
    b. Subdivision lots with lot numbers, areas in SF and Acres, and boundary dimensions;
    c. Street centerline and ROW data;
    d. Hydrant Locations;
    e. Lighting locations;
    f. Roadway improvements (curb, gutter, sidewalk, drive approach, ADA ramps, monuments);
    g. Parking Layout (if applicable);
    h. Dimensioning and labeling of applicable items including setbacks, ROW's, spacing between structures, curb return radii, etc.; and
        i. Phasing of project including location of temporary turn-around's at phase boundaries.

4. Overall Grading and Drainage Plan Sheet that includes:
    a. Existing Contour Lines (in grey) at one-foot intervals except in areas exceeding 10% slopes, in which case two-foot contour intervals are required;
    b. Proposed Contours at one-foot intervals except in areas exceeding 10% slopes, in which case two-foot contour intervals are required, (proposed contours should tie back to existing at limits of grading);
    c. County or City benchmark elevation;
    d. Storm drain system showing pipe alignments, sizes, materials, slopes, junction boxes, inlets, and catch basins;
    e. Detention system including spillways and overflow structures;
    f. Location and type of storm water treatment device;
    g. Points of connection to existing system; and
    h. Slope Arrows and labels along gutters, swales, catch and fill slopes, parking areas, and lots.

5. Overall Utility Plan that includes:
    a. Sanitary Sewer system showing pipe alignments, sizes, materials, slopes,

manholes, and laterals;
   b. Drinking and Secondary Water systems showing pipe alignments, sizes, materials, slopes, manholes, meters, and laterals;
   c. Location of meters and lateral for all open space areas;
   d. Locations of all water valves and fire hydrants;
   e. Locations and types of all pipe bends and fittings;
   f. Existing Utilities and plans for relocations as necessary;
   g. Points of connection to existing structures and pipe lines shall be labeled; and
   h. Existing and proposed easements as required by City Standards.

6. Storm Water Pollution Prevention Plan (SWPPP) for construction site activities:
   a. Be advised that a SWPPP is required to accompany final construction plans.

7. Landscaping and Irrigation Plan Sheet that includes:
   a. Landscaping plans;
   b. Planting Schedule;
   c. Irrigation Schematic;
   d. Metered Points of Connection;
   e. Fencing locations and types; and
   f. Conceptual Layout of Amenities within open spaces with labels and dimensions.

8. All sheets shall include
   a. Drawing scale for both vertical and horizontal;
   b. North arrow pointed towards the top of the sheet or to the left of the sheet;
   c. Match Lines if necessary to refer reader to adjacent drawings;
   d. All submitted Preliminary Construction Drawings shall be Standard D-size drawings (24” x 36”); and
   e. All drawings shall be signed and stamped by a Utah licensed professional engineer.

B. Final Construction Drawings shall include all Preliminary Construction Drawing Items as well as, at a minimum, the additional following information:

1. Grading and Drainage Plan shall include:
   a. Size and shape of all structures;
   b. Rim elevation of all structures;
   c. Invert-in and invert-out elevations at all structures;
   d. Drain pipe size, type, and class;
   e. Location and complete details of detention basins and appurtenant structures;
   f. Storm water treatment system;
   g. Plan and profile views of all storm drain lines with stationing of all structures;
   h. Plan and profile views of all roadways with slope labels, vertical curves, and points of inflection;
   i. Profile views shall show existing and final surface profiles;
   j. Spot Elevations at 50’ intervals along all TBC, Walls, PC, PT, Low Points, High Points, Ridge Lines, Connection to exiting, all transition locations;
   k. The locations of any utility conflicts;
   l. Data table with Cut/Fill quantities and Import/Export quantities;
   m. Phase boundaries and identification of what will be completed with each phase; and

n. Data table (broken up by phase if applicable) with quantities of each storm drain and site/road improvement item totaled by type and size including pipes, structures, fittings, and materials.

2. Sewer systems designs shall include:
   a. Size of all manholes;
   b. Rim elevation of all manholes;
   c. Invert-in and invert-out elevations at all manholes;
   d. Sewer pipe size, type, and class;
   e. Location and complete details of sewage lift stations or other structures;
   f. Plan and profile views of all sanitary sewer lines with stationing of all structures and laterals;
   g. Profile views shall show existing and final surface profiles;
   h. The locations of any utility conflicts;
   i. Phase boundaries and identification of what will be completed with each phase; and
   j. Data table (broken up by phase if applicable) with quantities of each sewer improvement item totaled by type and size including pipes, structures, fittings, and materials.

3. Drinking and Secondary Water system designs shall include:
   a. Pipe line sizes, types and class;
   b. Locations and types of all valves and fire hydrants;
   c. Locations and types of all pipe line fittings including bends, tee's, crosses, and reducers;
   d. Air-vac and blow-off valve locations in both plan and profile views;
   e. Plan and profile views of all water lines with stationing of all structures and laterals;
   f. Profile views shall show existing and final surface profiles;
   g. The locations of any utility conflicts, and the location and design of all waterline looping;
   h. Phase boundaries and identification of what will be completed with each phase; and
      i. Data table (broken up by phase if applicable) with quantities of each drinking water and secondary improvement item totaled by type and size including pipes, structures, fittings, and materials.

4. Storm Water Pollution Prevention Plan for construction site activities:
   a. Use the Utah Division of Water Quality template.

5. Long-Term Storm Water Management Plan:
   a. Use the Utah Storm Water Advisory Committee template which has been modified for use by projects within the City of Saratoga Springs.

~~5.~~6. Construction Details sheets shall include all applicable City Standard or non-standard Details including:
   a. Typical Road Sections and pavement section designs;
   b. Sidewalks and Curb and Gutter;
   c. Sewer;
   d. Water;
   e. Storm Drain;

f. Street Lights; and
g. Any other relevant details.

~~6.~~7. Striping and Signage Plan Sheet with details shall include:

a. Street Names;
b. Traffic Control Signage locations and types with references to MUTCD designations;
c. Pavement Marking locations and types with references to MUTCD and FHWA designations;
d. City Standard details for signage and striping;
e. Stationing of all signage and start and stop locations for striping;
f. Traffic calming locations and details; and
g. Phase boundaries and identification of what will be completed with each phase.

~~7.~~8. Lighting/Electrical Plan with details shall include:

a. Lighting locations and types;
b. Photometric plan for parking areas and open spaces;
c. Lighting details;
d. Phase boundaries and identification of what will be completed with each phase;
e. Location of power sources, conduit, electrical master meters and utility boxes; and
f. City Standard Notes for Lighting Plans including:
   i. Post-acceptance alterations to lighting plans or intended substitutions for accepted lighting equipment shall be submitted to the City for review.
   ii. The City reserves the right to conduct post-installation inspections to verify compliance with the City's requirements and accepted Lighting Plan commitments, and if deemed appropriate by the City, to require remedial action at no expense to the City.
   iii. All exterior lighting shall meet IESNA full-cutoff criteria.

~~8.~~9. Landscaping and Irrigation Plan Sheet shall include:

a. Detailed landscaping plans with designations for all areas and what surface treatments they shall receive;
b. Locations of all planting, designations for planning types and a comprehensive planting schedule;
c. Planting and landscaping details;
d. Detailed Irrigation design with the location of all valves, filters, and other appurtenances;
e. Metered Points of Connection;
f. Fencing locations, types and complete details for fences, posts, gates, and mow strips; and
g. Complete design of all open spaces including trails, pavilions, play areas, and other amenities including labels, dimensions, manufacture, model numbers, and all applicable details and typical sections.

~~9.~~10. Revisions made to drawings during the plan review process shall be made using coded revision clouds. Where clouds overly complicate a drawing, a description of the changes shall be noted and the note shall be clouded. If no such clouds are provided on the revised drawings, the revised drawing shall not be accepted and the original drawing shall stand.

C. As-built drawings shall be provided electronically in pdf format containing construction drawings with all field changes and modifications, including but not limited to:

1. Street light alignment, location of conduit, power sources, and street lights;
2. Location of Fire Hydrants, drinking water, secondary water, and sewer laterals stubbed into each lot with dimensions reference to permanent surface improvements;
3. Landscaping and Irrigation improvements;
4. As-Builts shall comply with Section 01780;
5. As-Builts shall be stamped and signed by a professional engineer with signature block stating “I have field verified that these record drawings are complete and accurately represent what was constructed for this project.”;
6. Pond Certification form stamped and signed by a professional engineer;
7. As-built drawings should not include detail sheets or a SWPPP plan; and
8. As-built drawings shall include a topographic view of the site along with all detention basins.

D. Easements Requirements:

1. Residential Development: All on and offsite easements (for public and private improvements) must be recorded before construction can begin on any part of the project;
2. Non-Residential Development: All on and offsite easements (for public and private improvements) must be recorded before occupancy will be granted for any buildings; and
3. Miscellaneous Construction: All on and offsite easements (for public and private improvements) must be recorded before construction can begin on any part of the project.

E. Reimbursement Requirements:

1. Reimbursements for any infrastructure upsizing beyond the project improvement needs (system improvements) must be presented to the City Council at the preliminary plat or site plan process for authorization to have staff work on a reimbursement agreement with the developer/applicant;
2. Reimbursement agreements must be accepted by the City Council and executed by both parties before construction can begin on the project (both residential and non-residential);
3. If the developer/applicant wishes to begin construction before there is an agreement in place with the City, they must sign and record a waiver stating they accept the risk that they may not be reimbursed for any improvements installed, even if they are system improvements (also applies to system improvements installed by an applicant outside of the development process such as grading permits or encroachment permits).

END OF SECTION

DIVISION 01

GENERAL REQUIREMENTS

SECTION 01300

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Coordination drawings.

D. Submittals for review, information, and project closeout.

E. Number of copies of submittals.

F. Submittal procedures.

1.2 RELATED SECTIONS

A. Section 01700 - Execution Requirements: Additional coordination requirements.

B. Section 01780 - Closeout Submittals: Project record documents.

1.3 PROJECT COORDINATION

A. Project Coordinator: City Engineer.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for project access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to the City Engineer:

1. Requests for interpretation.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.

7. Progress schedules.
8. Coordination drawings.
9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRECONSTRUCTION MEETING

A. City Engineer will schedule a meeting after Notice of Award.

B. Attendance Required:

1. Owners/ Representative.
2. City Representative.
3. Contractor.
4. Excavator

C. Agenda:

1. SWPPP and NOI Permit
2. Long-Term Storm Water Management Plan.
3. Submission of executed bonds and insurance certificates, prior to meeting.
4. Traffic Control plans
5. Submission of list of Subcontractors, and progress schedule.
6. Designation of personnel representing the parties in Contract, Developer, Contractor, Owner, and the City Engineer.
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Review safety standards and procedures.
9. Scheduling.
10. Scheduling activities of a testing company and Geotechnical Engineer, if required.
11. Construction water availability and procedures.

D. Record minutes and distribute copies within two days after meeting to participants, with one copy to Contractor, City Engineer, Owner, participants, and those affected by decisions made.

3.2 PROGRESS MEETINGS AND INSPECTIONS

A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Notify the City Inspector in writing at least 2 weeks in advance to request an inspection for the acceptance or rejection of project improvements. Allow at least 2 weeks to process bond reductions for accepted items upon completion of inspection. If site is impeded by winter weather conditions, City inspector shall reschedule inspection as soon as is practicable.

C. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

D. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, City Representative, as appropriate to agenda topics for each meeting.

E. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

F. Record minutes and distribute copies within two days after meeting to participants, with one copy to Contractor, City Engineer, Owner, participants, and those affected by decisions made.

3.3 COORDINATION DRAWINGS

A. Provide information required by Project Coordinator for preparation of coordination drawings.

B. Review drawings prior to submission to City Engineer.

3.4 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:

1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to City Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review and upon acceptance by the City, contractor shall provide copies and distribute

in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01780 - CLOSEOUT SUBMITTALS.

3.5 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:

1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for the City Engineer’s knowledge as contract administrator or for the Owner.

3.6 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:

1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

B. Submit for the Owner’s benefit during and after project completion.

3.7 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:

1. Small size sheets, not larger than 8-1/2 x 11 inches: Submit the number of copies which the Contractor requires, plus two copies which will be retained by the City Engineer.
2. Larger sheets, not larger than 36 x 48 inches: Submit the number of opaque reproductions which Contractor requires, plus two copies which will be retained by City Engineer.

B. Documents for Information: Submit two copies.

C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by the City Engineer.

1. After review, produce duplicates.
2. Retained samples will not be returned to Contractor unless specifically so stated.

3.8 SUBMITTAL PROCEDURES

A. Transmit each submittal electronically or hard copy with transmittal letter.

B. Sequentially number the transmittal letters. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify the Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

D. Apply Contractor 's stamp, signed or initialed certifying that review, acceptance , verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

E. Deliver submittals to City Engineer at business address.

F. Schedule submittals to expedite the Project, and coordinate submission of related items.

G. For each submittal for review, allow 7 days excluding delivery time to and from the Contractor.

H. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

I. Provide space for Contractor and City Engineer review stamps.

J. When revised for re-submission, identify all changes made since previous submission.

K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

L. Submittals that are not requested will not be recognized or processed.

M. All submittals requiring acceptance from the City shall expire 6 months from the acceptance date. Expired submittals require a resubmittal and acceptance from the City.

END OF SECTION

SECTION 01400

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. References and standards.

B. Quality assurance submittals.

C. Control of installation.

D. Tolerances.

E. Testing and inspection services.

F. Manufacturers' field services.

1.2 RELATED SECTIONS

A. Section 01300 - Administrative Requirements: Submittal procedures.

B. Section 01600 - Product Requirements: Requirements for material and product quality.

1.3 REFERENCES

A. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

B. ASTM D 290 - Standard Practice for Bituminous Mixing Plant Inspection.

C. 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.

D. ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

E. ASTM E 543 - Standard Practice for Agencies Performing Nondestructive Testing.

F. ASTM E 548 - Standard Guide for General Criteria used for Evaluating Laboratory Competence.

G. Use the latest issue of the above referenced standards as of the City’s acceptance date of the Construction Drawings.

1.4 SUBMITTALS

A. Testing Agency Qualifications:

1. USE AMRL/CCRL Accredited Laboratory. Comparable accreditations will be accepted at discretion of the City.

2. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
3. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of and deficiencies reported by the inspection.
4. USE WAQTC/UDOT TTQP Certified Technicians, with certifications in area of testing or inspection being performed. Comparable accreditations will be accepted at discretion of the City.

B. Test Reports: After each test/inspection, promptly submit two copies of report to City Engineer and to Contractor; within maximum of 24 hours.

1. Include:
    a. Date issued.
    b. Project title and number.
    c. Name of inspector.
    d. Date and time of sampling or inspection.
    e. Identification of product and specifications section.
    f. Location in the Project.
    g. Type of test/inspection.
    h. Date of test/inspection.
    i. Results of test/inspection.
    j. Conformance with Contract Documents.
    k. When requested by City Engineer, provide interpretation of results.
2. Test reports are submitted for the City Engineer’s knowledge as contract administrator or for the Owner, for information for the purpose of assessing conformance with information given and the design concept expressed in the contract documents.

C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor to City Engineer, in quantities specified for Product Data.

1. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or Product, but must be acceptable to City Engineer.

D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner’s information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

E. Manufacturer's Field Reports: Submit reports for the City Engineer’s benefit as contract administrator or for the Owner.

1. Submit information for the purpose of assessing conformance with information given and the design concept expressed in the contract documents.

F. Erection Drawings: Submit drawings for the City Engineer’s benefit as contract administrator or for the Owner.

1. Submit for information for the purpose of assessing conformance with information given and the design concept expressed in the contract documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by the City Engineer or Owner.

1.5 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code or project specification.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from the City Engineer before proceeding.

F. Neither the contractual relationships, duties, nor responsibilities of the parties in Contract nor those of the City Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

G. Submittals shall be as shown on the drawings and of the size and quality equal to or better than specification. If the Contractor desires to use other Materials than these specified herein, the Contractor shall secure written acceptance from the City Engineer before using these items in construction work. The standards for determining an acceptable equal will fall upon the City Engineer and will be based upon the standard of quality and salient characteristics established by the product brand name requested in the Standards and Specifications such as its size, strength, durability, rating, material composition, and compatibility with other system components. Any requests for consideration of an alternate equal must be accompanied by sufficient data to determine the products design specifications and to verify it’s performance characteristics such as:

1. Design data;
2. Product data;
3. Shop drawings;
4. Certificates;
5. Test reports;
6. Inspector reports;
7. Manufacturer’s field reports; and
8. Other performance and testing data.

H. All products, methods, tools, components, installation methods, etc. must be submitted and accepted by the City before use.

1.6 TESTING AND INSPECTION AGENCIES

A. Contractor shall employ and pay for services of an accredited testing agency to perform project specified testing and inspection. See Supplemental General Conditions and project specifications for specified testing.

B. Employment of agency or test results in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:

1. Testing agency: Comply with requirements of ASTM E 329, ASTM E 548, ASTM C 1093, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, ASTM E 1212, and ASTM C 1579.
    a. Use the latest issue of the above reference standards as of the date of the Project.
2. Inspection agency: Comply with requirements of ASTM D290.
3. Laboratory: Authorized to operate in State in which Project is located.
4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
5. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or National Institute of Standards and Technology.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work meeting the requirements of these Standards and Specifications.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from City Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified and/or certified by their industry to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from City Engineer before proceeding.

C. Adjust Products to appropriate dimensions; position before securing Products in place.

3.3 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Testing Agency Duties:

1. Provide qualified personnel at site every day to manage daily activities. Cooperate with City Engineer and Contractor in performance of services.
2. Perform specified sampling and testing of Products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Notify City Engineer and Contractor of observed irregularities or nonconformance of Work or Products immediately upon such observance.
5. Perform additional tests and inspections required by City Engineer.
6. Attend preconstruction meetings and progress meetings, when requested.
7. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not accept any portion of the Work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work without City’s authorization.

D. Contractor Responsibilities:

1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work.
3. Provide incidental labor and facilities:
    a. To provide access to Work to be tested/inspected.
    b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    c. To facilitate tests/inspections.
    d. To provide storage and curing of test samples.
4. Notify City Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.

5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

6. Arrange with Owner’s agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by the City Engineer. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.

3.4 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to City Engineer 30 days in advance of required observations.

1. Observer subject to being accepted by the City Engineer.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.5 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If it is not practical to remove and replace the Work, the City Engineer will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations and procedures.

E. Spare parts and maintenance materials.

1.2 RELATED SECTIONS

A. Section 01400 - Quality Requirements: Product quality monitoring.

1.3 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

1. Submit within 15 days after date of Agreement.
2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project.

D. Provide written statement that materials and equipment being furnished are suitable and proper for the intended installations; that suppliers have investigated intended uses; and that items will satisfactorily perform and operate in the installations.

PART 2 PRODUCTS

2.1 PRODUCTS

A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

B. Provide interchangeable components of the same manufacture for components being replaced.

2.2 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

PART 3 EXECUTION

3.1 SUBSTITUTION PROCEDURES

A. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

B. A request for substitution constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse Owner and City Engineer for review or redesign services associated with re- acceptance by authorities.

C. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

D. Substitution Submittal Procedure:

1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. The City Engineer will notify Contractor in writing of decision to accept or reject request.

3.2 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

3.3 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

D. For exterior storage of fabricated products, place on sloped supports above ground.

E. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

F. Store loose granular materials on relatively solid, flat surfaces in a well-drained area. Prevent mixing with foreign matter.

G. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

H. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01700

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Surveying for laying out the work.

C. Cleaning and protection.

D. Closeout procedures, except payment procedures.

1.2 RELATED SECTIONS

A. Section 01300 - Administrative Requirements: Submittals procedures.

B. Section 01400 - Quality Requirements: Testing and inspection procedures.

C. Section 01780 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

1.3 SUBMITTALS

A. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.

1. On request, submit documentation verifying accuracy of survey work.
2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
3. Submit surveys and survey logs as for the project record.

B. Provide NOI (UPDES) permit prior to commencing work.

1.4 QUALIFICATIONS

A. For survey work employ a land surveyor registered in Utah and acceptable to City Engineer. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

B. For field engineering employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located.

1.5 PROJECT CONDITIONS

A. Grade work areas to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

E. Erosion and Sediment Control: Plan and execute erosion control plan during construction to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

1. Minimize amount of bare soil exposed at one time.
2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
4. Each week and after all rain/snow events inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.6 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Coordinate completion and clean-up of work of separate sections.

PART 2 PRODUCTS

2.1 MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01600.

PART 3 EXECUTION

3.1 EXAMINATION

A. Document existing conditions with video and photographs. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Beginning new work means acceptance of existing conditions.

B. Examine and verify specific conditions described in individual specification sections.

C. Prior to Cutting: Examine existing conditions prior to commencing work, including elements

subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

A. Cut, move, or remove items as necessary for access to construction area. Replace and restore at completion where necessary.

B. Remove unsuitable material, such as brush, weeds, wood, metals, concrete and rocks. Load and haul removed materials and dispose of in a legally acceptable manner.

3.3 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Immediately notify City Engineer of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that established by Owner provided survey.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Report to City Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons within 24 hours.

G. Utilize recognized engineering survey practices.

H. Establish elevations, lines, grades and elevations. Locate and lay out by instrumentation and similar appropriate means:

I. Each day verify layouts by same means.

J. Maintain a complete and accurate log of control and survey work as it progresses.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install Products as specified in individual sections.

B. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new Work abuts or aligns with existing, perform a smooth and even transition.

3.5 PROGRESS CLEANING

A. Maintain construction areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipes and other closed spaces, prior to enclosing the space.

C. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

D. Follow UPDES permit and SWPPP. Roads shall be kept free of debris and rubbish and shall

be cleaned at the end of each workday as necessary.

3.6 PROTECTION OF INSTALLED WORK

A. Protect installed work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

C. Prohibit traffic from landscaped areas.

D. Contractor responsible for all damage prior to acceptance.

3.7 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean site; sweep paved areas, rake clean landscaped surfaces.

C. Remove waste and surplus materials, rubbish, and construction facilities from the site.

3.8 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

1. Provide copies to City Engineer and Owner.

B. City Inspector shall accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.

C. Notify City Engineer when work is considered ready for Substantial Completion within 48 hours.

D. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for City Engineer's review.

E. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

F. City Inspector shall accompany Project Coordinator on preliminary final inspection.

G. Notify City Engineer when work is considered finally complete within 48 hours.

H. Complete items of work determined by Inspector or City Engineer's final inspection.

END OF SECTION

SECTION 01780

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project Record Documents.

B. Warranties and bonds.

1.2 RELATED SECTIONS

A. Conditions of the Contract: Performance bond and labor and material payment bonds, warranty, and correction of work.

B. Section 01300 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

C. Section 01700 - Execution Requirements: Contract closeout procedures.

D. Individual Product Sections: Specific requirements for operation and maintenance data.

E. Individual Product Sections: Warranties required for specific products or Work.

F. Section 01785 - Project Evaluation.

1.3 SUBMITTALS

A. Project Record Documents: Submit documents to City Engineer.

B. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.

3. Addenda.
4. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Changes made by Addenda and modifications.

F. Record Drawings: Legibly mark each item on accepted construction drawings to record actual construction including:

1. Measured depths of foundations in relation to finish main floor datum.
2. Measured depths of manholes in relation to rim elevation.
3. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

G. Complete Pond Certification form and deliver to City.

END OF SECTION

DIVISION 02

SITE CONSTRUCTION

SECTION 02100

ROADWAY AND GENERAL EARTHWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating; filling and grading for street surfacing, concrete street improvements and appurtenances, as indicated on the drawings; removing and disposing of excess and unsuitable material; and compacting as required.

B. Removing vegetation, topsoil material; and stockpiling material on-site.

C. Removing and disposing of existing concrete items as indicated.

D. Backfilling, compacting and grading around and adjacent to new concrete work and paving, as indicated on the drawings.

E. Finish grading.

F. Dust control.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: trenching and backfilling for pipe work.

B. Section 02115 - Structural Excavation: Building and foundation excavating.

C. Section 02116 - Fill and Backfill: Backfilling for project pipe lines and at structures.

1.3 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Samples: Submit 10 pound sample (or amount required by the testing laboratory or Owner) of each type of material as required in the accepted drawings and specifications.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction Density Test Reports.

F. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with City of Saratoga Springs, Standards and Specifications Drawings.

1. Maintain one copy of standards on job site.

1.5 PROJECT CONDITIONS

A. Protect above- and below-grade utilities that remain.

B. Protect landscaping, such as plants, lawns, rock out-croppings, and other features, adjacent to work areas, from excavating equipment and vehicular traffic.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. See Section 02116 - Fill and Backfill.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Notify utility company to remove and relocate utilities, where and as required.

D. Verify that survey bench mark and intended elevations for the Work are as indicated.

E. Identify any areas of collapsible soils within the work area, and inform the City Engineer of their locations.

F. Compact and proof roll subgrade as per City Standards & Specification. Verify Existing soil Conditions and the removal of unsuitable materials with City inspector.

3.2 EXCAVATING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil material when wet.

C. Excavate to lines, grades and cross-sections as indicated on the drawings.

D. Notify City Engineer of unexpected subsurface conditions within 24 hours and discontinue affected work in area until notified by the City Engineer to resume work.

E. All excavating shall be done according to OSHA Standards and all other applicable regulations.

F. Excavation and grading operations shall be conducted in such a manner so as to cause minimum inconvenience to adjacent property, including dust control.

G. Surfaces of excavated areas shall, at all times, have sufficient grade and smoothness as necessary to ensure proper drainage. If existing drainage is interrupted, provide temporary facilities to re-route and maintain drainage so that adjacent properties are not damaged.

Temporary drainage facilities shall be considered incidental to work involved; and shall be removed after work is completed.

H. When unsuitable material is encountered in excavated areas at subgrade elevations, excavate as required to remove unsuitable material and backfill areas with selected backfill material.

I. Remove large rocks and boulders encountered at subgrade elevations to a depth of not less than 6- inches below subgrade, and fill and compact excavation with suitable material.

J. Remove excess and unacceptable excavated material from site and dispose of in an acceptable manner.

K. See Section 02116 for backfilling and filling procedures.

L. Slopes: Slopes greater than 3:1 shall be stabilized with accepted erosion control matting.

M. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

N. During construction, provide and maintain sufficient means and devices to promptly remove and properly dispose of all water entering excavations or other parts of the work.

1. Dispose of water from work area in a legally acceptable manner, without damage to adjacent property.
2. No pipe, concrete footings, foundations or floors shall be installed in water.
3. Water shall not be allowed to rise over concrete until it has set for at least 24 hours.
4. Water shall not be allowed to rise against walls and supporting beams for a period of 14 days after completion of walls and beams.
5. Any damage to pipe work or concrete work caused by water shall be repaired by the Contractor, at his expense.

O. The use of explosives will not be allowed; unless use has been specifically reviewed and accepted by the City Engineer. All blasting shall be done by a reputable contractor specializing in the use of explosives.

3.3 REMOVING MISCELLANEOUS ITEMS

A. Projects that eliminate the need for existing infrastructure shall be required to remove unneeded infrastructure at the project's sole expense, unless the Public Works Director and City Engineer deem it to be in the City's best interest for such infrastructure to remain.

1. Remove existing pipelines, culverts, curb and gutter, sidewalk, waterways, and driveway pavement as necessary to complete work and as directed by the accepted drawings.
2. Saw-cut existing concrete items at limit of removal as necessary to complete work and as directed by the accepted drawings; break up and demolish the concrete item; and load, haul and dispose of concrete debris in a legally acceptable manner.

3.4 SOIL REMOVAL

A. Segregate excavated material at time of excavation into topsoil material, acceptable material, and unsuitable material, as determined by the City Engineer.

B. Stockpile topsoil to be re-used on site; remove excess material from site and dispose of in an

acceptable manner.

C. Stockpile acceptable subsoil to be re-used on site; remove unacceptable and excess material from site and dispose of in a legally acceptable manner.

D. Stockpile materials separately in areas designated on site, within 200 feet of point of excavation; pile depth not to exceed four feet and protect from erosion.

3.5 BACKFILLING AND FILLING

A. Remove all vegetation, debris, unsuitable soil materials, obstructions and deleterious materials from designated areas prior to placement of backfills or fills.

B. Where existing ground surfaces have density less than that specified for particular area, plow area to required depth, pulverize existing material, moisture-condition to optimum moisture content and compact to required percentage of maximum density.

C. Place backfill and fill material in lifts accepted by a Geotechnical Engineer. Moisture-control each layer to provide optimum moisture content of material; but keep moist enough at all times to provide dust control.

D. Compact each layer to required percentage of maximum density for each area classification.

E. Do not place backfill or fill material on surfaces that are soft, unsuitable, frozen or contain frost or ice.

F. See Section 02116 for backfilling and filling procedures.

G. Correct areas that are over-excavated.

1. Use structural fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

H. Park strips shall be backfilled 3 inches below TBC.

3.6 COMPACTING

A. Compact backfill and fill material to provide not less than the following percentages of maximum density for each area classification:

1. Roadways: Under paving and similar construction, compact subgrade and each layer of backfill or fill material as specified in Section 02116.
2. Concrete Items: Under curb and gutter, sidewalks, and other concrete items, compact top 6- inches of subgrades and each layer of backfill or fill material as specified in section 02116.
3. Non-Landscaped Unpaved Areas: Compact each layer of backfill or fill material as specified in section 02116.

B. Moisture Control. Before compaction, moisture control subgrades or layers of backfill and fill material, as required, to achieve optimum moisture content of material.

1. For dry material, apply water uniformly to surface of material in a way that will prevent free water from appearing on surface during or after compaction operations.

2. For soil material that is too wet to allow compaction, remove and replace backfill or fill material, or scarify subgrade material and air dry, until desired moisture content is reached.

C. Proof roll until surface is verified as non-yielding by City Inspector.

3.7 FINISH GRADING

A. Grade project areas uniformly to lines and grades, as indicated, including adjacent transition areas.

B. Finish surfaces shall be smooth and compact, with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

C. Place topsoil in areas where seeding, sodding, and planting is indicated.

1. Place topsoil to the following compacted thicknesses:
    a. Areas to be seeded with grass: 6 inches.
    b. Areas to be sodded: 4 inches.
    c. Areas for shrub beds: 18 inches.
    d. Areas for flower beds: 12 inches.
2. Remove roots, weeds, rocks, and foreign material while spreading.
3. Near plants, spread topsoil manually to prevent damage.
4. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
5. Lightly compact placed topsoil.

3.8 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevations.

B. Top Surface of Finish Grade: Plus or minus 1/2 inch from required elevations.

3.9 FIELD QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for field inspection and testing.

B. See Section 02116 for compaction density and gradation testing.

C. Frequency of density testing: one test for each lift at 150 linear foot spacing for roadways, curb and gutter, sidewalks and other items.

D. Frequency of gradation testing: One test prior to first lot and then additional testing as necessary to verify the consistency of the material.

E. Proof Roll until surface is verified as non-yielding by City Inspector.

3.10 CLEAN-UP

A. Remove unused stockpiled materials; leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

C. All disturbed areas shall be restored with native grasses to match adjacent areas, conforming to the City Standards. These areas shall be seeded with material conforming to adjacent materials, as acceptable. Restored area shall achieve 70% plant coverage, and be free of erosion and invasive species prior to acceptance.

END OF SECTION

SECTION 02112

TRENCHING FOR PIPE WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating, backfilling and compacting for project pipe lines.

1.2 RELATED SECTIONS

A. Section 02115 - Structural Excavation: Excavating for miscellaneous structures.

B. Section 02116 - Fill and Backfill: Backfilling for project pipe lines and at structures.

1.3 REFERENCES

A. Use latest issue of the reference standards as of the date of the project.

B. AASHTO T 99 - Moisture-Density Relations of Soils Using a 5.5-lb (2.5 kg) Rammer and a 12-inch Drop.

C. AASHTO T 180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-inch Drop.

D. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

E. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

F. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

G. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)).

H. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

I. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

J. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

K. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

L. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

M. Specification for Excavating on State Highways.

N. General Safety Orders Covering Utah Industries - Section 69, Trenches.

O. United States Department of Labor OSHA Publication 2085 - "Employer - Employee, Safe Practice for Excavation and Trenching Operations".

P. Utah Occupational Safety and Health Rules and Regulations - General Standard (UOSHA).

1.4 DEFINITIONS

A. Pipe Line Grades and Elevations: Indicated on drawings.

B. Trench Cross Sections: Indicated on standard trench detail drawings.

C. Subgrade Elevations: Bottom of road base in paved areas, as indicated on drawings.

D. Finish Grade Elevations: Top of pavement in paved areas, as indicated on drawings.

E. Ground Elevations: Indicated on the drawings.

1.5 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Samples: 10 pound sample of each type of fill (or amount requested by the testing laboratory); submit to testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction Density Test Reports.

1.6 PROJECT CONDITIONS

A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where accepted by the City Engineer.

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
2. Prevent contamination.
3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the work match design drawings.

D. Protect plants, lawns, and other features to remain.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, curbs, and other improvements from excavating equipment and vehicular traffic.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. See Section 02116 - Fill and Backfill.

2.2 SOURCE QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Notify utility company to remove and relocate utilities, where and as required.

D. Identify any areas of collapsible soils within trench areas, and inform the City Engineer of their locations.

3.2 TRENCHING

A. Excavate trenches as required to allow project pipe to be installed to line and grade as indicated on the drawings.

B. Notify City Engineer of unexpected subsurface conditions within 24 hours and discontinue affected Work in area until notified to resume work.

C. All trenching shall be done according to OSHA Standards and other applicable regulations.

D. Do not interfere with 45 degree bearing splay of adjacent foundations.

E. Excavate trenches to width, depth and cross section as indicated on the trench detail drawings.

F. Hand trim excavations. Remove loose matter.

G. Remove large stones over 4 inches in diameter and other hard matter which could damage piping or impede consistent backfilling or compaction.

H. Remove excavated material that is unsuitable for re-use on the project from site and dispose of in an acceptable manner.

I. When unsuitable material is encountered in trenches at subgrade elevations, excavate as

required to remove the unsuitable material and backfill areas with acceptable material as per section 02116.

J. Stockpile excavated material to be re-used in area designated on site.

K. Remove excess excavated material from site and dispose of in an acceptable manner.

L. Excavation beyond or below lines and grades indicated shall be refilled with acceptable material as per section 02116 and compacted, at the Contractor's expense.

M. During construction, provide and maintain sufficient means and devices to promptly remove and properly dispose of all water entering excavations or other parts of the work.

1. Dispose of water from work area in an acceptable manner, without damage to adjacent property.
2. No pipe, concrete footings, foundations or floors shall be installed in water.
3. Water shall not be allowed to rise over concrete until it has set for at least 24 hours.
4. Water shall not be allowed to rise against walls and supporting beams for a period of 14 days after completion of walls and beams.
5. Any damage to pipe work or concrete work caused by water shall be repaired by the Contractor, at his expense.

N. The use of explosives will not be allowed; unless use has been specifically reviewed and accepted by the City Engineer. All blasting shall be done by a reputable contractor specializing in the use of explosives.

1. Comply with all laws, ordinances, and applicable safety code requirements and regulations relative to the handling, storage, and use of explosives and protection of life and property.
2. Contractor shall be fully responsible for all damage attributable to his blasting operations.
3. Excessive blasting or over shooting will not be permitted.
4. Remove any material outside of authorized cross-section which may be shattered or loosened by blasting operation.

3.3 PREPARATION FOR PIPE LINE PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with bedding material, or stabilization material, or other acceptable material, as per section 02116.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.4 BACKFILLING

A. Install as per Section 02116 – Fill and Backfill

3.5 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Install as per Section 02116 – Fill and Backfill

3.6 TOLERANCES

A. Top Surface of Backfilling in unimproved areas: Plus or minus 1 inch from required elevations.

B. Top Surface of Backfilling in improved areas: Plus or minus 1/2 inch from required elevations.

3.7 FIELD QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for field inspection and testing.

B. Testing is to be done as per APWA Standards and Specification; test results must be sent to the City Engineer or Inspector within 24 hours after the tests are completed.

C. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.

1. Perform gradation testing in accordance with ASTM C136.

D. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor"), ASTM D 1557 ("modified Proctor"), or AASHTO T 180.

E. If tests indicate work does not meet specified requirements, remove work, replace and retest.

F. Frequency of density tests: one test per lift per 150 linear foot of trench.

G. Frequency of Gradation test: one test prior to first lot, then 25, or as necessary to verify the consistency of the material.

3.8 CLEAN-UP

A. Remove unused stockpiled materials; leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

C. All disturbed areas shall be restored with native grasses to match vegetation in adjacent areas, conforming to the City Standards. These areas shall be seeded with material conforming to adjacent materials, as acceptable. Restored area shall achieve 70% plant coverage, be free of erosions and invasive species prior to acceptance.

END OF SECTION

SECTION 02115

STRUCTURAL EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating for structure volume below grade, footings, slabs-on-grade, paving, curb and gutter, sidewalks and other concrete work.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: Excavating, backfilling and compacting for project pipe lines.

B. Section 02116 - Fill and Backfill: Fill materials, filling, and compacting.

1.3 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Identify any areas of collapsible soils within the work areas, and inform the City Engineer of their locations.

3.2 EXCAVATING

A. Excavate to accommodate new structures and construction operations to lines and elevations indicated.

B. Notify City Engineer of unexpected subsurface conditions within 24 hours and discontinue affected Work in area until notified to resume work.

C. All excavating shall be done according the OSHA Standards and other applicable safety regulations.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut excavations wide enough to allow construction of structures as indicated; bottom dimensions shall be sufficient to provide at least 12 inches clear between extreme outside of concrete work and side of excavation. No tunneling or under cutting will be permitted.

F. Hand trim excavations. Remove loose matter.

G. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 02116.

H. When unsuitable material is encountered in excavations at subgrade elevations, excavate as required to remove unsuitable material and backfill areas with selected backfill material.

I. Grade top perimeter of excavation to prevent surface water from draining into excavation.

J. Remove excavated material that is unsuitable for re-use from site and dispose of in a legally acceptable manner.

K. Stockpile excavated material to be re-used in areas designated on site.

L. Remove excess excavated material from site and dispose of in a legally acceptable manner.

3.3 BACKFILLING

A. Backfilling shall conform to the requirements of Section 02116 - Fill and Backfill.

B. Backfill under structures with granular borrow, and compact to 95 percent of maximum density.

C. Backfill around structures with granular borrow, up to subgrade or finish grade elevations, as indicated, and compact to 95 percent of maximum density.

D. Employ placement method that will not disturb or damage structure.

E. Backfill shall be brought up uniformly around structures, so as to eliminate any possibility of unbalanced loading on structure which could damage or movement.

F. No backfill shall be placed against concrete work until concrete has been inspected and accepted by the City Inspector; and backfill operation has been authorized.

G. Granular Fill: Place and compact materials in equal continuous layers not exceeding uncompacted 8-inch lifts.

H. Structural Backfill: Place and compact materials uniformly around structures in equal continuous layers not exceeding uncompacted 8-inch lifts.

I. Correct areas that are over-excavated with structural backfill material, compacted to minimum 95 percent of maximum dry density; at the Contractor's expense.

3.4 FIELD QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

C. Testing is to be done as indicated in Supplemental General Conditions; test results will be sent to the City Engineer within 24 hours after the tests are completed.

D. Perform compaction density testing on compacted backfill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017, as listed in Section 02112.

E. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("Standard Proctor"), ASTM D 1557 ("Modified Proctor"), or AASHTO T 180, as indicated in Section 02112.

F. If tests indicate work does not meet specified requirements, remove work, replace and re-test.

G. Frequency of Tests: as required by the City Standards and Specifications as necessary to verify the consistency of the material.

3.5 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

3.6 CLEAN-UP

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

B. All disturbed areas shall be restored with native grasses to match adjacent areas, conforming to the City Standards. These areas shall be seeded with material conforming to adjacent materials, conforming to the City Standards. Restored area shall achieve 70% plan coverage prior to acceptance.

END OF SECTION

SECTION 02116

FILL AND BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Backfilling and compacting for project pipe lines.

B. Filling, backfilling, and compacting for miscellaneous structures.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: Excavating for project pipe lines.

B. Section 02115 - Structural Excavation: Excavating for structures.

1.3 REFERENCES

A. AASHTO M 145 - Standard Specification for Classification of Soils and Soil–Aggregate Mixtures for Highway Construction Purposes.

B. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in.(457 mm) Drop; American Association of State Highway and Transportation Officials.

C. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

D. ASTM D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).

E. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

F. ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)).

G. ASTM D 1883 - Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils

H. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

I. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

J. ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

K. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

L. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

M. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

N. ASTM D 6913 - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.

O. ASTM C 117 - Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

P. Use the latest issue of the above reference standards as of the date of the Project.

1.4 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

C. Pipe Invert Elevations: Indicated on drawings.

D. CBR – California Bearing Ratio

E. WAQTC – Western Alliance for Quality Transportation Construction. WAQTC Certification is implemented through UDOT or other State Highway Agency's Transportation Technician Qualification Program (TTQP).

F. Stratified Samples – Samples spread out evenly over an area or tonnage. For example, if planning four samples for 10,000 SF, take one sample from each 2,500 SF of the 10,000 SF area.

G. Commercial Source – Fill material meeting material requirements of this specification acquired from a qualified off-site source.

H. Off-site Source – An established operation that has been producing materials meeting state, county, municipal or APWA standards, under a documented quality control program, for a minimum of 3 years.

1.5 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Submit source documentation and mix design as per Article 2.2 Materials Sources: Submit name of imported materials source.

C. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports per Table 1 and Article 3.3.

E. Fill Quality Control Plan (FQCP) as per Article 1.6.E.1.

F. Fill Quality Control results as per Article 1.6.E.4.

1.6 QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for field inspection and

testing.

B. Perform quality control testing as per Table 1.

Table 1: Sampling and Testing Frequencies			
	Roadway	Flatwork/Driveways	Backfill
Gradation[a] and Plastic Index; ASTM C136, AASHTO T 90	Every 500 Tons	1 per day or Every 500 Tons[c]	
Density[b], ASTM D 5195	Every 2500 SF	Every 150 LF or 2500 SF[c]	Every 150 LF
a. Report all sieves required for AASHTO Soil Classification and maximum particle size. b. Density target of 95% of Modified Proctor, ASTM D 1557. c. Use whichever frequency is greater.			

C. Submit test and inspection reports to the City in accordance with Section 01400.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Native/On-Site Produced Material Quality Control Requirements

1. Provide a Fill Quality Control Plan (FQCP) when excavating, using or producing fill material from on-site materials sources. This applies to crushed, blended or excavated native materials. Submit the FQCP to the City for review a minimum of 15 days prior to the commencement of the material processing operation.
    a. The FQCP shall be site specific and state how the Contractor proposes to control the materials, equipment, and operations for the material processing operation.
    b. The FQCP shall be signed and dated by the Contractor's representative at the time the FQCP is submitted to the Engineer.
    c. The FQCP shall be maintained to reflect the current status of the operations, and revisions shall be provided in writing and approved by the City prior to initiating any changes.
    d. At a minimum the FQCP shall contain the following information:
        i. Quality Control Organization, including name, telephone number, duties, and employer of all quality control personnel necessary to implement the FQCP. Laboratory shall comply with ASTM D3740 and APWA Section 01 45 00 requirements. Provide the minimum number of quality control personnel:
            (a). FQCP Field Manager - The person responsible for the execution of the FQCP and liaison with the City. Use a FQCP Field Manager with experience in the management of crushing/blending operations and an understanding of statistical control of materials.
            (b). Quality Control Technician - The person responsible for conducting quality control sampling, testing and inspection to implement the FQCP. There may be more than one Quality Control Technician. The Technician shall be a WAQTC Qualified Technician or directly supervised by a WAQTC Qualified Technician for duties performed. The field manager and quality control person may be the same person.
            (c). For projects with more than one on-site produced material, FQCP Field Manager or QCT must be on-site at all times to observe and document placement practices, and verify that on-site produced materials are placed in proper locations and constructed according to applicable City standard.

ii. Crushing, Blending and Handling practices

(a). Include the following, at minimum

(i) Practices to be employed, including equipment and procedures to be used, to produce a homogeneous material meeting specification requirements.

(ii) Approximate daily tonnage to be produced

(iii) Anticipated schedule for production

iii. Sampling and Testing locations and frequencies for each material to be produced or placed. Meet the following sampling and testing minimums:

(a). Source quality test results as required by Article 1.5 Submittals.

(b). Pre-crusher/pre-blend/on-site material

(i) 1 each, minimum, per source or stockpile, per day.
1 Gradation – ASTM C136
2 Plasticity Index

(c). Post-crusher/post-blend/native testing

(i) Perform the following tests, at minimum, for every 500 tons, or portion thereof, of material produced:
1 Washed Gradation – ASTM C117, ASTM C136
2 Moisture Content
3 Soil Classification, including Atterberg Limits

(ii) Use stratified samples over projected production run

(iii) Restart minimum requirements if any of the following occur:
1 Production run is stopped.
2 Changes are made to production process, including change in source, > 10% change in rate, change in equipment, or any other change that results in change in material produced.
3 If source or produced material stockpile is relocated.

iv. Tolerances and Actions

(a). Establish and document tolerances using control charts for action and suspension limits for controlling production operation. Use action limits for initiating minor changes to production process. Use suspension limits for halting production. Recommended Action and Suspension limits are included in Table 2. Modifications can be proposed with appropriate explanation and justification.

Table 2

Sieve	Action Limit	Suspension Limit
½" and Larger	6.7 - 9.5	> 9.5
3/8" Sieve	5.5 - 8.0	> 8.0
#4 Sieve	5.0 - 7.0	> 7.0
#16 Sieve	3.0 - 5.5	> 5.5
#200 Sieve	1.6 - 2.3	> 2.3
Values are deviations from target grading curve, expressed as percent of dry weight of sample.		

(i) Document all deviations outside of action or suspension limits and associated corrections made to production process.

(ii) Document where rejected materials are stockpiled

(b). Place produced materials in separate stockpiles by production run. Stockpiles should be separated horizontally by a distance equivalent to the stockpile height. Alternatively, a physical barrier acceptable to the City can be maintained between stockpiles.

(c). Rework or remove and replace products not produced under or conforming to the requirements of this section.

v. Disposal or use plan for material produced that does not meet requirements of this specification.

2. If the Contractor's Quality Control operation is not functioning to City standards, the City may withdraw permission to use on-site material.

3. The City may require the replacement of ineffective or unqualified equipment or Quality Control personnel. Operations may be required to stop until appropriate Quality Control operations are taken.

4. Submit On-Site Fill Quality Control test results and inspection documentation to the City or it representative at the completion of material processing operations each day. Documents should be electronically filed on a site available for the City to view.

1.7 ACCEPTANCE

A. The City will perform acceptance decisions for all projects. The City may accept the lot based on results of the quality control test results defined in Article 1.6.

1. A lot is equal to one day's production.

2. The City will reject the lot if the Contractor QC data is outside the limits of Table 1.

3. At the City's discretion, the City may perform acceptance testing in accordance with Table 1.

B. If tests indicate work does not meet specified requirements, remove work, replace and retest.

1.8 CITY QUALITY ASSURANCE

A. If the contractor fails to follow the approved FQCP, the City may require the employment of a third-party independent firm, chosen by the City, to control operations, at the contractor's expense.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Granular Borrow: Imported borrow or soil excavated on-site; conforming to Type A-1-a of AASHTO Classification of Soils and Soil-Aggregate Mixtures.

1. Non-plastic (PI = 0), well graded as per Unified Soils Classification System (USCS) standards, 3-inch maximum

2. Free of debris and organic material

3. Do not use material that does not have determinable proctor value.

4. At least 50% of granular borrow material should have fractured faces per ASTM D5821.
5. Use Granular Borrow with a minimum laboratory CBR value of 30%, ASTM D 1883.

B. Common Borrow: Imported borrow or soil excavated on-site; conforming to Type A-4, or better, of AASHTO Classification of Soils and Soil-Aggregate Mixtures.

1. Free of rocks larger than 3 inches, organic matter and debris.
2. Do not use material that does not have determinable proctor value.

C. Concrete for Fill: Lean concrete.

1. Conforming to Flowable Fill, as per APWA Standard and Specifications section 31 05 15 (Cement Treated Flowable Fill).

D. 3/4" Free Draining Gravel: Angular crushed, washed stone; washed, free of shale, clay, friable material and debris.

1. Graded in accordance with ASTM C 136, within the following limits:

a.	1 inch sieve:	100 percent passing.
b.	3/4 inch sieve:	95 to 100 percent passing.
c.	3/8 inch sieve:	30 to 65 percent passing.
d.	No. 4 sieve:	5 to 25 percent passing.
e.	No. 8 sieve:	0 to 10 percent passing.
f.	No. 16:	0 to 5 percent passing.
g.	No. 200 Sieve:	0 to 2 percent passing.

E. 1" Free Draining Gravel: Free draining granular backfill material; natural or crushed aggregate.

1. Graded in accordance with ASTM C-136, within the following limits:

a.	1½ inch sieve:	100 percent passing.
b.	1 inch sieve:	95 to 100 percent passing.
c.	1/2 inch sieve:	25 to 60 percent passing.
d.	No. 4 sieve:	0 to 10 percent passing.
e.	No. 200 Sieve:	0 to 2 percent passing.

F. Sand: Non-plastic (PI = 0); free of silt, clay, loam, friable or soluble materials, and organic matter.

1. Graded in accordance with ASTM C 136; within the following limits:

a.	No. 4 sieve:	100 percent passing.
b.	No. 16 sieve:	0 to 100 percent passing.
c.	No. 40 sieve:	0 to 100 percent passing.
d.	No. 100 sieve:	4 to 70 percent passing.
e.	No. 200 sieve:	0 to 20 percent passing.

G. Topsoil: Topsoil shall meet APWA standards & specifications (section 31 05 13).

2.2 SOURCE QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for testing and analysis

of soil material.

B. Materials Sources: Submit name of imported or native materials source and Aggregate Composition Test Reports demonstrating compliance with Article 2.1.

1. Submit to the City at least 10 working days before placement.
2. Include, at minimum, the following:
    a. Soil Classification (AASHTO M-145)
    b. Target Gradation (Percent passing for standard sieve set from ASTM D 6913)
    c. Modified Proctor Value (AASHTO T-180)
    d. CBR Value, Compacted to 95% Modified Proctor, 10lb surcharge (ASTM D 1883)
    e. If tests indicate materials do not meet specified requirements, change material and retest.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Verify structural ability of unsupported walls to support imposed loads by the fill.

C. Proof roll until surface is verified as non-yielding by the City Inspector.

3.2 PREPARATION

A. Scarify subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Granular Borrow.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.3 FILLING

A. Fill to finish contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations where indicated;

1. In the ROW or other load-bearing foundation surfaces fill flush to required elevation, compacted to 95 percent of maximum dry density. AASHTO T-180 (“Modified Proctor”)
    a. Lift Thickness:
        i. Minimum – 1.5 times the maximum aggregate size
        ii. Maximum – 12 inches loose, 8 inches compacted

2. Soil Fill: Place and compact material in equal continuous layers not exceeding Geotechnical Recommendations.

C. Employ a placement method that does not disturb or damage other work.

D. Do not fill over porous, wet, frozen, or spongy, or undocumented fill.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend project slopes into existing areas.

G. Reshape and re-compact fills subjected to vehicular traffic.

3.4 FILL AT SPECIFIC LOCATIONS

A. Fill within Right-of-Way up to subgrade elevation:

1. Use Common borrow with CBR greater than the native layer below.
2. Fill to finish grade elevations.

B. Structural backfill and pavement subbase:

1. Use Granular Borrow as per the Geotechnical/Pavement Engineer.
2. Fill up to subgrade elevations.
3. Foundation walls and footings, as per geotechnical Engineering Recommendations. Backfill simultaneously on each side of unsupported foundation walls until supports are in place

C. Bedding and Backfill for Pipe Lines in Trenches:

1. Pipe Bedding: Within pipe zone - use the following:
    a. Around and to one foot over PVC pressure pipe, use bedding sand.
    b. Around and to one foot over ductile iron pressure pipe, use bedding sand.
    c. Around and to one foot over PVC sewer pipe, use ¾” free draining gravel.
    d. Around and to the top of concrete drain pipe, use ¾” to 1” free draining gravel.

D. Trench Backfill: Above pipe zone - use Granular Borrow.

1. Fill up to subgrade elevation or natural ground level.

E. At Landscaped Areas above subgrade/native elevation:

1. Use common borrow.
2. Fill up to 6 inches below finish grade elevations.

3.5 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

B. Top Surface of Filling Under Paved Areas: Plus or minus 1/2 inch from required elevations.

C. “Red Head” staking and “string test” required for finish grade verification.

3.6 PROJECT CONDITIONS

A. Provide sufficient quantities of fill to meet project schedule and requirements. When necessary, store materials on site in advance of need

B. When fill materials need to be stored on site, locate stockpiles where designated.

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
2. Prevent contamination.
3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

3.7 CLEAN-UP

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

B. Leave borrow areas in a clean and neat condition, grade to prevent standing surface water.

C. All disturbed areas shall be restored with native grasses to match adjacent areas, conforming to the City Standards. These areas shall be seeded with material conforming to adjacent materials, conforming to the City Standards. Restored area shall achieve 70% plant coverage, free of erosion & invasive species, prior to acceptance.

END OF SECTION

SECTION 02235

SANITARY SEWER SYSTEM

1.1 PART 1 GENERAL

1.2 SECTION INCLUDES

A. Sanitary sewer piping, fittings and accessories.

B. Casing pipes and accessories.

C. Connection of project pipe to existing manholes.

D. Sewer Service Connections.

1.3 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: Excavating of trenches.

B. Section 02116 - Fill and Backfill: Pipe bedding and trench backfilling.

C. Section 02340 - Manholes and Covers.

D. Section 03300 - Cast-In-Place Concrete.

1.4 REFERENCES

A. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

B. ASTM D 3034 - Standard Specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings.

C. ASTM F 477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

D. ASTM F 679 - Standard Specification for Poly Vinyl Chloride (PVC) Large-Diameter Gravity Sewer Pipe and Fittings; 18-inch through 24-inch smooth solid wall sewer pipe.

E. Use the latest issue of the above reference standards as of the date of the Project.

1.5 DEFINITIONS

A. Pipe Bedding: Fill placed within the pipe zone, which is under, beside and directly over pipe, prior to subsequent backfill operations; see standard trench detail drawing.

1.6 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe, pipe accessories, and fittings.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents:

1. Record location of pipe lines, connections, manholes, sewer laterals, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code for materials and installation of the Work of this section.

1.8 PROJECT CONDITIONS

A. Coordinate the Work on sewer lines and connections to existing manholes with the City Engineer or City Inspector.

PART 2 PRODUCTS

2.1 SEWER PIPE MATERIALS

A. Plastic Pipe: ASTM D 3034, SDR 35, Type PSM, Poly Vinyl Chloride (PVC) material; inside nominal diameter of 4 inches through 15 inches, bell and spigot joint ends with gaskets.

B. Plastic Pipe: ASTM F 679, Poly Vinyl Chloride (PVC) material; inside nominal diameter of 18 inches through 24 inches, bell and spigot joint ends with gaskets.

C. Joint Seals for Plastic Pipe: ASTM C 477 rubber compression gaskets for positive seal.

D. Fittings: Same material as pipe, molded or formed to suit pipe size and end design, in required configurations.

1. Clean outs and clean out caps shall be cast iron in non-residential applications and as specified by International Pumping Code.

2.2 CASING PIPE MATERIALS

A. Welded Steel Pipe: AWWA C 200, steel water pipe; diameter as indicated.

B. Casing Insulators: fusion coated steel casing insulators with 12-inch wide band and 2-inch wide glass reinforced plastic runners; Model C12G-2, manufactured by Pipeline Seal and Insulator, Inc.

C. Casing End Seals: flexible S-shaped seals fabricated on synthetic rubber with stainless steel bands and clamps; Model S Pull-On End Seals, manufactured by Pipeline Seal and Insulator, Inc.

D. Casings under irrigation canals are subject to the applicable canal company’s regulations.

2.3 BEDDING AND COVER MATERIALS

A. Pipe Bedding Material: As specified in Section 02116.

B. Trench Backfill Material: As specified in Section 02116.

PART 3 EXECUTION

3.1 TRENCHING

A. See Section 02112 for trenching; Sections 02115 and 02116 for structural excavation and fill and backfill.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill pipe zone with bedding material, tamp in place and compact; then complete backfilling of trench and compact.

3.2 INSTALLATION - SEWER PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on project plan and profile drawings.

B. Install pipe, fittings, and accessories in accordance with appropriate ASTM standards and manufacturer's instructions. Seal joints watertight.

C. Install pipe to alignment and slope gradients noted on project drawings; with maximum variation from design alignment of 0.25 foot and from design elevations of 0.10 foot. As-built pipe slope shall meet design slope within 10% error of design grade, except for pipes at minimum slopes.

3.3 INSTALLATION - CASING PIPES

A. See Sections 02115 and 02116 for structural excavation and fill and backfill; and for additional requirements.

B. Install casing pipes by ramming process where indicated.

C. Install casing pipes at the line and grade as required to allow carrier pipes to be installed within the casing pipes at the design line and grade, as indicated on the drawings.

D. Place casing insulators on carrier pipes to properly center and position carrier pipe inside the casing pipes; space insulators as recommended by the pipe manufacturer.

E. Carrier Pipe inside of casing shall have restrained joints.

F. Seal each end of casing with appropriate size flexible end seals; install according to manufacturer's instructions and recommendations.

G. Seal bore holes at each end, around periphery of casing, with grout, impervious clay or brick masonry.

H. Contractor shall be solely responsible for the accuracy, safety and adequacy of construction methods and procedures for installing casing pipes, and for any damage which may result from their failure. All operations of the Contractor for installation of casing pipes shall be subject to acceptance by the agency having jurisdiction over the item being crossed.

I. Contractor shall enter any agreement with, and furnish any and all indemnity and other bonds that may be required by, the agency listed above, for their protection against injury and

interference with flow of water caused by the operations of the Contractor.

J. Contractor shall secure required permission from the agency listed above before commencing with the installation of casing pipes and related work along and across the respective areas.

3.4 CONNECT PROJECT PIPE INTO EXISTING SEWER MANHOLE

A. See Sections 02115 and 02116 for structural excavation and fill and backfill.

B. Connection of project pipe into existing sewer manhole shall include:

1. All excavating required for the connection; and backfilling excavations after the connection is completed, and compacting backfill as required.
2. Removing existing and/or abandoned pipes where and if required.
3. Core-cutting hole through wall and base of existing manhole, where required, with appropriate size coring machine; and preparing hole for connection.
4. Installing new pipe in place and connecting to manhole wall with appropriate type flexible coupling, as recommended by the coupling manufacturer.
5. Reforming manhole floor and invert channel to provide smooth channel transitions to accommodate new connected pipes.
6. Sealing around new pipe with non shrink grout where it intersects manhole wall; make connection watertight.
7. Perform all other operations necessary to restore existing manhole to an acceptable condition to the City Inspector.

C. If existing manhole does not have steps, connection shall also include furnishing and installing new manhole steps. Steps shall be installed as described in Section 02340, Manholes.

D. Provide temporary facilities to divert existing sewer flows around work areas in a manner acceptable to the City Engineer.

3.5 SEWER SERVICE CONNECTIONS

A. Sewer service lines shall extend from a 4-inch or 6-inch wye branch placed in the sewer main, as indicated on the drawings.

1. Normally, a 22 1/2 degree or 45 degree bend, rotated so that proper alignment and grade is established, shall be installed in the main line wye branch.
2. In some instances, the bend may be omitted; and in some instances, two bends may be required.
~~2.~~ 3. Nose-on connections are not permitted.

B. All pipe and fittings shall be heavy wall PVC sewer pipe conforming to the specifications found elsewhere in this Section.

C. Installation:

1. Pipe and fittings for sewer service lines shall be installed as described herein.

2. 4-inch and 6-inch sewer laterals shall be installed at a minimum slope of 1/4-inch per foot, which is about a 2.0 percent grade.

3. Sewer service lines shall be installed at a uniform grade and alignment; and shall be free of low spots or adverse grades.

D. Cleaning and Testing.

1. Sewer service lines shall be cleaned, flushed and tested in accordance with applicable requirements of this Section. All testing documentation shall be furnished to the City prior to acceptance.

2. After flushing and testing have been completed, the end of the service line shall be plugged until the home or business is connected.

3.6 CONSTRUCTING COLLARS AROUND EXISTING MANHOLE COVERS

A. Construct collars around existing manhole covers after street pavement has been restored.

B. Collars shall be constructed according to City standards per City Standard Drawing SS-2.

3.7 FIELD QUALITY CONTROL

A. Clean and Flush new sewer pipe as follows.

1. Take every precaution to prevent dirt, grease, and all other foreign matter from entering each length of pipe before making connections in field.

2. After each section of piping is installed, it shall be thoroughly cleaned to remove rocks, dirt, and other foreign matter by washing, sweeping, scraping or other methods that will not harm lining of pipe.

3. For safety and to prevent rocks and other foreign matter from entering pipe, all open ends of pipe shall be plugged when workmen are not on the job or in the immediate area.

4. Flushing and testing shall be completed by the Contractor.

5. All temporary water connections for flushing and drainage shall be furnished, installed, and subsequently removed by the Contractor after completion of the operation.

B. Perform field inspection and testing in accordance with Section 01400 and 02112.

C. Pipe installation shall be inspected by the City Engineer or Inspector prior to backfilling of trench; backfilling will be done only after it is authorized by the City Engineer or City Inspector.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to City.

E. Test for Leakage: Test all pipe, fittings and other items for leakage, in presence of a City Inspector, after items have been cleaned. All joints, couplings, fittings shall be watertight.

1. Air Test: Low pressure air test may be performed. Section of pipe being tested shall be sealed; line under test shall be pressurized to approximately 3.5 psi; and pressure allowed to stabilize for a minimum of two minutes. During this period air shall be added if pressure drops below 3.5 psi. After this stabilization period, timing shall begin. The time of test, in minutes, shall be equal to the pipe diameter in inches. The maximum allowable pressure drop during specified time period shall be 1.0 psi.

F. Deflection Test, PVC Sewer Pipe: After PVC sewer pipe has been cleaned, perform deflection test on each section of pipe line between manholes. The maximum allowable pipe deflection, the reduction in vertical inside diameter, shall be 5 percent. Maximum allowable deflection shall be applied to the base inside diameters shown in Table 63, Base Inside Diameters For Deflection Measurements of ASTM D 3034 SDR35 PVC Sewer in the Uni-Bell "Handbook of PVC Pipe", to determine minimum permissible diameter, or other appropriate sources. Testing devices shall include deflectometer, calibrated television or photography, or properly sized mandrel or sewer ball.

G. Televise Sewer Lines. After pipe lines have been tested for leakage and deflection, the main sewer lines shall be televised, along with appropriate narrative, by company specializing in this type work. A digital copy of the video shall be provided to the City Engineer. Video shall be provided ~~CD~~ digitally and shall be in color by a camera capable of pan and tilt capabilities. Maximum speed shall be 20' per minute. Video shall be continuous with steady stream of water running in pipe.

3.8 PROTECTION

A. Protect pipe and bedding material from damage or displacement.

END OF SECTION

SECTION 02335

STORM DRAIN SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Storm drain pipe, fittings, and accessories.

B. Connection of project storm drain pipe line to existing storm drains.

C. Cleanout boxes, gutter inlet boxes, inlet boxes, diversion boxes, and appurtenant items.

D. Storm water treatment systems.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: Excavating, bedding, backfilling and compacting.

B. Section 02115 - Excavation: Excavating for structures and appurtenant items.

C. Section 02116 - Fill and Backfill: Bedding and backfilling.

D. Section 02340 - Manholes and Covers.

E. Section 03300 - Cast-in-Place Concrete: Concrete for miscellaneous construction.

1.3 REFERENCES

A. ASTM C 14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.

B. ASTM C 76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

C. ASTM C 443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

D. Use the latest issue of the above reference standards as of the date of the Project.

1.4 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.5 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe, pipe accessories, and miscellaneous structures.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents:

1. Record location of pipe lines, connections, cleanouts, gutter inlet boxes, inlet boxes, and miscellaneous structures and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for materials and installation of the Work of this section.

1.7 PROJECT CONDITIONS

A. Coordinate the Work with other contractor working in the area.

PART 2 PRODUCTS

2.1 DRAIN PIPE MATERIALS

A. Concrete Pipe: Non-reinforced, ASTM C 14 (ASTM C 14M), Class 3 minimum; inside nominal diameter as indicated, bell and spigot end joints.

B. Concrete Pipe: Reinforced, ASTM C 76 (ASTM C 76M), Class III minimum with Wall type B; mesh reinforcement; inside nominal diameter as indicated, bell and spigot end joints.

C. Reinforced Concrete Pipe Joint Device: ASTM C 443 (ASTM C 443M), rubber compression gasket joint.

2.2 PIPE ACCESSORIES

A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

B. Trash Grates: shall be fabricated galvanized steel grates of design and size.

2.3 STORM DRAIN STRUCTURES

A. Frames and Covers: Heavy duty cast iron, as indicated; designed for H-20 highway loading.

1. Gutter Inlet Box:
    a. Lid Design: bicycle proof design grate; size and type as indicated.
2. Cleanout box:
    a. Lid Design: solid, with pick holes; size and type as indicated.
3. Inlet Box:
    a. Lid Design: bicycle proof design grate; size and type as indicated.
4. Manholes: see Section 02340.

B. Precast Box: type and size as indicated; minimum floor and wall thickness of 6-inches, minimum top slab thickness of 8-inches; design for H-20 highway loading; sleeved to receive storm drain pipe sections. Concrete work shall conform to Section 03300.

C. Cast-in-Place Box: of type and size indicated; concrete work shall conform to Section 03300; sleeved to receive storm drain pipe sections.

D. Joint Filler: flexible, bituminous mastic, gasket type sealant.

2.4 BEDDING AND BACKFILL MATERIALS

A. Bedding: As specified in Sections 02112 and 02116.

B. Backfill: As specified in Sections 02112 and 02116.

PART 3 EXECUTION

3.1 TRENCHING

A. See Section 02112, Trenching for Pipe Work, and Sections 02115 and 02116 for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around pipe with bedding material as indicated, tamp in place and compact; then complete backfilling.

3.2 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

B. Install concrete pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal Watertight and provide concrete collar on exterior of manhole or junction box. Seal with non-shrink grout on interior of manhole or box.

C. Install pipe to slope gradients noted on drawings; with maximum variation of 10% of the design slope.

D. Connect to existing storm drain boxes as indicated.

E. Install trash grates over the ends of all exposed pipe, 15-inch diameter and larger.

3.3 INSTALLATION - STORM DRAIN STRUCTURES

A. Trim bottom of excavation clean and smooth to correct elevation; place bedding as indicated.

B. Install precast boxes plumb, according to the manufacturer's instructions, at the design elevations as indicated; connect project pipes with appropriate type flexible couplings.

C. Construct cast-in-place concrete boxes, as indicated; connect project pipes with appropriate type flexible couplings.

D. Establish elevations and pipe inverts for inlets and outlets as indicated.

E. Install lid and frame level in top slab of box, as indicated, according to manufacturer's instructions.

F. Fill all joints between box sections, grade rings, and cover frames with joint sealant.

3.4 INSTALLATION - STORM WATER TREATMENT SYSTEMS

A. Storm water treatment systems shall be constructed where and as required to meet all applicable rules and regulations.

3.5 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400 and 02112.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

C. Infiltration Test: Infiltration test required when pipe line is below groundwater level. The amount of water leaking into the pipe shall be measured; allowable infiltration shall be one gallon per day per inch diameter of pipe per mile of pipe.

D. Exfiltration Test: Exfiltration test required when pipe line is above groundwater level. The section of pipe to be tested, including upstream structure, shall be filled with water to not less than four feet nor more than eight feet above lowest point of pipe section being tested. The amount of water added during the test period to maintain water level shall be measured; allowable exfiltration shall be one gallon per day per inch diameter of pipe per mile of pipe. An air test per manufacturer's recommendation may be permitted in lieu of exfiltration test as accepted by the City Inspector.

E. Deflection Test: Check alignment by sighting through pipe or by measurements. Pipe lines shall not vary from horizontal alignment shown on the drawings by more than 0.25 foot.

F. Televise Sewer Lines. After pipe lines have been tested for leakage and deflection, the main sewer lines shall be televised, along with appropriate narrative, by company specializing in this type work. A copy of the videotape shall be provided to the City Engineer. Video shall be provided on a CD and shall be in color by a camera capable of pan and tilt capabilities. Maximum speed shall be 20' per minute. Video shall be continuous with steady stream of water running in pipe.

3.6 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 02340

MANHOLES AND COVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Monolithic cast-in-place concrete manholes with masonry or precast transition to lid frame, covers, anchorage, and accessories.

B. Modular precast concrete manhole sections with tongue-and-groove joints, precast transition to lid frame, covers, anchorage, and accessories.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete.

1.3 REFERENCES

A. ASTM A 48 - Standard Specification for Gray Iron Castings.

B. ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.

C. ASTM C 923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manholes Structures, Pipes and Laterals.

D. Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate manhole locations, elevations, piping sizes and elevations of pipe inverts.

C. Product Data: Provide manhole covers, component construction, manhole steps, features, configuration, and dimensions.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this section with at least three years of documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Amcor-White, Inc.

B. Geneva Pipe Company.

C. Substitutions: See Section 01600 - Product Requirements.

2.2 MATERIALS

A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C 478 (ASTM C 478M), with gaskets in accordance with ASTM C 923 (ASTM C 923M).

B. Concrete: As specified in Section 03300.

C. Concrete Reinforcement: As specified in Section 03300.

D. Manhole Lining: Epoxy coating in accordance to manufacturer specifications.

2.3 COMPONENTS

A. Manhole Base: precast concrete manhole base of appropriate size.

1. Provide appropriate size flexible sleeves of synthetic rubber, with stainless steel clamps and bolts, for all pipe openings in base section.
2. Construct poured-in-place manhole base where manhole is to be constructed over existing sewer pipe line. Manhole base shall be constructed as indicated on the drawings.

B. Manhole Rise Sections: precast riser sections of appropriate size and length, extending from top of base section to bottom of top section.

C. Manhole Top Section: precast eccentric cone section of appropriate size, with 30-inch diameter top opening.

1. Flat slab top sections can be used only where indicated on the plan drawings; designed for H-20 live loading and one-foot minimum earth cover.

D. Joints: Base section, riser sections, and top section shall have lipped male/female ends, which shall provide uniform and continuous interior wall surface.

1. Joints shall be sealed mastic sealer. Joints may be air tested if the inspector has reason to believe that a joint is not tight.

E. Grade Rings: precast grade rings, as required, to adjust height of manhole lid and frame.

1. Grade rings shall have key locks and use flexible, bituminous mastic, gasket-type sealer to insure watertight installation.
2. Maximum aggregate height of tow rings to be 12”.

F. Lid and Frame: ASTM A 48, Class 30B Cast iron construction, machined flat bearing surface, removable lid with cleated surface and pick holes, solid lockable lids if indicated, vented lid design in improved areas and solid lid design in unimproved areas, H-20 highway load rating; lid molded with identifying name. Provide Model A-1180 manufactured by D & L Supply. Lids shall be marked with “SARATOGA SPRINGS” and with either “WATER”, “SEWER”, “PRESSURE IRRIGATION”, or “STORM DRAIN”, as applicable. Manholes with solid lids shall be epoxy lined.

G. Manhole Steps: Formed, copolymer polypropylene-encased, steel rungs; 1/2inch diameter minimum. Cast-in-place or vibrate into green concrete. Model PSI-FF manhole steps, manufactured by M. A. Industries, Inc.

H. Collars: Construct according to City Standard Drawing SS-2.

2.4 CONFIGURATION

A. Manholes shall be constructed as indicated on the Standard Manhole Detail drawing.

B. Shaft Construction: Concentric with eccentric cone top section; lipped male/female joints; sleeved to receive pipe sections.

C. Shape: Cylindrical, unless indicated otherwise.

D. Clear Inside Dimensions: 48 inch, 60 inch or 72 inch diameter, as indicated.

E. Design Depth: As indicated.

F. Clear Lid Opening: 30 inch diameter, as indicated.

G. Pipe Entry: Provide openings for all pipes entering manhole, as indicated.

H. Steps: 12 inches on center vertically, set into manhole wall directly under opening.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes is correct.

3.2 PREPARATION

A. Where native material encountered at foundation depth of manhole is considered unsuitable, remove unsuitable material; and place and compact bedding material, to limits directed by the City Engineer or City Inspector.

3.3 MANHOLES

A. Install precast concrete manhole base level on a compacted foundation, according to manufacturer's instructions.

B. Construct cast-in-place manhole base over existing sewer lines. Manhole base shall be constructed as indicated on the drawings.

1. After new manhole has been completed, saw-cut into top of existing sewer pipe, remove section of pipe as required, and dispose of the removed material; construct watertight grout invert channels through new manhole, between new pipe and existing pipe line. Invert channel shall be formed to direct sewage flows through the manhole as indicated.
2. Divert existing sewage flows around work area to allow connection to existing pipe line to be made.

C. Forces main discharge manholes shall be epoxy lined.

1. Manhole shall be prepared and liner installed as per manufacture recommendation.

2. Additional manholes immediately downstream of the discharge manhole may also need to be epoxy lined as determined by the City Engineer.

D. Place manhole riser sections plumb and level, from the manhole base to the top section, as indicated and according to manufacturer's instructions; anchor to base; align steps perpendicular to sewer line, and seal joints.

E. Place top section, cone section or flat slab, on top riser section, with opening positioned over steps. Top of cone section or flat slab shall be from 10-inches to 18-inches below final surface elevation.

F. Install grade rings, as required, to adjust top of lid and frame to match finish elevation.

G. When coring a manhole a minimum of 6” shall be left between outer edge of core and top and bottom of manhole section.

H. Connect pipe to manhole with appropriate type flexible coupling as recommended by manufacturer. Provide pipe joint or flexible coupling on all pipes approximately 18-inches from outside of manhole. Grout around pipe after installation is complete. Make connections watertight.

I. Grout inside of manhole base sections to form channel between connected pipes, as indicated. Trowel smooth. Top of channel shall be a same elevation as top of outlet pipe.

J. Set cast iron frames and covers level without tipping, to correct elevations. After placement, grout around the exterior of frame from top of concrete top section to top of frame, as indicated, to ensure watertight condition. No wood material shall be used to place frames in final position; only solid materials shall be used as accepted by the City Inspector.

K. After manhole base has been completed, furnish and install temporary pipe plugs to seal all interior pipe openings; plugs to be Brent DuoSeal Pipe Plug by Burke Rubber Company, Cherne Pipe Plug by Cherne Manufacturing Company. Pipe plugs shall remain in place until final review and acceptance of completed sewer. Plugs shall then be removed; and shall be property of Contractor.

L. In paved areas, collars shall be constructed around covers as indicated. Collars shall be constructed after new pavement has been placed and accepted by the City Engineer or City Inspector.

M. Coordinate with other sections of work to provide correct size, shape, and location.

N. 5-foot and 6-foot manholes. 5-foot manholes shall be used in the following situations:

a. At all intersections of three or more 8-inch or larger pipe lines.
b. Where the deflection angle of the pipe line exceeds 90 degrees.
c. When both items “a” and “b” are designed in the same manhole, a 6-foot manhole is required.

3.4 FIELD QUALITY CONTROL

A. Manholes shall be tested using vacuum test method to demonstrate integrity of installed materials and construction procedures. Method and material for repair shall be accepted by the City Engineer or City Inspector.

1. Each manhole shall be tested immediately after assembly and backfilling.

2. Plug all lift holes with a non-shrink grout.
3. Plug all pipes entering manhole; securely brace plugs during test.
4. Test head shall be placed at inside top of cast iron frame; and the seal shall be inflated in accordance with manufacturer's recommendations.

B. Testing shall conform to ASTM C 1244, Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

C. If manhole fails initial test, make necessary repairs per the manufacturer’s recommendations. The manhole shall be re-tested until the satisfactory test is obtained.

END OF SECTION

SECTION 02350

STORM WATER TREATMENT SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Storm water treatment systems.

B. Reinforced concrete structures.

1.2 RELATED SECTIONS

A. Section 02115 - Structural Excavation: Excavating for structures and appurtenant items.

B. Section 02116 - Fill and Backfill: Bedding, backfilling and compacting.

C. Section 02335 - Storm Water System.

D. Section 03300 - Cast-in-Place Concrete: Concrete for structures and appurtenant items.

1.3 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product data on storm water treatment system and appurtenant items including removal curves and washout testing that validate the unit selection

C. Shop Drawings:

1. Provide dimensional shop drawings; prepared at a scale of not less than 3/16-inches per foot (1:75).
2. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials, and design assumptions for structural analysis.
3. Submit hard or electronic copies of equipment shop drawings to the City Engineer for review and acceptance.

D. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents: Record actual locations structures and appurtenant items. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 QUALITY CONTROL INSPECTION

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the City Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places.

1. The sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture.

2. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once.

3. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the City Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. All sections shall be inspected for general appearance, dimensions, soundness, and related items. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.

C. Imperfections may be repaired, subject to the acceptance of the CIty Engineer, after demonstration by the manufacturer that strong and permanent repairs result.

1. Repairs shall be carefully inspected before final acceptance.

2. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days when tested in 3 inch diameter by 6 inch long cylinders stored in the standard manner.

3. Epoxy mortar may be utilized for repairs.

PART 2 PRODUCTS

2.1 STORMWATER HYDRODYNAMIC VORTEX TREATMENT STRUCTURE (HVS)

1. Construct the reinforced concrete structure for the treatment system as indicated on the drawings.

2. Structure dimensions, wall thicknesses, and slab thicknesses shall be as indicated on the dimensional drawings.

3. Concrete for structure shall conform to Section 03300; and shall meet the following additional requirements:

    a. All concrete shall be cured in accordance with the City Standards and Specifications. Concrete sections shall not be stripped until the concrete has attained a compressive strength of 4,000 psi or 5 days after fabrication and/or repair, whichever is the longer.

    b. Joints shall be as shown on the drawings with a butyl mastic sealant conforming to ASTM C 990.

4. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed with a hydraulic cement conforming to ASTM C 595M or Link-Seal.

5. Internal aluminum plate components shall be aluminum alloy 5052-H32 in accordance with ASTM B 209.

6. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with Section 02340 and all City requirements.

7. Manhole frames and covers shall be in accordance with Section 02340; with the words "Storm Water Treatment System" cast in covers.

8. A bitumen sealant in conformance with ASTM C 990 shall be utilized in affixing the aluminum swirl chamber to the concrete vault.

9. The cast iron manhole frames and covers shall be sized as per the manufacturer’s drawings and shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The masonry fixing bolts shall be Type 304 stainless steel.

B. Treatment System Components and Design.

1. Storm water treatment system shall include a tangential inlet to induce a swirling flow pattern that will accumulate and store settable solids in a manner and a location that will prevent re- suspension of previously captured particulates. Swirl chamber diameter shall be sized for the anticipated storm water flows.
2. Storm water treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer, using accepted principles of fluid mechanics, which raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.
3. Storm water treatment system shall have a design treatment capacity sized for the anticipated storm water flows; and shall not re-suspend trapped sediments or re-entrain floating contaminants at flow rates up to and including the design treatment capacity.
4. Storm water treatment system shall have usable sediment storage capacity of volume designed by the manufacturer for the anticipated storm water flows.
5. The system shall be designed such that the pump-out volume is less than one-half of the total system volume.
6. The system shall be designed to not allow surcharge of the upstream piping network during dry weather Conditions and shall have a sediment sum that is protected from high flows during peak flow events.
7. A water-lock feature shall be incorporated into the design of the storm water treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain events.
8. Direct access shall be provided to the sediment and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.
9. The manufacturer shall certify that storm water treatment system conforms to the performance requirements described herein for the anticipated storm water flows.

C. Manufacturer.

1. Only products that have been approved for pretreatment by the Washington Department of Ecology under general use level designation (GULD) or conditional use level designation (CULD) shall be allowed. ~~Storm water treatment systems shall be of a type that has been installed and used successfully for a minimum of 3 years. The manufacturer of said systems shall have been regularly engaged in the engineering design and production of systems for physical treatment of storm water runoff during the aforementioned period.~~

2.2 SEPARATION TYPE STORM WATER TREATMENT SYSTEMS

A. Reinforced Concrete Structures.

1. Construct the reinforced concrete manholes for the treatment system as indicated on the drawings.
2. Manholes shall be sized by the manufacturer to conform to the performance requirements described herein.
3. Manholes shall be constructed as described in Section 02340.

4. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed with a hydraulic cement conforming to ASTM C 595M or Link-Seal.

5. Manhole frames and covers shall be in accordance with Section 02340; with the words" Storm Water Treatment System" cast in covers.

B. Treatment System Components and Design.

1. The storm water treatment system shall include a primary manhole, separator unit, storage manhole, pipes, fittings, and appurtenant items.

2. The primary manhole will accumulate and store coarse settleable solids; and the storage manhole will accumulate and store fine settable solids, oils and floatable contaminates. Manholes shall be designed to prevent re-suspension of previously captured particulates; and shall be sized for the anticipated storm water flows.

3. The separation unit and piping shall be designed and certified by a professional engineer, to totally treat the anticipated storm water flows. No overflow of the system will be allowed.

C. Manufacturer.

1. Only products that have been approved for pretreatment by the Washington Department of Ecology under general use level designation (GULD) or conditional use level designation (CULD) shall be allowed. ~~Storm water treatment systems shall be of a type that has been installed and used successfully for a minimum of 3 years. The manufacturer of said systems shall have been regularly engaged in the engineering design and production of systems for physical treatment of storm water runoff during the aforementioned period.~~

2.3 STORM WATER TREATMENT SYSTEM PERFORMANCE

A. Performance. Storm water treatment systems shall adhere to the following performance specifications at the anticipated design treatment capacities.

1. Treatment standard: 80% TSS based on a particle size with a max 110 µm average (D50) particle size at the water quality flow rate

2. Detained Water Quality Flow Rate: 100-yr peak flow through the orifice during the critical storm less than~~a~~ 24 hours in duration~~storm~~

3. Undetained Water Quality Flow Rate: 2 year peak flow through the system during the critical storm less than~~a~~ 24 hours in duration~~storm~~

4. Peak Flow (pass through) rate: 100-yr peak flow through the system during the critical storm less than~~a~~ 24 hours~~.~~ in duration~~Storm~~

B. The design engineer shall determine the following performance requirements:

1. Total treatment capacity.

2. Sediment storage capacity.

C. The design engineer shall submit calculations used to determine anticipated storm water flows.

~~D. The manufacturer shall design and size the treatment system to treat the total storm water flow through the treatment system to the following requirements:~~

1. ~~Treatment system shall be capable of removing 80% of the net annual Total Suspended Solids (TSS) load based on a 110-micron particle size.~~

   a. ~~Annual TSS removal efficiency models shall be based on documented removal efficiency performance from full scale laboratory tests.~~

   b.a. ~~Annual TSS removal efficiency models shall only be considered valid if they are corroborated by independent third party field testing. Said field testing shall include influent and effluent composite samples from a minimum of ten storms at one location.~~

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the storm drain pipe line sizes, locations, and invert elevations are as indicated on the drawings.

3.2 PREPARATION

A. Prepare ends of storm drain pipe for connections to treatment system structures.

3.3 EXCAVATION

A. See Sections 02115 and 02116 for additional requirements.

B. Excavate to the limits as described in Section 02116.

C. After the concrete structures have been completed, backfill around and over the structure, tamp in place and compact. See Section 02116 for requirements.

3.4 CONSTRUCTION - CONCRETE STRUCTURE

A. Furnish all labor, materials, equipment and appurtenant items required to construct the reinforced concrete structure for the storm water treatment system, in accordance with the drawings and the specifications.

B. Furnish, place and compact granular base of the thickness indicated; conforming to Section 02116.

C. Construct the reinforced cast-in-place concrete structure as indicated on the drawings.

1. Precast concrete vaults may be used with the following requirements.
   a. Concrete shall conform to the requirements of Section 03300.
   b. Precast concrete vaults shall be designed for HS20-44 loading as determined by a Licensed Professional Engineer.
   c. Precast sections shall have tongue and groove joints with a butyl mastic sealant conforming to ASTM C990
   d. Vaults shall conform to the dimensions indicated for the cast-in-place vault, and to the appropriate required described herein.
   e. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Stormwater Treatment Systems shall conform to ASTM specification C 891 "Standard Practice for Installation of Underground Precast Utility Structures".
   f. Holes made in the concrete sections for handling or other purposes shall be

plugged with a non-shrink grout or by using grout in combination with concrete plugs.

g. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections; connections shall be watertight.

D. The treatment system shall be installed inside of the vault before the top slab for the vault is constructed or installed.

E. Outlet weirs shall be constructed where and as required and using manufacturer's recommendations.

F. After constructing the roof section of the vault, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a 1/4-inch maximum tolerance allowed.

G. Backfill around vault in a careful manner, bringing the fill up in 6-inch lifts on all sides.

H. If leaks appear, clean the inside joints and caulk with lead wool.

I. Construct 12' paved access road to storm water treatment manhole; access roads are to meet all city road standards as per section 00500 (Tables 6 - 10).

3.5 CONSTRUCTION - CONCRETE MANHOLES

A. Furnish all labor, materials, equipment and appurtenant items required to construct reinforced concrete manholes for the separation type storm water treatment system, in accordance with the drawings and the specifications.

B. Furnish, place and compact granular base of the thickness indicated; conforming to Section 02316.

C. Construct the reinforced concrete manholes as indicated on the drawings; conforming to Section 02640.

3.6 INSTALLATION - TREATMENT SYSTEMS

A. HVS Treatment System.

1. Furnish all labor, materials, equipment and appurtenant items required and install storm water treatment systems and appurtenances in accordance with the Drawings and these specifications, and according to manufacturer's written instructions and recommendation.
2. After constructing the base and wall sections, prepare to install the swirl chamber.
    a. Place the 3/4-inch thick by 3/4-inch wide butyl mastic seal vertically on the outside of the swirl chamber starting one inch above the bottom of the swirl chamber and continuing to a height equal to the elevation of the bottom of the upper aperture of the swirl chamber.
    b. The butyl mastic seal should about the downstream side of the pre-drilled mounting holes that attach the swirl chamber to the long walls of the concrete vault.
    c. Next, install the extruded EPDM seal on the bottom edge of the 180 degree downstream section of the swirl chamber by first applying a bead of Sikaflex-1a polyurethane elastomeric sealant into the extruded slot, then slide the seal onto

the swirl chamber. The extruded seal should extend 3-inches upstream of the mounting holes, toward the inlet end of the vault.

d. Set the swirl chamber into position and keep the seal approximately 1/2-inch above the floor of the concrete vault. Apply a continuous bead of Sikaflex-1 a sealant under the cupped bottom of the seal.

e. Set and anchor the circular swirl chamber by bolting the swirl chamber to the side walls of the concrete vault at the three (3) tangent points and at the inlet tab using HIL TI brand stainless steel drop-in wedge anchors, or equivalent, 3/8-inch diameter by 2-3/4 inch minimum length at heights of approximately three (3) inches off the floor and at fifteen (15) inch intervals to approximately the same height of the butyl mastic sealant (at locations of pre-drilled holes in aluminum components). Apply a continuous bead of Sikaflex-1 a sealant to the intersection of the inside bottom edge of the extruded seal and the vault floor.

3. Prior to constructing the roof section, bitumen sealant equal to ASTM C 990 shall be placed along the top of the baffle wall, using more than one layer of mastic if necessary, to a thickness at least 1-inch greater than the nominal gap between the top of the baffle and the roof section.

   a. The nominal gap shall be determined either by field measurement or the shop drawings.

   b. After construction of the roof section has compressed the butyl mastic sealant in the gap, finish sealing the gap with a non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout.

   c. Also apply non-shrink grout or Sikaflex-1a to the joints at the side edges of the baffle walls.

B. Separation Type Treatment System.

1. Furnish all labor, materials, equipment and appurtenant items required and install storm water treatment systems and appurtenances in accordance with the Drawings and these specifications, and according to manufacturer's written instructions and recommendation.

2. Manholes shall be constructed as described herein, and according to the requirements of the treatment system manufacturer.

3. The separator unit, pipe and fittings, and appurtenant items, shall be installed according to the shop drawings and as recommended by the manufacturer.

3.7 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. If tests indicate that the Work does not meet specified requirements, remove the Work and replace or repair the work as required; and retest at no cost to the City Engineer.

3.8 PROTECTION

A. Protect the treatment systems from damage or displacement until backfilling operations have been completed.

END OF SECTION

SECTION 02355

STORM WATER DETENTION PONDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Storm water detention ponds.

B. Pond pipe lines, structures, and appurtenant items.

1.2 RELATED SECTIONS

A. Section 02100 - General Excavation: General excavating, embankments and compacting.

B. Section 02112 - Trenching for Pipe Work: Excavating, bedding, backfilling and compacting.

C. Section 02115 - Excavation: Excavating for structures and appurtenant items.

D. Section 02116 - Fill and Backfill: Bedding, backfilling and embankment material.

E. Section 02335 - Storm Drain System.

F. Section 02724 - Automatic Sprinkling System.

G. Section 02726 - Landscaping.

H. Section 03300 - Cast-in-Place Concrete: Concrete for structures.

1.3 REFERENCES

A. See Section 02335 for storm water system materials.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, accessories and soil and embankment material.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of pipe lines, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

E. Storm water detention ponds, structures and all appurtenant items shall be sized and designed by the developer’s engineer. Ponds shall be designed and constructed according to the City’s standards. The plan drawings shall be submitted to the City Engineer for review; along with all calculations required to show how the various components were sized and how they are intended to operate. No work shall be done until the plan drawings have been accepted by the City Engineer.

F. Geotechnical report and recommendations.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with City's requirements as described herein.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials as recommended by the manufacturers.

PART 2 PRODUCTS

2.1 EMBANKMENT AND BACKFILL MATERIALS

A. Embankment and Backfill Materials: As specified in Sections 02112, 02115 and 02116.

2.2 PIPE LINES AND STRUCTURES

A. Pipe lines and structures shall be constructed as specified in Section 02335.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that location and elevations are as indicated.

3.2 PREPARATION

A. Clear and grub the pond site, as required; and dispose of cleared material in a legally acceptable manner.

B. Remove top soil material as described in Section 02100.

3.3 POND CONSTRUCTION

A. See Section 02112 and Sections 02115 and 02116 for additional requirements.

1. See Section 02335 for installation of pipe lines. Construct a pipeline under the pond, or a concrete-lined low-flow channel through the bottom of the pond to convey flows that are less than the capacity of the outlet.

B. Excavate for ponds and structures to the limits indicated on accepted drawings; conforming to the requirements of Section 02100.

1. Furnish, place and compact gravel base, as indicated on the drawings, for structures.
2. Furnish, place and compact pipe bedding and backfill material for pipe trenches.

C. Compact sub-base as described in Section 02115.

D. Construct embankments as indicated on the drawings and as described in Section 02100.

1. Embankments shall have maximum slopes of 3 horizontal to 1 vertical.
2. Construct a 12-foot wide (minimum) maintenance access road to the bottom of pond and for access to structures. The access road pavement shall be capable of supporting H-20 loading. The maximum slope shall be 15 percent.

3. Embankment shall provide a minimum of 1’ of freeboard.

E. Construct pond structures as indicated on accepted construction drawings.

1. Bubble-up type inlet boxes shall be constructed in the pond to discharge high flows of storm water into the pond; and to allow water to drain from the pond at controlled rates, as required. Boxes shall be as indicated on the construction drawings; and shall be constructed with floor of boxes at least 6-inchers below pipe inverts.
2. Construct an overflow box or spillway in the pond as per the accepted construction drawings. Overflow box shall have a trash grate of accepted design; and spillway shall convey overflows to the public row or to an acceptable location as accepted by the City Engineer.

F. Construct automatic sprinkling system for pond area, as indicated on accepted construction drawings; conforming to Section 02724.

G. Landscape the pond area, as indicated on accepted construction drawings; conforming to Section 02726.

3.4 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to City.

END OF SECTION

SECTION 02410

WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe and fittings for project water lines, to include domestic water lines, fire water lines, and drinking water lines.

B. Valves, Fire hydrants, and appurtenant items.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: Excavating, bedding, backfilling and compacting.

B. Section 02115 - Excavation: Excavating for structures and appurtenant items.

C. Section 02116 - Fill and Backfill: Bedding and backfilling.

D. Section 02415 - Disinfection of Water Distribution Systems: Disinfection of site service utility water piping.

E. Section 03300 - Cast-in-Place Concrete: Concrete for thrust restraints.

1.3 REFERENCES

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers.

B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers.

C. ASTM B 88 - Standard Specification for Seamless Copper Water Tube.

D. ASTM D 3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

E. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society.

F. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association (ANSI/AWWA C104/A21.4).

G. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association (ANSI/AWWA C105/A21.5).

H. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association (ANSI/AWWA C111/A21.11).

I. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; (ANSI/AWWA C151/A21.51).

J. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; American Water Works

Association.

K. AWWA C502 - Dry Barrel Fire Hydrants; American Water Works Association (ANSI/AWWA C502/C502a).

L. AWWA C504 - Rubber Seated Butterfly Valves; American Water Works Association.

M. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; American Water Works Association; (ANSI/AWWA C508/C508a).

N. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C509/C509a).

O. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C515).

P. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; (ANSI/AWWA C600).

Q. ASTM D2774 - Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.

R. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution; American Water Works Association; (ANSI/AWWA C900/C900a).

S. AWWA C200 - Steel Water Pipe casings, 6-inches and larger as needed.

T. Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of all improvement including, pipe lines, valves, connections, thrust restraints, services and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Owner's requirements as described herein.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 WATER PIPE

A. Ductile Iron Pipe: AWWA C151:

1. Fittings: Ductile iron, standard thickness.
2. Joints:
    a. Push-On Joints: AWWA C111, push-on type with rubber gasket.
    b. Mechanical Joints: AWWA C111, mechanical joint type with gasket, bolts, and nuts.
    c. Flange Joints: AWWA C110, flange type with gasket, bolts, and nuts.
3. Jackets: AWWA C105 polyethylene jacket with polyethylene tape.

B. Copper Tubing: ASTM B 88, Type K, annealed: Not allowed in right-of-ways.

1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
2. Joints: Compression connection or AWS A5.8, BCuP silver braze.

C. PVC Pipe: AWWA C900 DR-18 for lines up to and including 24 inches in diameter.

1. Fittings: AWWA C111, cast iron.
2. Joints: ASTM D 3139 compression gasket ring.

D. Polyethylene Pipe: ASTM D2737, C.T.S., 200 psi, SDR 9.

1. Joints: Mueller compression type couplings.

E. Trace Wire: #14 gauge to be installed on all buried pipe. Provide continuity test to ensure proper installation.

F. Detector Tape: Blue plastic tape imprinted with “DRINKING WATER” in large letters, to be installed on all buried pipes.

2.2 CASING PIPE MATERIALS

A. Welded Steel Pipe: AWWA C 200, steel water pipe; diameter as indicated.

B. Casing Insulators: Fusion coated steel casing insulators with 12-inch wide band and 2-inch wide glass reinforced plastic runners; Model C12G-2, manufactured by Pipeline Seal and Insulator, Inc.

C. Casing End Seals: Flexible S-shaped seals fabricated on synthetic rubber with stainless steel bands and clamps; Model S Pull-On End Seals, manufactured by Pipeline Seal and Insulator, Inc.

D. Casings under irrigation canals shall meet the more-stringent of either the City Standards or the canal company’s standards and regulations

2.3 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

1. Jackets: AWWA C105 polyethylene jacket with polyethylene tape.

B. Gate Valves Up To 3 Inches:

1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and handwheel.
2. Product: Powell U.S. Bronze Gate Valves.
3. Substitutions: See Section 01600 - Product Requirements.

C. Gate Valves 3 Inches and Over:

1. AWWA C500, iron body, bronze trim, non-rising stem with square nut, single wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, mechanical joint or flanged ends as indicated, and cast iron valve box.
3. AWWA C515, ductile iron, bronze trim, non-rising stem with square operating nut, single ductile iron wedge, mechanical joint or flanged ends, as indicated, and cast iron valve box.
4. Product: Clow, Mueller, or American Flow Control 2500.

D. Butterfly Valves from 2 Inches to 24 Inches:

1. AWWA C504, iron body, bronze disc, resilient replacement seat, mechanical joint or flanged ends as indicated, manual worm gear operator, and cast iron valve box where required.
2. Underground manual operators shall be totally enclosed, factory grease packed and sealed, bronze worm gear operators with self-locking gearing; stops shall be provided to prevent over travel of valve disc.
3. Valve operator shall be geared to close valves slowly. Number of turns to close valve from full open position shall be: 32 turns for 10-inch and smaller valves, 52 turns for 12-inch thru 16-inch valves, and 76 turns for 18-inch thru 24-inch valves. Closing times for larger valves must first be accepted by the City Engineer.
4. Product: Mueller "Lineseal III" Butterfly Valve with appropriate type Pacific States Cast Iron Valve Box.

E. Corporation Stops: Shall be type for connecting to copper or polyethylene pipe; Mueller No. H- 15000.

F. Blow-Off Hydrants: shall be Non-Freeze Blow-Off Assembly.

2.4 HYDRANTS

A. Hydrants: AWWA C502, UL 246, dry barrel type.

1. Jackets: AWWA C105 polyethylene jacket with polyethylene tape.
2. Inside dimension: 7 inches minimum, with minimum 5 inches diameter valve seat opening.
3. Minimum net water area of barrel not less than 190 percent of valve opening.
4. 6 inch flanged inlet connection with accessories, gland bolts, and gaskets.
5. Product: Mueller "Super Centurion 250", Waterous “Pacer WB 67-250”,or Clow “Medallion” Fire Hydrants. ~~or equal.~~

B. Hydrant Extensions: Fabricate with rod and coupling to increase barrel length, 1 extension

maximum.

C. Hose and Streamer Connection: Two hose nozzles, 2 1/2-inch size, one pumper nozzle, 4 1/2 inch size.

D. Finish: Buried portion of hydrant shall be painted with two coats of CA50 coal tar enamel. Exposed portion shall be painted with Primer and two coats of enamel in red color conforming to the currently adopted Fire Code.

2.5 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Sections 02112 and 02116.

B. Backfill: As specified in Sections 02112 and 02116.

2.6 ACCESSORIES

A. Service Saddles: shall be bronze, double-strap type; Mueller No. H-16134.

B. Concrete for concrete collars, slabs, and thrust restraints: Concrete type specified in Section 03300.

2.7 RESIDENTIAL WATER CONNECTIONS

A. Meter boxes, meter setters, meters, and appurtenant items shall be as indicated on the drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that water main and main line tee size, location, and invert are as indicated.

B. Verify bedding material and installation.

C. Verify trails lines continuity.

D. Verify thrust block installation and sizing.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or mechanical joints.

3.3 TRENCHING

A. See Section 02112 and Sections 02115 and 02116 for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required square footage

of thrust restraint bearing on subsoil as indicated on the drawings.

D. Backfill around sides and to top of pipe with backfill material, tamp in place and compact, then complete backfilling.

3.4 INSTALLATION - PIPE

A. Maintain separation of water main from sewer piping in accordance with State code.

B. Establish elevations of buried piping to ensure not less than four feet of cover over pipe; or as indicated on the drawings.

C. Install pipe to indicated elevation to within tolerance of one inch.

D. Install ductile iron piping and fittings to AWWA C600.

E. Install PVC pressure pipe and fittings to ASTM D2774.

F. Install pipe lines to line and grade indicated.

G. Install pipe to allow for expansion and contraction without stressing pipe or joints.

H. Install access fittings to permit disinfection of water system performed under Section 02415.

I. Install #14 trace wire and detector tap above all pipe; coordinate with Section 02112.

3.5 INSTALLATION - CASING PIPES

A. See Sections 02315 and 02316 for structural excavation and fill and backfill; and for additional requirements.

B. Install casing pipes where indicated.

C. Install casing pipes at the line and grade as required to allow carrier pipes to be installed within the casing pipes at the design line and grade, as indicated on the drawings.

D. Place casing insulators on carrier pipes to properly center and position carrier pipe inside the casing pipes; space insulators as recommended by the pipe manufacturer.

E. Carrier Pipe inside of casing shall have restrain joints per City Engineer.

F. Seal each end of casing with appropriate size flexible end seals; install according to manufacturer's instructions and recommendations.

G. Seal bore holes at each end, around periphery of casing, with grout, impervious clay or brick masonry.

H. Contractor shall be solely responsible for the accuracy, safety and adequacy of construction methods and procedures for installing casing pipes, and for any damage which may result from their failure. All operations of the Contractor for installation of casing pipes shall be subject to acceptance by the agency having jurisdiction over the item being crossed.

I. Contractor shall enter any agreement with, and furnish any and all indemnity and other bonds that may be required by, the agency listed above, for their protection against injury and interference with flow of water caused by the operations of the Contractor.

J. Contractor shall secure required permission from the agency listed above before commencing with the installation of casing pipes and related work along and across the respective areas.

3.6 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on concrete block.

B. Center and plumb valve box over valve operating nut. Set box cover flush with finished grade. Valve nut not to exceed 4' in depth without valve nut extension.

C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.

D. Set hydrants to grade, with bury mark at ground level and with nozzles at least 18 inches above ground level.

E. Locate hydrant control valve as indicated on the accepted drawings.

F. Provide a drainage pit, 24 inches square by 12 inches deep, filled with 1/2-inch washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening

3.7 SERVICE CONNECTIONS

A. Provide water service as indicated in detail with meter box and meter yoke with double check valve.

3.8 CONNECTIONS TO EXISTING WATER LINES

A. Connection to existing water lines shall be made where and as indicated on the accepted drawings. The sizes of pipe, fittings, valves and appurtenant items required to make connection shall correspond to the sizes of existing pipe and of project pipe.

B. Excavate to existing pipe line at point of connection; determine actual conditions of existing pipe and all fittings and appurtenant items required to make the connection; and have all materials needed on site prior to any shut down or cutting into existing pipe lines.

C. Connection which involve cutting into existing pipe lines include: cutting and removing sections of existing pipe and fittings as required; cleaning and preparing ends of existing pipe as required for connection; furnishing and installing all new pipe, fittings and valves required to make the connection of project pipe to the existing pipe as indicated; and all appurtenant work required to complete the connection.

D. Connection into existing pipe lines under pressure include: furnishing and installing mechanical joint tapping sleeve of the appropriate size on the existing pipe at point of connection; furnishing and installing tapping valve, with valve box, on sleeve; tapping existing pipe with drilling machine and equipment, without interrupting flow in existing pipe line; and all appurtenant work required to complete the connection.

E. Connection to existing pipe line shall be made at such times and within the time limits and according to the directions as agreed to between the Contractor and the Owner.

F. Cut and plug existing pipe lines where indicated on the drawings. Excavate as required to locate existing pipe lines to be abandoned in place; cut the existing pipe, as required; and install permanent plug in end of pipe to be abandoned.

G. Follow AWWA C651 guidelines for cutting existing pipes.

3.9 RECONNECT EXISTING WATER SERVICE LINES

A. Reconnect existing water service lines where and as indicated on the accepted drawings. The sizes of pipe, fittings, saddles, corporation stops, and appurtenant items required to make reconnections shall correspond to the sizes of existing service lines and of project pipe.

B. Excavate as required to locate the existing service line; determine actual conditions of existing service line and all fitting and appurtenant items needed to make the reconnections; and have all materials needed on site prior to any shut down of existing service line.

C. After project pipe line has been thoroughly tested, disinfected and put into operation, disconnect existing water service lines from the existing water line. Excavate as required to expose the existing service line; cut the existing service line and remove back to main as required; and remove the existing corporation stop from the existing pipe and install a permanent plug in the tap in the existing water line which is to be abandoned.

D. Tap the project pipe line with the appropriate size tapping machine and install a double strap service saddle, with corporation stop, on the project pipe. New copper tubing sized polyethylene (blue) pipe shall be furnished and installed to make the connection from the end of the existing service line to the new corporation stop. The new CTS sized poly pipe tubing shall be connected to the end of the existing service line with the appropriate type coupling and to the new corporation stop. In all reconnections, at least five feet of new tubing shall be installed, as indicated. Insulating couplings or adapters shall be used to connect pipe of dissimilar material.

E. After the existing water service line has been disconnected from the existing water line, the reconnection work shall be pursued diligently so that the service line is reconnected to the project water line and put back into service in the shortest possible time.

3.10 REMOVING EXISTING FIRE HYDRANTS

A. Existing fire hydrant installations shall be removed and delivered to the Owner.

B. Excavate as required to locate the existing hydrant supply line and control valve; determine actual conditions of existing supply line and all fitting required to complete the removal; and have all material needed at the job site prior to any shut down or cutting into existing pipe.

C. After project pipe line has been thoroughly tested, disinfected and put into operation, cut the existing hydrant supply line and remove back to tee at main. Install a plug in the tee and secure with bolts as per manufacture recommendation. Remove the existing hydrant, control valve and valve box and deliver the material to the Owner.

D. After the hydrant installation has been completely removed and the existing pipe plugged, backfill the excavation to match adjacent ground surfaces; and compact material as described herein.

3.11 WATER METER RELOCATION

A. Contractor shall notify the water customer and the City 48 hours in advance before starting the water service meter relocation. Contractor will be responsible for obtaining all necessary permits from the City. Contractor shall verify size and type of materials required for the water service meter relocation before commencing work. The Contractor shall also be responsible for relocation, reconnection, and replacement of any damaged materials.

1. After existing meter box is moved, the resultant void shall be backfilled, compacted, and the surface restored.
2. The meter box, ring, and lid shall be installed to one inch above final grade.
3. The relocated service shall be located so the meter box is centered in the park strip and the meter shall be rotated from perpendicular to parallel to the street.
4. The water service meter setter shall be installed in the horizontal and up-right position and with the top of the angle stop eighteen (18) to twenty two (22) inches below the finish grade. (See Standard Details CW-5).
5. Length of water service CTS poly pipe extension shall be the minimum length necessary to install the water service meter setter in its new location.
6. Contractor shall replace any water service meter that is damaged or misplaced as a result of the Contractor's operation.
7. Place a compression coupler over the section of CTS poly pipe at the location where the pipe was crimped.
8. Extend the trace wire and splice using a grease nut.

B. Water services may need to be upgraded to current City Construction Standards.

3.12 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Pressure test water piping to 200 PSI for 2 hours.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

D. Disinfection and bacteria testing per section 02415.

END OF SECTION

SECTION 02412

PRESSURE REDUCING VALVE STATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pressure regulating valve (PRV) station; including reinforced concrete vault, pipe, fittings, valves, and appurtenant items.

1.2 RELATED SECTIONS

A. Section 02115 - Excavation: Excavating for structures and appurtenant items.

B. Section 02116 - Fill and Backfill: Bedding and backfilling.

C. Section 02410 - Water Distribution System: Pipe, fittings, valves and appurtenant items.

D. Section 02415 - Disinfection of Water Distribution Systems: Disinfection of station piping.

E. Section 03300 - Cast-in-Place Concrete: Concrete for concrete vault and thrust restraints.

1.3 REFERENCES

A. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ASTM C 858 - Standard Specification for Underground Precast Concrete Utility Structures.

C. AWWA C504 - Rubber Seated Butterfly Valves; American Water Works Association.

D. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C509/C509a).

E. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C151).

F. Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of pipe lines, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Owner's requirements as described herein.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves and appurtenant items in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 REINFORCED CONCRETE VAULT

A. Reinforced Concrete Vault. The reinforced concrete vault is shown on the drawings as constructed of poured-in-place concrete; but a precast reinforced concrete vault may be provided at the option of the Contractor.

1. The vault shall be sized to adequately accommodate all valves, pipe, fittings and appurtenant items to be enclosed in the vault.
2. Poured-in-Place Concrete. A poured-in-place reinforced concrete vault, of the size indicated on the construction drawings, may be constructed; which shall conform to applicable requirements of Section 03300.
3. Precast Concrete. A precast reinforced concrete vault of equal dimensional and strength characteristics, as determined by the City Engineer during shop drawing review, may be provided. Precast vault shall have wall thickness of 9-inch minimum, bottom slab thickness of 6-inch minimum, and top slab thickness of 9-inch minimum; designed for H-20 highway loading.
    a. Precast vault shall conform to ASTM C 858; and shall be as manufactured by Amcor-White, Inc., Dura-Crete.
4. Reinforcement. Reinforcing steel shall be as specified in Section 03300, using Grade 60 bar of the size(s) shown on the construction drawings.
5. Steps. Plastic encased steel steps shall be installed in station walls; spaced at 12-inches on center and centered under the access opening. Steps shall be copolymer poly-propylene- encased, 60,000 tensile strength steel, Model PSI-FF manhole steps, as manufactured by M. A. Industries, Inc.
    a. An aluminum ladder may be provided and permanently installed.

B. Access Doors: The access door leaf and channel frame, with strap anchors, shall be constructed of steel with hot-dip galvanized finish (ASTM 123); designed for H-20 highway loading. Doors shall be provided with 316 stainless steel hardware throughout; including all parts of the latch and lifting mechanism assemblies, hold open arms and guides, and all brackets, hinges, pins and fasteners. The doors shall have recessed has covered by a hinged lid flush with the surface of the door.

1. The access doors shall be Type J Access Doors as manufactured by The Bilco Company of the size indicated on the drawings. The manufacturer shall guarantee the door against defects in material and workmanship for a period of five years.

C. Proprietary Items. Provide proprietary items of the type, size and manufacture noted on the drawings or as required to complete the work.

D. Miscellaneous Metal Work. Furnish and erect miscellaneous metal work as required to complete the pressure regulating station, as described herein and as shown on the drawings.

1. Codes. Specifications for the Design, Fabrication and Erection of Structural Steel For Buildings of the American Institute of Steel Construction shall govern the work. Welding shall be done in accordance with applicable and most recent American Welding Society Standards.
2. Substitutions. Substitutions of sections or modifications of details, or both, and the reasons therefore shall be submitted for acceptance by the City Engineer.
3. Responsibility for Errors. The Contractor shall be responsible for all errors of detailing, fabrication, erection, and correct fitting of the miscellaneous metal work.
4. Materials. Material shall conform to their respective specifications as follows:
    a. Bolts and Nuts: ASTM Standard A-307
    b. Gray Iron Castings: A-48 Class 40 or Better
    c. Structural Steel: ASTM Standard A-36
    d. Washers: ASTM Standard B-27.2, Type B
    e. Miscellaneous Items: Miscellaneous items shall be as indicated on the drawings or as required.

E. Painting. All exposed pipe, valves, fittings, and metal work inside of the station shall be painted with either: four coats of alkyd paint, Painting System II (Steel Structural Painting Council - Specification No. 2); or four coats of phenolic paint, Painting System III (Steel Structural Painting Council - Specification No. 3). Painting shall include surface preparation, pretreatment, primer coat, inter-mediate coats, and finish coat, as specified; with total dry film thickness not less than 4.0 mils. Aluminum surfaces which will be in contact with concrete after erection shall be coated with bituminous mastic coating, SSPC- Paint 12, prior to erection.

2.2 VALVE STATION PLUMBING

A. Pipe and Fittings.

1. Ductile Iron Pipe: AWWA C151: See Section 02410. Exposed pipe and fittings shall not be coated with coal tar pitch varnish; but shall be painted as specified herein.
2. Copper Tubing: ASTM B 88, Type K, annealed: See Section 02410.
3. Galvanized Steel Pipe: ASTM A 53: Galvanized steel pipe shall be Schedule 80, seamless or welded pipe, with threaded ends. Fittings shall be 150 lb. galvanized malleable iron banded type, with screwed ends. Unions shall be galvanized railroad type with ground brass-to-iron seats.

B. Valves.

1. Manufacturer's name and pressure rating marked on valve body.
2. Gate Valves Up To 3 Inches:
    a. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and handwheel.
    b. Product: Powell U.S. Bronze Gate Valves.
    c. Substitutions: See Section 01600 - Product Requirements.
3. Gate Valves 3 Inches and Over:
    a. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends as indicated, and cast iron valve box.
    b. AWWA C515, ductile iron, bronze trim, non-rising stem with square operating

nut, single ductile iron wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.

c. Product: Mueller Gate Valves or Resilient Seat Gate Valves, or American Flow Control Series 2500 Resilient Seat Gate Valves; with appropriate type Pacific States Cast Iron Valve Box, or accepted equal.

4. Butterfly Valves From 2 Inches to 24 Inches:

   a. AWWA C504, iron body, bronze disc, resilient replacement seat, flanged ends as indicated, and manual worm gear operator.

   b. Valve operator shall be geared to close valves slowly. Number of turns to close valve from full open position shall be: 32 turns for 10-inch and smaller valves, 52 turns for 12-inch thru 16-inch valves, and 76 turns for 18-inch thru 24-inch valves. Closing times for larger valves must first be accepted by the City Engineer.

   c. Product: Mueller "Lineseal III" Butterfly Valve with appropriate type manual worm gear operator.

5. Pressure Reducing Valves:

   a. Valves shall have cast iron or stainless steel bodies, with bronze pilot and trim; designed to reduce a higher inlet pressure to a steady lower pressure downstream, regardless of flow rate.

   b. Valves shall be hydraulically operated; capable of holding delivery pressure to within one or two psi of valve setting; and shall be adjustable, with downstream pressure range of 30 to 110 psi.

   c. Pressure reducing valves shall be Clayton Model 90G-01AB Pressure Reducing Valves, as manufactured by Cla-Val Company.

   d. Other type valves may be required for specific applications within the water system.

6. Strainers:

   a. Strainers shall have cast iron bodies and covers, stainless steel strainer and stainless steel bolts.

   b. End flanges shall be ANSI class 125 standard flanges

   c. Stainless steel strainers shall have an area of two times the nominal inlet pipe opening.

   d. Strainers shall be designed for easy access and in-line servicing of strainer element; and shall have drain plugs for periodic flushing

   e. Strainer screens to be #4 mesh

7. Combination Air-Vacuum Release Valves.

   a. Valves shall be designed to release large quantities of air from pipes during filling, admit large quantities of air into pipes during draining, and release small accumulations of air during normal operation of pipes.

   b. Valves shall be equal in quality to "Heavy-Duty Combination Air Release Valves, No. 143C", as manufactured by Valve and Primer Corp. (APCO); and shall meet the provisions of these specifications.

8. Hose Gate Valves.

   a. Hose gate valves shall be high grade brass with handwheel, inside screw ends, rising stem, screwed bonnet, taper wedge double disc. Valve shall be designed to operate at 200 psi water pressure.

   b. Hose gate valves shall be equal to Powell U.S. Bronze Hose Gate Valve No. 527.

9. Pressure Relief Valves.

C. Miscellaneous Items.

1. Dismantling Joint. The dismantling joint shall be Romac DJ 400, with anchor studs as recommended by the manufacturer; for connecting ductile iron pipe to flanged valves, equipment and fittings.
2. Mechanical Couplings. The mechanical couplings shall be Dresser, Rockwell; for connecting the size and type of pipe shown on the drawings. Couplings exposed to soil shall be primed and coated with a 1/4-inch layer of coal tar or rust preventing wax compound.
3. Gauges. Gauges shall be as shown on the drawings and of the size and quality equal to or better than United States Gauge "A" Line, Figure No. 5000. Gauges shall have a range of 0 to 350 psi.
4. Gauge Cocks. Gauge cocks shall be of high grade bronze with tee head; designed for 200 psi water pressure, and factory-tested to 300 psi; Crane Nos. 708, 712, 744.
5. Service Clamps: shall be bronze, double-strap type; Mueller No. H-16134, for up to 2 inch service lines.
6. Other Items. Other miscellaneous materials shall be as indicated on the drawings.

D. Hangers, Supports and Blocks.

1. Provide all hangers, supports, clamps, guides, sleeves, inserts, anchors and other such devices required for hanging or supporting pipe, preserving alignment, prevention of movement, passage of pipe through walls and floors, or securing pipe in any manner. The required number, location and detail of such items may or may not be indicated on the drawings; but, in any case, such work shall be provided as work incidental to furnishing and installing any type of pipe, fittings and appurtenances, and no extra payment will be made for this work.
    a. Piping shall be supported or suspended in such manner as to prevent sagging or over stressing of pipe, valves, fittings or connections; and so that no pipe, fittings, valves or other items transfer load or strain to equipment of any kind.
2. Supports.
    a. Concrete supports shall be installed under pipe and valves wherever shown on the drawings. Concrete supports shall be neatly constructed and finished. No supports shall be made until all pipe is in its final position.
    b. All other pipe supports shall be of the adjustable type of the style and size recommended by the manufacturer; and shall be located as indicated on the drawings. Floor flanges shall be of the size required to fit the pipe attached to the saddle support and as recommended by the manufacturer. Adjustable pipe supports shall be used as kick blocks for pipe in open locations.
3. Blocks. Concrete thrust blocks shall be used wherever shown on the drawings or where thrust is great enough to cause movement of the piping.

E. Miscellaneous. Miscellaneous appurtenant items shall be as indicated on the drawings or as required to complete the station.

2.3 BEDDING AND BACKFILL MATERIALS

A. Bedding: As specified in Sections 02115 and 02116.

B. Backfill: As specified in Sections 02115 and 02116.

2.4 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Section 03300.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that water main size, location, and invert are as indicated.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or mechanical joints.

3.3 EXCAVATING

See Section 02112 and Sections 02115 and 02116 for additional requirements.

A. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required square foot of thrust restraint bearing on undisturbed subsoil as indicated on the drawings.

C. Backfill around sides and to top of pipe with backfill material, tamp in place and compact, then complete backfilling.

3.4 CONSTRUCTION - VALVE VAULT

A. Construct the vault for the pressure regulating station at the location indicated on the drawings; in accordance with the details shown on the construction drawings and as specified herein.

B. Earthwork shall be done in accordance with applicable requirements of Section 02115.

1. Foundation Material. Where native material encountered at the foundation depth is found to be unable to provide adequate structural support of the vault or is determined to be moisture sensitive, the unsuitable material shall be removed and replaced by the appropriate granular borrow material as per the accepted drawings or under the direction of a licensed geotechnical engineer.
2. Excess Material. Unsatisfactory and excess excavated materials shall be removed from the work site and disposed of in a legally acceptable manner.

C. Concrete Work. Comply with requirements of Section 03300, for placement, consolidation, finishing and protection of cast-in-place concrete.

D. Precast Concrete Vault. Precast concrete vault shall be installed level and plumb, in accordance with the manufacturer's written instructions and recommendations.

E. Access Door: Install according to manufacturer’s written instructions and recommendations.

F. Miscellaneous Metal Work.

1. Miscellaneous metal work shall be fabricated and assembled in the shop to the greatest extent possible.
2. Miscellaneous metal work shall be erected in conformity with AISC Code of Standard Practice.

3.5 INSTALLATION - PLUMBING

A. All pipe, fittings, valves, equipment and appurtenant items, together with supports and anchors, shall be installed as specified herein and as indicated on the drawings; in conformity with currently adopted plumbing codes.

B. Equipment shall be installed as shown on the drawings, and in accordance with accepted manufacturer's written instructions.

C. Strainers shall be installed upstream of all pressure regulating valves.

D. All material and workmanship shall conform to applicable requirements of the currently adopted plumbing code.

E. Establish elevations of buried piping to ensure not less than four feet of cover over pipe.

F. Install pipe to indicated elevation to within tolerance of one inch.

G. Install ductile iron piping and fittings to AWWA C600.

H. Install pipe to allow for expansion and contraction without stressing pipe or joints.

I. Install access fittings to permit disinfection of water system performed under Section 02515.

J. Set valves on concrete block.

K. After plumbing system has been installed and completed, it shall be tested and disinfected as specified herein; including an operating test for acceptance of the work. Tests shall be performed in the presence of the City Engineer or his authorized representative.

3.6 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with section 01400.

B. Pressure test water piping to 200 PSI for 2 hours (see section 02410).

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 02414

WATER METER VAULT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water meter stations, complete, including:

1. Reinforced concrete vault.
2. Pipe, fittings, valves, meter, and appurtenant items.

B. Station testing.

1.2 RELATED SECTIONS

A. Section 02115 - Excavation: Excavating for structures and appurtenant items.

B. Section 02116 - Fill and Backfill: Pipe bedding and excavation backfilling.

C. Section 02410 - Water Distribution System: Pipe, fittings, valves and appurtenant items.

D. Section 02415 - Disinfection of Water Distribution Systems: Disinfection of station piping.

E. Section 03300 - Cast-in-Place Concrete: Concrete for structures and thrust blocks.

1.3 REFERENCES

A. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ASTM A 234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

C. ASTM C 858 - Standard Specification for Underground Precast Concrete Utility Structures.

D. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association; (ANSI/AWWA C104/A21.4).

E. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; (ANSI/AWWA C105/A21.5).

F. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; (ANSI/AWWA C111/A21.11).

G. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; (ANSI/AWWA C151/A21.51).

H. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; American Water Works Association.

I. AWWA C504 - Rubber Seated Butterfly Valves; American Water Works Association.

J. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; American Water Works Association; (ANSI/AWWA C508/C508a).

K. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C509/C509a).

L. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C515).

M. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; (ANSI/AWWA C600).

N. Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, meters, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of pipe lines, valves, meters, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with City's requirements as described herein.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves, valves and appurtenant items in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 REINFORCED CONCRETE VAULT

A. Reinforced Concrete Vault. The reinforced concrete vault is shown on the drawings as constructed of poured-in-place concrete; but a precast reinforced concrete vault may be provided at the option of the Contractor.

1. Concrete work shall conform to applicable requirements of Section 03300.
2. Poured-in-Place Concrete. A poured-in-place reinforced concrete vault, of the size indicated on the drawings, may be constructed; which shall conform to applicable requirements of Section 03300.
    a. Poured-in-place concrete vault shall have wall thickness of 9-inch minimum, bottom slab thickness of 6-inch minimum, and top slab thickness of 9-inch minimum; designed for H-20 highway loading.
    b. Submit construction drawings of the vault for review by the City Engineer, before any work is begun. The drawings shall be stamped by a professional licensed structural engineer.

3. Precast Concrete. A precast reinforced concrete vault of equal dimensional and strength characteristics may be provided. Precast vault shall have wall thickness of 9-inch minimum, bottom slab thickness of 6-inch minimum, and top slab thickness of 9-inch minimum; designed for H-20 highway loading.

    a. Precast vault shall conform to ASTM C 858; and shall be as manufactured by Amcor-Old Castle or Dura-Crete.

4. Reinforcement. Reinforcing steel shall be as specified in Section 03300, using Grade 60 bar of the size(s) shown on the drawings.

5. Steps. Plastic encased steel steps shall be installed in station walls; spaced at 12-inches on center and centered under the access opening. Steps shall be copolymer poly-propylene- encased, 60,000 tensile strength steel, Model PSI-FF manhole steps, as manufactured by M. A. Industries, Inc.

B. Access Doors: The access door leaf and channel frame, with strap anchors, shall be constructed of steel with hot-dip galvanized finish (ASTM 123); designed for H-20 highway loading. Doors shall be provided with 316 stainless steel hardware throughout; including all parts of the latch and lifting mechanism assemblies, hold open arms and guides, and all brackets, hinges, pins and fasteners. The doors shall have recessed hasp covered by a hinged lid flush with the surface of the door.

    a. The access doors shall be Type J Access Doors as manufactured by The Bilco Company, of the size indicated on the drawings. The manufacturer shall guarantee the door against defects in material and workmanship for a period of five years.

C. Proprietary Items. Provide proprietary items of the type, size and manufacture noted on the drawings or as required to complete the work.

D. Miscellaneous Metal Work. Furnish and erect miscellaneous metal work as required to complete the pressure regulating station, as described herein and as shown on the drawings.

1. Codes. Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings of the American Institute of Steel Construction shall govern the work. Welding shall be done in accordance with AWS D1.1 of the American Welding Society Standards.

2. Substitutions. Substitutions of sections or modifications of details, or both, and the reasons therefore shall be submitted for acceptance by the City Engineer.

3. Responsibility for Errors. The Contractor shall be responsible for all errors of detailing, fabrication, erection, and correct fitting of the miscellaneous metal work.

4. Materials. Material shall conform to their respective specifications as follows:

    a. Bolts and Nuts: ASTM Standard A-307
    b. Gray Iron Castings: A-48 Class 40 or Better
    c. Structural Steel: ASTM Standard A-36
    d. Washers: ASTM Standard B-27.2, Type B
    e. Miscellaneous Items: Miscellaneous items shall be as indicated on the drawings or as required.

E. Painting. All exposed pipe, valves, fittings, and metal work inside of the station shall be painted with either: four coats of alkyd paint, Painting System II (Steel Structural Painting Council - Specification No. 2); or four coats of phenolic paint, Painting System III (Steel Structural Painting Council - Specification No. 3). Painting shall include surface preparation, pretreatment, primer coat, inter-mediate coats, and finish coat, as specified; with

total dry film thickness not less than 4.0 mils. Aluminum surfaces which will be in contact with concrete after erection shall be coated with bituminous mastic coating, SSPC-Paint 12, prior to erection.

2.2 METER STATION PLUMBING

A. Pipe and Fittings.

1. Ductile Iron Pipe: AWWA C151: See Section 02410. Exposed pipe and fittings shall not be coated with coal tar pitch varnish; but shall be painted as specified herein.
2. Copper Tubing: ASTM B 88, Type K, annealed: See Section 02410.
3. Galvanized Steel Pipe: ASTM A 53: Galvanized steel pipe shall be Schedule 80, seamless or welded pipe, with threaded ends. Fittings shall be 150 lb. galvanized malleable iron banded type, with screwed ends. Unions shall be galvanized railroad type with ground brass-to-iron seats.

B. Valves.

1. Manufacturer's name and pressure rating marked on valve body.
2. Gate Valves Up To 3 Inches:
    a. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and handwheel.
    b. Product: Powell U.S. Bronze Gate Valves.
    c. Substitutions: See Section 01600 - Product Requirements.
3. Gate Valves 3 Inches and Over:
    a. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends as indicated, and cast iron valve box.
    b. AWWA C 515, ductile iron, bronze trim, non-rising stem with square operating nut, single ductile iron wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
    c. Product: Mueller Gate Valves or Resilient Seat Gate Valves, or American Flow Control Series 2500 Resilient Seat Gate Valves; with appropriate type Pacific States Cast Iron Valve Box.
4. Butterfly Valves From 2 Inches to 24 Inches:
    a. AWWA C504, iron body, bronze disc, resilient replacement seat, flanged ends as indicated, and manual worm gear operator.
    b. Valve operator shall be geared to close valves slowly. Number of turns to close valve from full open position shall be: 32 turns for 10-inch and smaller valves, 52 turns for 12-inch thru 16-inch valves, and 76 turns for 18-inch thru 24-inch valves. Closing times for larger valves must first be accepted by the City Engineer.
    c. Product: Mueller "Lineseal III" Butterfly Valve with appropriate type manual worm gear operator.
5. Combination Air-Vacuum Release Valves.
    a. Valves shall be designed to release large quantities of air from pipes during filling, admit large quantities of air into pipes during draining, and release small accumulations of air during normal operation of pipes.
    b. Valves shall be equal in quality to "Heavy-Duty Combination Air Release Valves, No. 143C", as manufactured by Valve and Primer Corp. (APCO); and shall meet the provisions of these specifications.

6. Strainers:
    a. Strainers shall have cast iron bodies and covers, stainless steel strainer and stainless steel bolts.
    b. End flanges shall be ANSI class 125 standard flanges
    c. Stainless steel strainers shall have an area of two times the nominal inlet pipe opening.
    d. Strainers shall be designed for easy access and in-line servicing of strainer element; and shall have drain plugs for periodic flushing.

C. Meters. Meters shall be of design, type, size and manufacturer as accepted by the City Engineer.

D. Miscellaneous Items.

1. Dismantling Joint. The dismantling joint shall be Romac DJ 400, for connecting ductile iron pipe to the flanged valves, equipment and other fittings.
2. Mechanical Couplings. The mechanical couplings shall be Dresser or Rockwell, for connecting the size and type of pipe shown on the drawings. Couplings exposed to soil shall be primed and coated with a 1/4-inch layer of coal tar or accepted rust preventing wax compound.
3. Gauges. Gauges shall be as shown on the drawings and of the size and quality equal to or better than United States Gauge "A" Line, Figure No. 5000. Gauges shall have a range of 0 to 350 psi.
4. Gauge Cocks. Gauge cocks shall be of high grade bronze with tee head; designed for 200 psi water pressure, and factory-tested to 300 psi; Crane Nos. 708, 712, 744.
5. Service Clamps: shall be bronze, double-strap type; Mueller No. H-16134.
6. Other Items. Other miscellaneous materials shall be as indicated on the drawings.

E. Hangers, Supports and Blocks.

1. Provide all hangers, supports, clamps, guides, sleeves, inserts, anchors and other such devices required for hanging or supporting pipe, preserving alignment, prevention of movement, passage of pipe through walls and floors, or securing pipe in any manner. The required number, location and detail of such items may or may not be indicated on the drawings; but, in any case, such work shall be provided as work incidental to furnishing and installing any type of pipe, fittings and appurtenances, and no extra payment will be made for this work.
    a. Piping shall be supported or suspended in such manner as to prevent sagging or over stressing of pipe, valves, fittings or connections; and so that no pipe, fittings, valves or other items transfer load or strain to equipment of any kind.
2. Supports.
    a. Concrete supports shall be installed under pipe and valves wherever shown on the drawings. Concrete supports shall be neatly constructed and finished, as indicated on the drawings. No supports shall be made until all pipe is in its final position.
    b. All other pipe supports shall be of the adjustable type of the style and size recommended by the manufacturer; and shall be located as indicated on the drawings. Floor flanges shall be of the size required to fit the pipe attached to the saddle support and as recommended by the manufacturer. Adjustable pipe supports shall be used as kick blocks for pipe in open locations.

3. Blocks. Concrete thrust blocks shall be used wherever shown on the drawings or where thrust is great enough to cause movement of the piping.

F. Miscellaneous. Miscellaneous appurtenant items shall be as indicated on the drawings or as required to complete the station.

2.3 BEDDING AND BACKFILL MATERIALS

A. Bedding: As specified in Sections 02115 and 02116.

B. Backfill: As specified in Sections 02115 and 02116.

2.4 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Section 03300.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall furnish all labor, materials and equipment as required to construct the water meter station, complete, as described herein, and as shown on the drawings.

B. All work shall be done according to the current adopted plumbing codes, and to manufacturer's written instructions and recommendations.

C. The Contractor shall test the station to assure proper operation.

3.2 EXAMINATION

A. Verify that design drawings conform to project conditions.

B. Verify that water main size, location, and invert are as indicated.

3.3 PREPARATION

A. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or mechanical joints.

3.4 EXCAVATING

A. Excavating for the meter station shall be done to ensure proper grades and alignment as shown on the drawings.

B. See Section 02112 and Sections 02115 and 02116 for additional requirements.

C. Hand trim excavation for accurate construction or placement of concrete vault to elevations indicated.

D. Backfill around structure with backfill material, tamp in place and compact to required densities.

3.5 CONSTRUCTION - VALVE VAULT

A. Construct the vault for the meter station at the location indicated on the drawings; in accordance with the details shown on the drawings and as specified herein.

B. Earthwork shall be done in accordance with applicable requirements of Section 02115.

1. Foundation Material. Where native material encountered at the foundation depth is found to be unable to provide adequate structural support of the vault, or is determined to be moisture sensitive, the unsuitable material shall be removed and replaced by the appropriate granular borrow material as per the accepted drawings or under the direction of a licensed geotechnical engineer.
2. Excess Material. Unsatisfactory and excess excavated materials shall be removed from the work site and disposed of in a legally acceptable manner.

C. Concrete Work. Comply with requirements of Section 03300, for placement, consolidation, finishing and protection of cast-in-place concrete and reinforcement.

D. Precast Concrete Vault. Precast concrete vault shall be installed level and plumb, in accordance with the manufacturer's written instructions and recommendations.

E. Access Door: Install according to manufacturer’s written instructions and recommendations.

F. Miscellaneous Metal Work.

1. Miscellaneous metal work shall be fabricated and assembled in the shop to the greatest extent possible.
2. Miscellaneous metal work shall be erected in conformity with AISC Code of Standard Practice.

3.6 INSTALLATION - PLUMBING

A. All pipe, fittings, meters, valves, equipment and appurtenant items, together with supports and anchors, shall be installed as specified herein and as indicated on the drawings; in conformity with the currently adopted plumbing code.

B. Equipment shall be installed as shown on the drawings, and in accordance with accepted manufacturer's written instructions.

C. Strainers shall be installed upstream of all meters with a No. 4, 100 micron, screen.

D. All material and workmanship shall conform to applicable requirements of the currently adopted plumbing code.

E. Establish elevations of buried piping to ensure not less than four feet of cover over pipe; or as indicated on the drawings.

F. Install pipe to indicated elevation to within tolerance of one inches.

G. Install ductile iron piping and fittings to AWWA C600.

H. Install pipe to allow for expansion and contraction without stressing pipe or joints.

I. Install access fittings to permit disinfection of water system performed under Section 02415.

J. Set valves on concrete block.

K. After plumbing system has been installed and completed, it shall be tested and disinfected as specified herein; including an operating test for acceptance of the work. Tests shall be performed in the presence of the City Engineer or his authorized representative.

3.7 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Pressure test water piping to 200 PSI for 2 hours (see section 02410).

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.8 OPERATIONAL TESTING

A. Provide City Engineer with seven days written notice of operational test of backflow preventer.

B. Test shall consist of the operation of the station for propose of checking operation and assuring of absence of leaks.

1. Repair pipe, fittings, valves, or connections which show evidence of leakage.

C. After all repairs or replacements have been made, repeat the above required test.

END OF SECTION

SECTION 02415

DISINFECTION OF WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Disinfection of project pipe lines specified in Section 02410.

B. Disinfection of site domestic water lines, site fire water lines, and hydrant supply lines and water service lines specified in Section 02410.

C. Testing and reporting results.

1.2 RELATED SECTIONS

A. Section 02410 - Water Distribution System.

1.3 REFERENCES

A. AWWA B300 - Hypochlorites; American Water Works Association; (ANSI/AWWA B300).

B. AWWA B301 - Liquid Chlorine; American Water Works Association; (ANSI/AWWA B301).

C. AWWA B302 - Ammonium Sulfate; American Water Works Association; (ANSI/AWWA B302).

D. AWWA B303 - Sodium Chlorite; American Water Works Association; (ANSI/AWWA B303).

E. AWWA C651 - Disinfecting Water Mains; American Water Works Association; (ANSI/AWWA C651).

F. Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Test Reports: Indicate results comparative to specified requirements.

C. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.

D. Disinfection report:

1. Type and form of disinfectant used.
2. Date and time of disinfectant injection start and date and time of disinfectant injection completion.
3. Test locations.
4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
5. Date and time of flushing start and completion.

6. Disinfectant residual after flushing in ppm for each outlet tested.

E. Bacteriological report:

1. Date issued, project name, and testing laboratory name, address, and telephone number.
2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certification that water conforms, or fails to conform, to bacterial standards of State.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AWWA C651.

B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of Utah.

C. Submit the bacteriologist's signature and the Utah certified authority associated with testing.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code or regulation for performing the work of this Section.

B. Provide certificate of compliance from Utah certified authority having jurisdiction indicating acceptance of water system.

PART 2 PRODUCTS

2.1 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite; AWWA B301, Liquid Chlorine; AWWA B302, Ammonium Sulfate; and AWWA B303, Sodium Chlorite.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping system has been cleaned and inspected.

3.2 EXECUTION

A. Provide and attach required equipment to perform the work of this Section.

B. Introduce treatment into piping system if not already added during installation.

C. Maintain disinfectant in system for 24 hours.

D. Flush, circulate, and clean until required cleanliness in accordance with this section, is achieved; use municipal domestic water.

E. Replace permanent system devices removed for disinfection.

F. Perform bacteria test at location accepted by City Inspector. After receiving clean bacteria test results, pressure test system to 200 psi for 2 hours. Repair leaks and re-test.

~~F.~~G. Perform a second bacteria test upon completion and acceptance of pressure test.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Test samples in accordance with AWWA C651.

END OF SECTION

SECTION 02416

AIR-VACUUM VALVE STATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Air-Vacuum Valve Stations; including reinforced concrete vault, pipe, fittings, valves, and appurtenant items, as indicated on the drawings and as described herein.

1.2 RELATED SECTIONS

A. Section 02115 - Excavation: Excavating for structures and appurtenant items.

B. Section 02116 - Fill and Backfill: Bedding and backfilling.

C. Section 02410 - Water Distribution System: Pipe, fittings, valves and appurtenant items.

D. Section 02415 - Disinfection of Water Distribution Systems: Disinfection of station piping.

E. Section 03300 - Cast-in-Place Concrete: Concrete for concrete vault and thrust restraints.

1.3 REFERENCES

A. ASTM B 43 - Standard Specifications for Seamless Red Brass Pipe, Standard Sizes.

B. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM C 858 - Standard Specification for Underground Precast Concrete Utility Structures.

D. AWWA C504 - Rubber Seated Butterfly Valves; American Water Works Association.

E. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C509/C509a).

F. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service; American Water Works Associations; (ANSI/AWWA C515).

G. Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of pipe lines, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Owner's requirements as described herein.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves and appurtenant items in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 GRAVEL BASE. Gravel shall conform to the requirements of Section 02116.

2.2 REINFORCED CONCRETE VAULT

A. Precast Riser Sections. Riser sections shall be reinforced concrete pipe sections, class IV, with tongue and groove joints; meeting the requirements of ASTM C 76. Riser sections shall extend from the top of the base to the bottom of the cover slab.

1. Joints. Joints between precast sections, except grade rings, shall be sealed with pre-lubricated rubber gaskets conforming to requirements of ASTM C443 and C361; and shall be equal to Forsheda No. 114 Seal, as manufactured by Forsheda Pipe Seal Company.

B. Top Sections. Top sections shall be precast flat slab tops, with top opening of 30-inch diameter, minimum. Design shall be based on H-20 live loading and one-foot minimum earth cover.

C. Grade Rings. Precast grade rings shall be provided as required to adjust height of cover slab. The maximum height of the grade rings shall be 12-inches; and shall have key locks and use mastic sealer to insure water-tightness.

D. Concrete. Concrete, poured-in-place, and grout shall conform to applicable requirements of Section 03300.

E. Frames and Covers. Frames and covers shall be cast iron with a 22 3/4-inch diameter clear opening; and shall be gravity, solid, non-rocking, heavy duty type meeting requirements for Salt Lake City Standard Manhole Rings and Covers. Covers shall be vented in improved areas and solid in unimproved areas; shall have cleated surfaces and pick holes; and shall be marked with “SARATOGA SPRINGS” and either “WATER” or “PRESSURE IRRIGATION”.

1. Castings. Castings shall be of uniform quality free of porosity, hard spots, and shrinkage defects. Exposed surfaces shall be smooth and true to pattern. Iron shall conform to ASTM A48, Gray Iron Castings, Grade B.

F. Proprietary Items. Provide proprietary items of the type, size and manufacture noted on the drawings or as required to complete the work.

2.3 VALVE STATION PLUMBING

A. Pipe and Fittings.

1. Ductile Iron Pipe: AWWA C151: See Section 02510. Exposed pipe and fittings shall not be coated with coal tar pitch varnish; but shall be painted as specified herein.
2. Copper Tubing: ASTM B 88, Type K, annealed: See Section 02410.

3. Red Brass Pipe: ASTM B 53, Red brass pipe shall be Schedule 80, seamless pipe with threaded ends. Fittings shall be Schedule 80 with screwed ends.

B. Valves.

1. Manufacturer's name and pressure rating marked on valve body.
2. Gate Valves Up To 3 Inches:
    a. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and handwheel operator.
    b. Product: Powell U.S. Bronze Gate Valves.
    c. Substitutions: See Section 01600 - Product Requirements.
3. Gate Valves 3 Inches and Over:
    a. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flagged ends as indicated and cast iron valve box.
    b. AWWA C 515, ductile iron, bronze trim, non-rising stem with square operating nut, single ductile iron wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
    c. Product: Mueller Gate Valves or Resilient Seat Gate Valves, or American Flow Control Series 2500 Resilient Seat Gate Valves; with appropriate type Pacific States Cast Iron Valve Box.
4. Combination Air-Vacuum Release Valves.
    a. Valves shall be designed to release large quantities of air from pipes during filling, admit large quantities of air into pipes during draining, and release small accumulations of air during normal operation of pipes.
    b. Valves shall be equal in quality to "Heavy-Duty Combination Air Release Valves", of the appropriate type and size, as manufactured by Valve and Primer Corporation (APCO); and shall meet the provisions of these specifications.
5. Hose Gate Valves.
    a. Hose gate valves shall be high grade brass with handwheel, inside screw ends, rising stem, screwed bonnet, taper wedge double disc. Valve shall be designed to operate at 200 psi water pressure.
    b. Hose gate valves shall be equal to Powell U.S. Bronze Hose Gate Valve No. 527.

C. Miscellaneous Items.

1. Dismantling Joint. The dismantling joint shall be Romac DJ 400, with anchor studs as recommended by the manufacturer; for connecting ductile iron pipe to the flanged valves, equipment and fittings.
2. Mechanical Couplings. The mechanical couplings shall be Dresser, Rockwell, for connecting the size and type of pipe shown on the drawings. Couplings exposed to soil shall be primed and coated with a 1/4-inch layer of coal tar or rust preventing wax compound.
3. Gauges. Gauges shall be as shown on the drawings and of the size and quality equal to or better than United States Gauge "A" Line, Figure No. 5000. Gauges shall have a range of 0 to 350 psi.
4. Gauge Cocks. Gauge cocks shall be of high grade bronze with tee head; designed for 200 psi water pressure, and factory-tested to 300 psi; Crane Nos. 708, 712, 744.

5. Service Clamps: shall be bronze, double-strap type; Mueller No. H-16134, for up to 2 inch service lines.

6. Other Items. Other miscellaneous materials shall be as indicated on the drawings and as required to complete the station.

D. Hangers and Supports. Provide all hangers, supports, clamps, guides, sleeves, inserts, anchors and other such devices required for hanging or supporting pipe, preserving alignment, prevention of movement, passage of pipe through walls and floors, or securing pipe in any manner. The required number, location and detail of such items may or may not be indicated on the drawings; but, in any case, such work shall be provided as work incidental to furnishing and installing any type of pipe, fittings and appurtenances, and no extra payment will be made for this work.

a. Piping shall be supported or suspended in such manner as to prevent sagging or over stressing of pipe, valves, fittings or connections; and so that no pipe, fittings, valves or other items transfer load or strain to equipment of any kind.

2.4 BEDDING AND BACKFILL MATERIALS

A. Bedding: As specified in Sections 02115 and 02116.

B. Backfill: As specified in Sections 02115 and 02116.

2.5 ACCESSORIES

A. Concrete for Thrust Restraints: Concrete type specified in Section 03300.

PART 3 EXECUTIONS

3.1 EXAMINATION

A. Verify that water main size, location, and invert are as indicated.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or mechanical joints.

3.3 EXCAVATING

A. See Section 02112 and Sections 02115 and 02116 for additional requirements.

B. Hand trim excavation for accurate placement of station to elevations indicated.

C. Backfill around sides and to top of valve vault with backfill material, tamp in place and compact.

3.4 CONSTRUCTION - VALVE VAULT

A. Construct the vault for the air-vacuum valve station at the location indicated on the drawings; in accordance with the details shown on the drawings and as specified herein.

B. Earthwork shall be done in accordance with applicable requirements of Section 02115.

1. Foundation Material. Where native material encountered at the foundation depth is found to be unable to provide adequate structural support of the vault or is determined to be moisture sensitive, the unsuitable material shall be removed and replaced by the appropriate granular borrow material as per the accepted drawings or under the direction of a licensed geotechnical engineer.
2. Excess Material. Unsatisfactory and excess excavated materials shall be removed from the work site and disposed of in a legally acceptable manner.

C. Concrete Work. Comply with requirements of Section 03300, for placement, consolidation, finishing and protection of cast-in-place concrete.

D. Precast Items. Precast riser sections shall be installed, from the gravel base to the cover slab, in accordance with the manufacturer's recommendations; and shall be installed to stand plumb. Precast flat slab tops shall be installed on the top riser section; with the opening positioned as indicated on the drawings. The top of concrete flat slab tops shall be approximately 12-inches below final surface elevations.

E. Placement of Frame and Cover.

1. Placement. After the top slab of the station has been placed, the cast iron frame and cover shall be installed into the opening in the top slab; using precast grade rings to place the cover flush with adjacent finish grade.
2. Grouting. After placement of the frame and cover, grout around the exterior of the frame from the top of concrete top slab to the top of frame, as indicated on the drawing, to insure a watertight condition.

F. Flexible Pipe Couplings. A pipe joint or flexible coupling shall be provided on all pipes connected to the stations, located approximately 18-inches from the outside of the station. The joint or coupling shall be of the same size as the pipe, and shall be as recommended by the pipe manufacturer.

G. Miscellaneous Metal Work.

1. Miscellaneous metal work shall be fabricated and assembled in the shop to the greatest extent possible.
2. Miscellaneous metal work shall be erected in conformity with AISC Code of Standard Practice.

3.5 INSTALLATION - PLUMBING

A. All pipe, fittings, valves, equipment and appurtenant items, together with supports and anchors, shall be installed and connected to operate as specified herein and as indicated on the drawings; in conformity with the currently adopted plumbing code, and in conformity to good and acceptable plumbing practices according to industry standards.

B. Equipment shall be installed as shown on the drawings, and in accordance with accepted manufacturer's written instructions.

C. All material and workmanship shall conform to applicable requirements of the currently adopted plumbing code.

D. Establish elevations of buried piping to ensure not less than four feet of cover over pipe; or as

indicated on the drawings.

E. Install pipe as required to indicate elevation to within tolerance of one inches.

F. Install pipe to allow for expansion and contraction without stressing pipe or joints.

G. Install access fittings to permit disinfection of water system performed under Section 02415.

H. Set valves on concrete block.

I. Mechanical couplings exposed to soil shall be primed and coated with 1/4-inch layer of coal tar, or rust preventing wax compound.

J. Adjustable pipe supports shall be used to support pipe and valves; and shall be equal to Grinnell Company Figure 264.

K. After plumbing system has been installed and completed, it shall be tested to show its functional fitness by operating the station; and shall be tested for water-tightness as specified herein; and disinfected as specified herein. Tests shall be performed in the presence of the City Engineer or his authorized representative.

L. Buried pipe or otherwise inaccessible pipe shall be tested before it is concealed, and again in connection with the final testing.

3.6 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Pressure test water piping to 200 psi for 2 hours.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 02580

SECONDARY WATER SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe and fittings for project water lines, to include secondary water lines.

B. Valves and appurtenant items.

C. Water Service Connections.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: Excavating, bedding, backfilling and compacting.

B. Section 02115 - Excavation: Excavating for structures and appurtenant items.

C. Section 02116 - Fill and Backfill: Bedding and backfilling.

D. Section 02340 - Manholes and Covers.

E. Section 03300 - Cast-in-Place Concrete: Concrete for thrust restraints.

1.3 REFERENCES

A. ASTM D 3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

B. ASTM D 3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.

C. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association; (ANSI/AWWA C104/A21.4).

D. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; (ANSI/AWWA C105/A21.5).

E. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; (ANSI/AWWA C111/A21.11).

F. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; (ANSI/AWWA C151/A21.51).

G. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; American Water Works Association.

H. AWWA C504 - Rubber Seated Butterfly Valves; American Water Works Association.

I. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; American Water Works Association; (ANSI/AWWA C508/C508a).

J. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water

Works Association; (ANSI/AWWA C509/C509a).

K. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C515).

L. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; (ANSI/AWWA C600).

M. ASTM D2774 - Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.

N. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution; American Water Works Association; (ANSI/AWWA C900/C900a).

O. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inch through 3 inch, for Water Service; American Water Works Association.

P. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 inch through 63 inch, for Water Distribution; American Water Works Association.

Q. AWWA C200 - Steel Water Pipe Casing, 6-inches and larger as needed.

R. Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of pipe lines, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the City's requirements as described herein.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 WATER PIPE

A. Ductile Iron Pipe: AWWA C151:

1. Fittings: Ductile iron, standard thickness.
2. Joints:
    a. Push-On Joints: AWWA C111, push-on type with rubber gasket.
    b. Mechanical Joints: AWWA C111, mechanical joint type with gasket, bolts, and

nuts.

c. Flange Joints: AWWA C110, flange type with gasket, bolts, and nuts.

3. Jackets: AWWA C105 polyethylene jacket with polyethelene tape; purple color.

B. PVC Pipe: AWWA C900, DR-18 for waterlines up to and including 24 inches in diameter:

1. Fittings: AWWA C111, cast iron.

C. Polyethylene Pipe: ASTM D 3035, for 200 psi pressure rating:

1. Fittings: AWWA C901, molded or fabricated.
2. Joints: Compression.

D. High Density Polyethylene Pipe: AWWA C906:

1. Material: PE 4710 High Density Polyethylene (HDPE) meeting ASTM D3350 cell classification of 445474C.
2. Fittings: AWWA C906, molded or fabricated; or mechanical joint ductile iron fittings.
3. Joints: Butt fusion.

E. Trace Wire: Number 14 gauge detectable conductor. Provide testing for continuity. Placed on all buried pipe.

F. Detector Tape: Purple plastic tape, imprinted with "PRESSURIZED IRRIGATION" in large letters. Placed on all buried pipe.

2.2 CASING PIPE MATERIALS

A. Welded Steel Pipe: AWWA C 200, steel water pipe; diameter as indicated.

B. Casing Insulators: fusion coated steel casing insulators with 12-inch wide band and 2-inch wide glass reinforced plastic runners; Model C12G-2, manufactured by Pipeline Seal and Insulator, Inc.

C. Casing End Seals: flexible S-shaped seals fabricated on synthetic rubber with stainless steel bands and clamps; Model S Pull-On End Seals, manufactured by Pipeline Seal and Insulator, Inc.

2.3 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

1. Jackets: AWWA C105 polyethylene jacket with polyethelene tape; purple color.

B. Gate Valves Up To 3 Inches:

1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and handwheel.
2. Product: Powell U.S. Bronze Gate Valves.
3. Substitutions: See Section 01600 - Product Requirements.

C. Gate Valves 3 Inches and Over:

1. AWWA C500, iron body, bronze trim, non-rising stem with square nut, single wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, mechanical joint or flanged ends as indicated, and cast iron valve box.
3. AWWA C515, ductile iron, bronze trim, non-rising stem with square operating nut, single ductile iron wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
4. Product: Mueller Gate Valves or Resilient Seat Gate Valves, or American Flow Control Series 2500 Resilient Seat Gate Valves; with appropriate type Pacific States Cast Iron Valve Box.

D. Ball Valves Up To 2 Inches:

1. Brass body, Teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, compression inlet end, compression outlet, with control rod, valve key, and extension box.

E. Swing Check Valves From 2 Inches to 24 Inches:

1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.
2. Product: Mueller Swing-Type Check Valve.

F. Butterfly Valves ~~From 2 Inches to 24 Inches~~12" and larger:

1. AWWA C504, iron body, bronze disc, resilient replacement seat, mechanical joint or flanged ends as indicated, manual worm gear operator, and cast iron valve box where required.
2. Underground manual operators shall be totally enclosed, factory grease packed and sealed, bronze worm gear operators with self-locking gearing; stops shall be provided to prevent over travel of valve disc.
3. Valve operator shall be geared to close valves slowly. Number of turns to close valve from full open position shall be: 32 turns for 10-inch and smaller valves, 52 turns for 12-inch thru 16-inch valves, and 76 turns for 18-inch thru 24-inch valves. Closing times for larger valves must first be accepted by the City Engineer.
4. Product: Mueller "Lineseal III" Butterfly Valve with appropriate type Pacific States Cast Iron Valve Box.

G. Corporation Stops: shall be type for connecting to copper or polyethylene pipe; Mueller No. H-15000, for up to 2-inch service line.

H. Air Release Valves: shall be combination air release valves; APCO Combination Air Release Valves, of size indicated on the drawings.

I. Blow-Off Hydrant: shall be Non-Freezing Blow-Off Assembly.

2.4 SECONDARY WATER CONNECTIONS

A. Secondary water connections shall be constructed as indicated on the drawings.

B. Connections shall include meter boxes, meters, valve boxes, stop & water valves, and all appurtenant items, as indicated on the drawings.

2.5 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Sections 02112 and 02116.

B. Backfill: As specified in Sections 02112 and 02116.

2.6 ACCESSORIES

A. Service Clamps: shall be bronze, double-strap type; Mueller No. H-16134, for up to 2 inch service lines.

B. Concrete for Thrust Restraints: Concrete type specified in Section 03300.

C. Manhole and Cover: Refer to Section 02340.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that water main and main line tee size, location, and invert are as indicated.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or mechanical joints.

3.3 TRENCHING

A. See Section 02112 and Sections 02115 and 02116 for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required area of thrust restraint bearing on subsoil as indicated on the drawings.

D. Backfill around sides and to top of pipe with backfill material, tamp in place and compact, then complete backfilling.

3.4 INSTALLATION - PIPE

A. Establish elevations of buried piping to ensure not less than 36 inches of cover over pipe; or as indicated on the drawings.

B. Install pipe to indicated elevation to within tolerance of one inch.

C. Install ductile iron piping and fittings to AWWA C600.

D. Install PVC pressure pipe and fittings to ASTM D2774.

E. Install pipe lines to line and grade indicated.

F. Install pipe to allow for expansion and contraction without stressing pipe or joints.

G. Slope water pipe and position drains at low points.

H. Install trace wire and detector tape above all pipe; coordinate with Section 02112.

3.5 INSTALLATION - CASING PIPES

A. See Sections 02115 and 02116 for structural excavation and fill and backfill; and for additional requirements.

B. Install casing pipes by jacking process where indicated.

C. Install casing pipes at the line and grade as required to allow carrier pipes to be installed within the casing pipes at the design line and grade, as indicated on the drawings.

D. Place casing insulators on carrier pipes to properly center and position carrier pipe inside the casing pipes; space insulators as recommended by the pipe manufacturer.

E. Carrier Pipe inside of casing shall have restrain joints.

F. Seal each end of casing with appropriate size flexible end seals; install according to manufacturer's instructions and recommendations.

G. Seal bore holes at each end, around periphery of casing, with grout, impervious clay or brick masonry.

H. Contractor shall be solely responsible for the accuracy, safety and adequacy of construction methods and procedures for installing casing pipes, and for any damage which may result from their failure. All operations of the Contractor for installation of casing pipes shall be subject to acceptance by the agency having jurisdiction over the item being crossed.

I. Contractor shall enter any agreement with, and furnish any and all indemnity and other bonds that may be required by, the agency listed above, for their protection against injury and interference with flow of water caused by the operations of the Contractor.

J. Contractor shall secure required permission from the agency listed above before commencing with the installation of casing pipes and related work along and across the respective areas.

3.6 INSTALLATION - VALVES

A. Set valves on concrete block.

B. Center and plumb valve box over valve operating nut. Set box cover flush with finished grade.

3.7 INSTALLATION - AIR RELEASE STATIONS

A. Locate air release stations as indicated on the construction drawings.

B. Set air valve and piping plumb according to manufacturer's written instructions and recommendations; set vault plumb on solid foundation.

C. Set top of valve box to grade, with cover matching finish grade.

3.8 SERVICE CONNECTIONS

A. Provide water service lines, as indicated on the drawings. Residential service lines shall include stop & waste valves with valve boxes; meter boxes, valve and appurtenant items; and valve boxes with ball valve; and all appurtenant work. The Developer is to provide meter(s) for multi-family; institutional; and commercial service connections.

B. Water service lines shall extend to locations designated by the City Engineer, which will be near property lines of property being served and inside side-lot PUE, as indicated.

C. All pipe, fittings and valves shall conform to the specifications found elsewhere in this Section.

D. Pipe, fittings and valves shall be installed as described herein.

E. Service lines shall be installed at uniform grades and alignments; and shall be free of low spots or adverse grades.

F. Service lines shall be cleaned, flushed and tested in accordance with applicable requirements of these specifications.

3.9 CONNECTIONS TO EXISTING WATER LINES

A. Connection to existing water lines shall be made where and as indicated on the drawings. The sizes of pipe, fittings, valves and appurtenant items required to make connection shall correspond to the sizes of existing pipe and of project pipe.

B. Excavate to existing pipe line at point of connection; determine actual conditions of existing pipe and all fittings and appurtenant items required to make the connection; and have all materials needed on site prior to any shut down or cutting into existing pipe lines.

C. Connections that involve cutting into existing pipe lines include: cutting and removing sections of existing pipe and fittings as required; cleaning and preparing ends of existing pipe as required for connection; furnishing and installing all new pipe, fittings and valves required to make the connection of project pipe to the existing pipe as indicated; and all appurtenant work required to complete the connection.

D. Connection into existing pipe lines under pressure include: furnishing and installing mechanical joint tapping sleeve of the appropriate size on the existing pipe at point of connection; furnishing and installing tapping valve, with valve box, on sleeve; tapping existing pipe with drilling machine and equipment, without interrupting flow in existing pipe line; and all appurtenant work required to complete the connection.

E. Connection to existing pipe line shall be made at such times and within the time limits and according to the directions as agreed to between the Contractor and the City Engineer or City Inspector.

F. Cut and plug existing pipe lines where indicated on the drawing. Excavate as required to locate existing pipe lines to be abandoned in place; cut the existing pipe, as required; and install permanent plug in end of pipe to be abandoned.

3.10 CONNECTIONS TO DRINKING WATER LINES

A. Connections of secondary water systems to drinking water systems shall be done as indicated on the drawings and as described in Section 02586 BACKFLOW PREVENTER

STATION.

B. Connections of secondary water services to drinking water systems shall be done as indicated on the drawings and as described in Section 02587 SERVICE WATER BACKFLOW PREVENTER STATION.

3.11 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400 and 02112.

B. Pressure test water piping to 200 psi for 2 hours.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the City.

END OF SECTION

SECTION 02586

BACKFLOW PREVENTER STATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Backflow preventer stations, complete, including:

1. Backflow preventer valves.
2. Pipe, fittings, valves, and appurtenant items.

B. Station testing.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: Excavating, pipe bedding, backfilling and compacting.

B. Section 02115 - Excavation: Excavating for structures and appurtenant items.

C. Section 02116 - Fill and Backfill: Pipe bedding and excavation backfilling.

D. Section 03300 - Cast-in-Place Concrete: Concrete for structures and thrust blocks.

1.3 REFERENCES

A. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ASTM A 234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

C. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association; (ANSI/AWWA C104/A21.4).

D. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; (ANSI/AWWA C105/A21.5).

E. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; (ANSI/AWWA C111/A21.11).

F. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; (ANSI/AWWA C151/A21.51).

G. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; American Water Works Association.

H. AWWA C504 - Rubber Seated Butterfly Valves; American Water Works Association.

I. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; American Water Works Association; (ANSI/AWWA C508/C508a).

J. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C509/C509a).

K. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C515).

L. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; (ANSI/AWWA C600).

M. Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, controllers, sprinkler heads, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of pipe lines, valves, controllers, sprinkler heads, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with City's requirements as described herein.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves and appurtenant items in shipping containers with labeling in place.

1.7 OPERATING AND MAINTENANCE DATA

A. Provide instructions covering full operation, care and maintenance of backflow preventer valves; and manufacturer's parts catalog. Information shall be included in the manual for operation and maintenance of the backflow preventer station.

B. Instruct Owner's designated maintenance personnel in the proper operation of the valves.

C. Submit 3 copies of written instructions recommending procedures to be established by the City Engineer for the maintenance of the valves from year to year.

1. Submit prior to expiration of required one year guarantee period.
2. Provide information in the manuals that include the following:
    a. written index near front of Manual listing location in the Manual of all emergency data regarding the installation;
    b. complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of the nearest vendor of replacement parts; and
    c. copy of all guarantees and warranties issued on the installation showing all dates of expiration.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. Ductile Iron Pipe: AWWA C151:

1. Fittings: Ductile iron, standard thickness.
2. Joints:
    a. Push-On Joints: AWWA C111, push-on type with rubber gasket.
    b. Mechanical Joints: AWWA C111, mechanical joint type with gasket, bolts, and nuts.
    c. Flange Joints: AWWA C110, flange type with gasket, bolts, and nuts.
3. Jackets: AWWA C105 polyethylene jacket.

B. Steel Pipe: ASTM A 53:

1. Fittings: ASTM A 47.

2.2 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves Up To 3 Inches:

1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and handwheel.
2. Product: Powell U.S. Bronze Gate Valves.
3. Substitutions: See Section 01600 - Product Requirements.

C. Gate Valves 3 Inches and Over:

1. AWWA C500, iron body, bronze trim, non-rising stem with square nut, single wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, mechanical joint or flanged ends as indicated, and cast iron valve box.
3. AWWA C515, ductile iron, bronze trim, non-rising stem with square operating nut, single ductile iron wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
4. Product: Mueller Gate Valves or Resilient Seat Gate Valves, or American Flow Control Series 2500 Resilient Seat Gate Valves; with appropriate type Pacific States Cast Iron Valve Box.

D. Ball Valves Up To 2 Inches:

1. Brass body, teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, compression inlet end, compression outlet, with control rod, valve key, and extension box.

E. Swing Check Valves From 2 Inches to 24 Inches:

1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.
2. Product: Mueller Swing-Type Check Valve.

F. Butterfly Valves From 2 Inches to 24 Inches:

1. AWWA C504, iron body, bronze disc, resilient replacement seat, mechanical joint or flanged ends as indicated, manual worm gear operator, and cast iron valve box where required.
2. Underground manual operators shall be totally enclosed, factory grease packed and sealed, bronze worm gear operators with self-locking gearing; stops shall be provided to prevent over travel of valve disc.
3. Valve operator shall be geared to close valves slowly. Number of turns to close valve from full open position shall be: 32 turns for 10-inch and smaller valves, 52 turns for 12-inch thru 16-inch valves, and 76 turns for 18-inch thru 24-inch valves. Closing times for larger valves must first be accepted by the City Engineer.
4. Product: Mueller "Lineseal III" Butterfly Valve with appropriate type Pacific States Cast Iron Valve Box.

G. Corporation Stops: shall be type for connecting to copper or polyethylene pipe; Mueller No. H- 15000, for up to 2-inch service line.

H. Air Release Valves: shall be combination air release valves; APCO Combination Air Release Valves, of size indicated on the drawings.

2.3 BACKFLOW PREVENTER

A. The backflow preventer shall be a reduced pressure type valve.

1. The backflow preventer shall be bronze for 6-inch and smaller valves, and epoxy coated ductile iron for 8-inch and larger valves.
2. The backflow preventer shall consist of two independently acting, spring-loaded check valves with a differential pressure relief valve located between the check valves.
3. The backflow preventer shall include inlet and outlet shutoff valves; and four test cocks, three on the backflow preventer valve bodies and one on the inlet shutoff valve.

B. The backflow preventers shall be of the appropriate size and type, as manufactured by Febco or ~~Conbraco~~Watts.

2.4 MISCELLANEOUS METAL WORK

A. Miscellaneous metal work shall be provided as indicated on the drawings, as required to complete the Station.

2.5 PAINTING

A. All exposed pipe, valves, fittings, and metal work for the station shall be painted.

1. Painting shall consist of either:
    a. 4 coats of alkyd paint, Painting System II (Steel Structural Painting Council - Specification No. 2);

b. 4 coats of phenolic paint, Painting System III (S. S. P. C. - Specification No 3).

2. Painting shall include surface preparation, pretreatment, primer coat, inter-mediate coats, and finish coat, as specified; with total dry film thickness not less than 4.0 mils.

3. Aluminum surfaces which will be in contact with concrete after erection shall be coated with bituminous mastic coating, SSPC-Paint 12, prior to erection.

2.6 MISCELLANEOUS ITEMS

A. Miscellaneous appurtenant items shall be as indicated on the drawings or as required to complete the station.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall furnish all labor, materials and equipment as required to construct the backflow preventer station, complete, as described herein and as shown on the drawings.

B. The backflow preventer station shall be constructed on the supply line to the sprinkling system, as shown, where the supply line is connected to a drinking water line.

C. All work shall be done according to the currently adopted plumbing codes, and to manufacturer's written instructions and recommendations.

D. The Contractor shall test the station to assure proper operation.

3.2 EXAMINATION

A. Verify that design drawings conform to project conditions.

B. Verify that water line sizes and locations are as indicated on the drawings.

3.3 PREPARATION

A. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside of pipes before assembly.

C. Prepare pipe connections to equipment with flanges, mechanical joints or mechanical couplings.

3.4 EXCAVATING

A. Excavating for the backflow preventer station shall be done to ensure proper grades and alignment as shown on the drawings.

B. See Section 02112 and Sections 02115 and 02116 for additional requirements.

C. Hand trim excavation for accurate placement of pipe to elevations indicated.

D. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required area of thrust restraint bearing on subsoil as indicated on the drawings.

E. Backfill around sides and to top of pipe zone with pipe bedding material, tamp in place and compact to required density.

F. Backfill trench from top of pipe zone to top of trench with trench backfill material, tamp in place and compact to required density.

3.5 INSTALLATION - PIPE

A. Establish elevations of buried piping to ensure not less than 2 feet of cover over secondary water lines and 4 feet over drinking water lines; or as indicated on the drawings.

B. Install pipe to indicated elevation to within tolerance of one inches.

C. Install ductile iron piping and fittings to AWWA C600.

D. Install pipe lines to the line and grade indicated.

E. Install pipe to allow for expansion and contraction without stressing pipe or joints.

F. Slope water pipe and position drains at low points.

3.6 INSTALLATION – VALVES

A. Set valves level and plumb, as indicated.

B. Install adjustable pipe supports under each valve.

C. Reduced pressure (RP) backflow preventer assemblies shall be installed as indicated on the drawings and as described herein.

1. The assemblies shall be installed in a horizontal position only.
2. The assemblies shall be maintained as an intact assembly.
3. The bottom of the RP assembly shall be minimum of 12-inches above the ground or floor level; and shall not be closer than 12 inches to any wall, ceiling or other encumbrance. Assemblies shall be readily accessible for testing, repair and maintenance.
4. RPZ assemblies shall NOT be installed in a pit.
5. The relief valve on the RP assembly shall not be directly connected to any waste disposal line, including sanitary sewer, storm drains or vents.
6. RP assemblies shall be protected from freezing and vandalism where applicable.

3.7 CONCRETE WORK

A. Construct a concrete slab for the station over a compacted gravel base, as shown on the drawing.

B. Concrete work and reinforcing shall conform to the requirements of Section 03300 of these specifications.

3.8 MISCELLANEOUS ITEMS

A. Miscellaneous appurtenant items shall be furnished and installed as indicated on the drawings or as required to complete the station.

3.9 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Pressure test water piping to 200 PSI for 2 hours.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to City.

3.10 OPERATIONAL TESTING

A. Provide the City Engineer or City Inspector with seven days written notice before operational test of backflow preventer. Test must be completed by a certified backflow technician.

B. Test shall consist of the operation of the station for propose of checking operation and assuring of absence of leaks.

1. Repair pipe, fittings, valves, or connections which show evidence of leakage.

C. After all repairs or replacements have been made and accepted by the City Engineer or City Inspector, repeat the above required test.

END OF SECTION

SECTION 02621

GRAVEL SURFACING AND ROAD BASE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. New gravel road base.

B. Restore gravel road base.

C. New gravel road surfacing.

D. Restore gravel road surfacing.

1.2 RELATED SECTIONS

A. Section 01300 - Administrative Requirements

B. Section 01400 - Quality Requirements

C. Section 02112 - Trenching for Pipe Work.

D. Section 02116 - Fill and Backfill: Compacted fill under base course.

E. Section 02641 - Bituminous Paving: Binder and finish asphalt courses.

1.3 REFERENCES

A. APWA Standards and Specifications - 2012 Edition

B. AASHTO T 11 - Materials Finer than 75-

C. AASHTO T 19 - Bulk Density (“Unit Weight”) and Voids in Aggregate

D. AASHTO T 27 - Sieve Analysis of Fine and Coarse Aggregates

E. AASHTO T 89 - Determining the Liquid Limit of Soils

F. AASHTO T 90 - Determining the Plastic Limit and Plasticity Index of Soils

G. AASHTO T 96 - Resistance to Degradation of Small-Sized Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

H. AASHTO T 193 – The California Bearing Ratio

I. AASHTO T 335 - Determining the Percent of Fracture in Coarse Aggregate

J. ASTM C 117 - Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing

K. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

L. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil

Using Modified Effort

M. ASTM D 5195 - Standard Test Method for Density of Soil and Rock In-Place at Depths Below Surface by Nuclear Methods

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Submit source documentation and mix design as per Article 2.02

C. Compaction Density Test Reports per Article 1.05.

1.5 QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform quality control testing as per Table 1.

Table 1: Sampling and Testing Frequencies			
Gradation, ASTM C136	Roadway Every 500 Tons	Flatwork/Driveways 1 per day or Every 500 Tons	Backfill
Density, ASTM D 5195	Every 2500 SF	Every 150 LF or 2500 SF	Every 150 LF
Report all sieves identified in the UDOT Specification. Density target of 95% of Modified Proctor, ASTM D 1557. Use whichever frequency is greater.			

C. Submit test and inspection reports to the City in accordance with Section 01400.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

1.6 ACCEPTANCE

A. The City will perform acceptance decisions for all projects; based on results of the quality control test results defined in Article 1.05.

1. The City will reject the lot if the Contractor QC data is outside the limits of Table 1.
2. At the City's discretion, the City may perform acceptance testing in accordance with Table 1.

B. If tests indicate work does not meet specified requirements, remove work, replace and retest.

PART 2 PRODUCTS

2.1 MATERIALS

A. Untreated Base Course.

1. Material: Use 1-1/2 inch UDOT Specification

2.2 SOURCE QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.

B. If tests indicate materials do not meet specified requirements, change material and retest.

C. Provide materials of each type from same source throughout the Work.

D. Materials Sources: Submit name of imported materials source and Aggregate Composition Test Reports demonstrating compliance with Article 2.01.

1. Submit to the City at least 10 working days before placement.

PART 3 EXECUTION

3.1 EXAMINATION

A. For new gravel road base and gravel surfacing, verify that sub-base has been compacted, inspected and accepted by the City Inspector, that gradients and elevations are correct, and that it is dry.

B. Verify that all areas of collapsible soil have been identified and properly prepared for road base.

1. Submit report to the City summarizing investigative procedures and results prior to placement of base course.

C. For restoration of gravel road base and gravel surfacing, verify trenches and excavations have been backfilled, compacted, inspected and accepted by the City Inspector, that gradients and elevations are correct, and that they are dry.

3.2 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

C. Red head staking required for grade verification.

3.3 INSTALLATION

A. New gravel road base and surfacing.

1. Place gravel road base material over prepared substrate to provide total compacted thickness as indicated on plans.

B. Restoration of gravel road base and surfacing.

1. Restore gravel road base, along with temporary gravel surfaces, within one day after trench backfill has been placed, compacted, and inspected and accepted by the City Inspector.

2. Temporary gravel shall be maintained by blading, sprinkling, rolling, adding additional gravel as required, and appurtenant work to provide a safe, uniform surface over trench area satisfactory to the City Inspector. The temporary surface shall be restored at least every 7 days until the final surfacing is to be placed; and sprinkled with water at least once each day, including weekends and holidays.
3. When final surfacing is to be placed, remove the temporary gravel to the bottom of the surface to be restored. After removing temporary gravel, the sub-base shall be graded and rolled to provide a compact, smooth base for placement of final surfacing.
4. Place gravel road base material over prepared substrate to provide total compacted thickness equal to the adjacent road base, but not less than the thickness as indicated.

C. Place material at near optimum moisture.

D. Level and contour surfaces to elevations and gradients indicated.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

G. Provide red head staking and string test for finished grading verification.

H. When aggregate materials need to be stored on site, locate stockpiles where indicated.

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
2. Prevent contamination.
3. Protect stockpiles from erosion and deterioration of materials.
4. Aggregate stockpiles shall be placed so that the aggregate gradation is maintained and segregation of larger and smaller aggregate does not happen.

I. Verify that survey bench marks and intended elevations for the Work are as indicated.

3.4 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from Design Elevation: Within 1/2 inch.

3.5 CEASE PRODUCTION

A. Cease production when any two out of three consecutive tests meet one of the following criteria:

1. Gradation does not meet limits of the UDOT Specification
2. Density does not meet requirements of Table 1 after reworking and retesting.

B. Prior to continuing product, a corrective action plan must be submitted to the City Engineer and accepted. This plan must indicate the changes in production procedures that will be implemented to correct the deficiencies.

3.6 CLEAN-UP

A. Remove unused stockpiled materials; leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

B. All disturbed areas shall be restored with native grasses to match adjacent areas, conforming to the City Standards. These areas shall be seeded with material conforming to adjacent materials. Restored area shall achieve 70% plan coverage prior to acceptance.

END OF SECTION

SECTION 02631

GEOGRID

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Geogrid for use in roadway and roadway embankment applications.

1.2 RELATED SECTIONS (Not Used)

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO Recommended Practice for Geosynthetic Reinforcement of the Aggregate Base Course of Flexible Pavement Structures, AASHTO PP46-01, April 2001 Interim Edition of the AASHTO Provisional Standards.
2. Standard Specification for Highway Bridges (1997 Interim)
3. AASHTO Guide for Design of Pavement Structures (1993)
4. AASHTO Guide for Design of Pavement Structures (1993)

B. American Society for Testing and Materials (ASTM)

1. D5732-95 - Standard Test Method for Stiffness of Fabrics
2. D6637-01 - Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-rib Tensile Method
3. D4354-96 - Practice for Sampling of Geosynthetics for Testing
4. D4759-92 - Practice for Determining the Specification Conformance of Geosynthetics
5. D5818-95 - Practice for Obtaining Samples of Geosynthetics from a Test Section for Assessment of Installation Damage

C. Geosynthetic Research Institute (GRI)

1. GRI-GG2-87 - Standard Test Method for Geogrid Junction Strength

D. U.S. Department of Transportation – Federal Aviation Administration (FAA)

1. Specification for Geogrid Reinforced Base Courses, Engineering Brief No. 49 (1994).

E. U.S. Environmental Protection Agency (U.S. EPA)

1. EPA 9090 - Compatibility Test for Wastes and Membrane Liners

F. U.S. Army Corps of Engineers (U.S. COE)

1. Draft specification for Grid Aperture Stability by In-Plane Rotation
2. CW-02215 Determination of Percent Open Area.

G. American Society of Civil Engineers (ASCE)

1. Giroud, J.P., and Han, J. (2004). “Design method for geogrid reinforced unpaved roads. Part I – Development of design method.” Journal of Geotechnical and Geoenvironmental Engineering, 130 (8), 775-786.
2. Giroud, J.P., and Han, J. (2004). “Design method for geogrid reinforced unpaved roads. Part II –Calibration and applications.” Journal of Geotechnical and Geoenvironmental Engineering, 130 (8), 787-797. City Road Repair and Crack Seal Program 2013 02072 - 2 GEOGRID

1.4 DEFINITIONS

A. Geogrid - A biaxial polymeric grid formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth to function primarily as reinforcement.

B. Multi-Layer Geogrid - A geogrid product consisting of multiple layers of grid which are not integrally connected throughout.

C. Woven Geogrid – A geogrid product formed by weaving discrete strips of polymer into a network.

D. Welded Strip geogrid – A geogrid product formed by heat bonding (welding) discrete strips of polymer into a regular network.

E. Minimum Average Roll Value (MARV) - Value based on testing and determined in accordance with ASTM D4759-92.

F. Traffic Benefit Ratio (TBR) (also known as Traffic Improvement Factor or TIF) - A ratio comparing the performance of a pavement cross-section with a geogrid-reinforced base course to a similar cross-section without geogrid reinforcement, based on the number of cycles to failure, with failure defined as a selected depth of rut.

G. True Initial Modulus in Use - The ratio of tensile strength to corresponding zero strain. The tensile strength is measured via ASTM D6637 at a strain rate of 10 percent per minute. Values shown are MARVs. For multi-layer geogrid products, rib tensile testing shall be performed on the multi-layer configurations, as prescribed by ASTM D6637.

H. Junction Strength - Breaking tensile strength of junctions when tested in accordance with GRI- GG2 as modified by AASHTO Standard Specification for Highway Bridges, 1997 Interim, using a single rib having the greater of 3 junctions or 8 inches and tested at a strain rate of 10 percent per minute based on this gauge length. Values shown are minimum average roll values. For multi-layer geogrid products, junction strength testing shall be performed across junctions from each layer of grid individually, and results shall not be assumed as additive from single layers to multiple layers.

I. Flexural Stiffness (also known as Flexural Rigidity) - Resistance to bending force measured via ASTM D5732-95, using specimens of width two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs (as a “ladder”), and length sufficiently long to enable measurement of the overhang dimension. The overall Flexural Stiffness is calculated as the square root of the product of the MD and XMD Flexural Stiffness values. For multi-layer geogrid products, flexural stiffness testing shall be performed directly on the multi-layer configuration without using any connecting elements other than those used continuously throughout the actual product, and results shall not be assumed as additive from testing performed on a single layer of the multi-layer product.

J. Aperture Stability Modulus (also known as Torsional Rigidity or Torsional Stiffness) -

Resistance to in-plane rotational movement measured by applying a 20 kg-cm (2 m-N) moment to the central junction of a 9-inch by 9-inch specimen restrained at its perimeter. Values shown are MARVs. For multi-layer geogrid products, torsional stiffness testing shall be performed on each layer of grid individually, and results shall not be assumed as additive from single layers to multiple layers. City Road Repair and Crack Seal Program 2013 02072 - 3 GEOGRID

K. Subgrade Improvement – Placement of a geogrid immediately over a soft subgrade soil in order to improve the bearing capacity and mitigate deformation of the subgrade soil. The goal of this application is to reduce undercut requirements, improve construction efficiency, reduce the amount of aggregate subbase/base material required, provide a stiff working platform for pavement construction, or combination of these.

L. Base Reinforcement - Placement of a geogrid beneath or within the aggregate base course of a flexible pavement system to improve the stiffness of the system. The goal of this application may be to reduce the amount of aggregate base material required (reducing initial cost), increase the life of the pavement (reduce life-cycle cost), or a combination of the two.

1.5 SUBMITTALS

A. Submit geogrid product sample approximately 4 inches by 7 inches or larger. Refer to ASTM D 4354.

B. Submit geogrid product data sheet and certification from the Manufacturer that the geogrid product supplied meets the requirements of this Section.

C. Submit Manufacturer’s installation instructions and general recommendations.

D. Submit the following to the City Engineer at least 2 days prior to bid letting for alternate geogrid materials that do not meet the requirements of this Section. The City Engineer will respond with a written justification to allow or disallow the requested alternate Geogrid.

1. Full-scale laboratory and in-ground testing of pavement structures reinforced with the specific geogrid. Testing must be conducted in full-scale at an Accelerated Pavement Testing Facility in the United States. Testing must quantify the structural benefit of the submitted product. Full scale testing must be included in the submittal. The geogrid submitted must meet or exceed that of the design geogrid.
2. A list of 5 comparable projects that are similar in terms of size and application, are located in the United States, and where the results of using the specific alternate geogrid material can be verified after a minimum of five years of service life.
3. A sample 4 x 7 inches or larger.
4. Recommended installation instructions.
5. Additional information as requested by the City Engineer to fully evaluate the product.

1.6 QUALITY ASSURANCE

A. Manufacturer shall have at least five years continuous experience in manufacturing polypropylene geogrid or experience manufacturing at least 10,000,000 square feet of polypropylene geogrid.

B. Geogrid installer shall be manufacturer’s representative or trained to install manufacturer’s product.

C. Pre-Construction Conference - Prior to the installation of the geogrid, the Contractor shall arrange a meeting at the site with the geogrid material supplier and, where applicable, the geogrid installer. The Owner and the City Engineer shall be notified at least 3 days in advance of the time of the meeting. A representative of the geogrid supplier shall be available on an “as needed” basis during construction.

1.7 ACCEPTANCE

A. Owner rejects geogrid at installation if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transport, handling or storage.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver geogrid to site in roles. Each roll shall have identification tag indicating manufacturer and product type. Ship per manufacturer’s recommendations.

B. Storage and Protection

1. Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.
2. Store at temperatures above -20 degrees F (-29 degrees C).
3. Rolled materials may be laid flat or stood on end.
4. Geogrid materials should not be left directly exposed to sunlight for a period longer than recommended by the manufacturer.

1.9 PROJECT CONDITIONS

A. Place geogrid when ambient temperature is between 40 degrees Fahrenheit and 95 degrees Fahrenheit.

B. Do not place geogrid during any precipitation; in presence of moisture such as fog, rain, dew; or excessive winds.

1.10 WARRANTY

A. Provide one year written warranty for materials and workmanship for geogrid.

PART 2 PRODUCTS

2.1 MATERIALS

A. Geogrid General–

1. Synthetic fiber net at least 85-percent by weight of polypropylene, polyethylene, or polyester.
2. Resistant to chemical attack, rot and mildew.
3. No tears or defects that will adversely alter properties of product.

B. Roadway Aggregate Geogrid - Base Reinforcement

1. Geogrids are a regular network of integrally connected polymer tensile elements constructed in a single layer with aperture geometry sufficient to permit significant mechanical interlock with the surrounding soil or rock. Geogrids must also be dimensionally stable and able to retain their geometry under manufacture, transport and installation.

2. Geogrids shall have the following properties:

Type 1 Geogrid			
Biaxial Type 1 Geogrid Quality Control Values			
Geogrid Properties	Test Method	MD	CMD
Type of Geogrid		Punched and Drawn	
Rib Shape	Observation	Rectangular or Square	
Rib Thickness	Nominal Dimensions	Minimum 0.05 in	
Nominal Aperture Size	I.D. Callipered	1.0 to 1.5 inches	
Flexural Stiffness	ASTM D-5732-95	Minimum 750,000 mg-cm	NA
Minimum True Initial Modulus in Use	ASTM 6637-01	Minimum 27,420 lb/ft	Minimum 44,550 lb/ft
Junction Efficiency	GRI-GG2-87	93%	
Aperture Stability Modulus at 20 cm-kg	Kinney-01	0.65 m-N/deg	NA
Resistance to Long Term Degradation	EPA 9090 Immersion Testing	100%	
Biaxial Type 2 Geogrid Quality Control Values			
Geogrid Properties	Test Method	MD	CMD
Type of Geogrid		Punched and Drawn	
Rib Shape	Observation	Rectangular or Square	
Rib Thickness	Nominal Dimensions	Minimum 0.07 in	
Nominal Aperture Size	I.D. Callipered	1.0 to 1.5 inches	
Flexural Stiffness	ASTM D-5732-95	Minimum 2,000,000 mg-cm	NA
Minimum True Initial Modulus in Use	ASTM 6637-01	Minimum 27,420 lb/ft	Minimum 44,550 lb/ft
Junction Efficiency	GRI-GG2-87	93%	
Aperture Stability Modulus at 20 cm-kg	Kinney-01	0.75 m-N/deg	NA
Resistance to Long Term Degradation	EPA 9090 Immersion Testing	100%	

a) Resistance to elongation when initially subjected to load measured via ASTM 6637 without deforming test materials under load before measuring such resistance or employing “secant” or “offset” tangent methods of measurement.

b) Resistance to bending force measured via ASTM D-5732-95, using specimens of width two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs (as a “ladder”), and of length sufficiently long to enable measurement of the overhang dimension. The overall Flexural Stiffness is calculated as the square root of the product of machine-and cross-machine-direction Flexural Stiffness values.

Triaxial Type 1 Geogrid Quality Control Values					
Geogrid Properties	Test Method	Longitudinal	Diagonal	Transverse	General
Type of Geogrid					Punched and Drawn
Rib Pitch	Nominal Dimensions	1.6	1.6		
Mid-rib depth	Nominal Dimensions		0.05	0.05	
Mid-rib width	I.D. Callipered		0.04	0.04	
Rib Shape	ASTM D-5732-95				Rectangular
Aperture Shape	ASTM 6637-01				Triangular
Radial Stiffness	ASTM 6637-01				15,430 lb/ft @ 0.5% strain
Junction Efficiency	GRI-GG2-87				93%
Resistance to Long Term Degradation	EPA 9090 Immersion Testing				100%
Triaxial Type 2 Geogrid Quality Control Values					
Geogrid Properties	Test Method	Longitudinal	Diagonal	Transverse	General
Type of Geogrid					Punched and Drawn
Rib Pitch	Nominal Dimensions	1.6	1.6		
Mid-rib depth	Nominal Dimensions		0.07	0.06	
Mid-rib width	I.D. Callipered		0.04	0.05	
Rib Shape	ASTM D-5732-95				Rectangular
Aperture Shape	ASTM 6637-01				Triangular
Radial Stiffness	ASTM 6637-01				29,500 lb/ft @ 0.5% strain
Junction Efficiency	GRI-GG2-87				93%
Resistance to Long Term Degradation	EPA 9090 Immersion Testing				100%

a) Load transfer capability determined in accordance with GRI-GG2-87 and expressed as a percentage of ultimate tensile strength.
b) Determined from tensile stiffness measured in any in-plane axis from testing in accordance with ASTM D6637-01.
c) Resistance to loss of load capacity or structural integrity when subjected to chemically aggressive environments in accordance with EPA 9090.

3. Using multiple layers of geogrid to meet the requirements set forth in the preceding table will not be accepted.

4. Acceptance Requirements – Base the actual minimum average roll values furnished by the manufacturer on representative test results from the manufacturing plant which produced the geogrid. Meet or exceed each of the specified minimum values. Clearly label all geogrids as being part of the same production run certified as meeting all applicable requirements.

C. Acceptable Manufacturers:

1. Structural Geogrid, TX5 or BX1500, Tensar Earth Technologies, (801) 789-5407 or (800) 836- 7271.

2.2 SOURCE QUALITY CONTROL PREPARATION

A. Manufacturer shall conduct inspections and testing during production to verify product meets material properties specified.

PART 3 EXECUTION

3.1 PREPARATION

A. Subgrade shall be smooth, free of all foreign and organic material, sharp objects, or debris of any kind.

B. Subgrade shall have no sharp changes or abrupt breaks in grade.

C. Subgrade shall not have standing water or excessive moisture.

3.2 INSTALLATION

A. Install geogrid in accordance with manufacturer's instructions.

B. Layout geogrid on prepared subgrade or Granular Borrow. Place temporary anchoring such as Granular Borrow or Untreated Base Course material, pins, or staples as necessary to prevent movement.

C. Provide 1-foot minimum overlap at edges and ends of rolls.

D. Place overlap shingle style in direction of fill advancement to ensure stability during installation.

E. Place and compact fill in accordance with manufacturer's recommendations and in accordance with Section 02116.

3.3 PROTECTION

A. Protect subgrade from damage while unrolling geogrid.

B. Protect geogrid from damage from equipment, tools, and personnel working on geogrid.

C. Protect geogrid from damage during backfill operations.

END OF SECTION

SECTION 02641

BITUMINOUS PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Bituminous paving for new surfaces.

B. Bituminous paving for restoration of bituminous surfaces.

C. Bituminous paving for overlay.

1.2 RELATED SECTIONS

A. Section 01300 – Administrative Requirements

B. Section 01400 - Quality Requirements.

C. Section 02100 – Roadway and General Earthwork.

D. Section 02116 - Fill and Backfill: Compacted subgrade for paving.

E. Section 02621- Gravel Road Base Course: Gravel road base course.

1.3 REFERENCES

A. AASHTO M 303 – Lime for Asphalt Mixtures

B. AASHTO R 35 – Superpave Volumetric Design for Hot-Mix Asphalt

C. AASHTO T 19 – Bulk Density (“Unit Weight”) and Voids in Aggregate

D. AASHTO T 89 – Determining the Liquid Limit of Soils

E. AASHTO T 90 – Determining the Plastic Limit and Plasticity Index of Soils

F. AASHTO T 96 – Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

G. AASHTO T 104 – Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate

H. AASHTO T 176 – Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test

I. AASHTO T 195 – Determining Degree of Particle Coating of Asphalt Mixtures

J. AASHTO T 209 – Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

K. AASHTO T 255 – Total Evaporable Moisture Content of Aggregate by Drying

L. AASHTO T 304 – Uncompacted Void Content of Fine Aggregate

M. AASHTO T 324 – Hamburg Wheel-Track Testing of Compacted Hot-Mix Asphalt (HMA)

N. AASHTO T 335 – Determining the Percentage of Fracture in Coarse Aggregate

O. APWA Standard Specifications – 2012 Edition

P. Asphalt Institute Manual SP-2: Superpave Mix Design

Q. ASTM D 4791 – Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

R. UDOT Quality Management Plan 514: Hot Mix Asphalt (latest edition as of date of project)

S. UDOT Standard Specifications (latest edition as of date of project)

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures

B. Volumetric Mix Design as per Article 2.02 D.

C. Verification of current UDOT HMA Mix Plant certification as per Article 1.05 B.

D. Verification of Laboratory Accreditation and Technician Certification as per Article 1.05 D.

E. Daily Plant Production records and Quality Control Data as per Article 1.05 E and Article 1.06 A.

F. Cold weather paving plan as per Article 1.09 A.2.

1.5 QUALITY ASSURANCE

A. Perform Mix Design and Quality Control work in accordance with Section 32 12 05 of the APWA Standard Specifications unless otherwise directed within this specification.

B. HMA Mixing Plant: Use UDOT 514 QMP certified Asphalt Mix Plant.

1. Submit plant certification and lab accreditation documentation with mix design.

C. Obtain materials from same source throughout or submit new mix design.

D. Independent Laboratory: Use AMRL certified laboratory and WAQTC/UDOT TTQP certified technicians.

1. Submit lab accreditation documentation with mix design
2. Submit field technician certification documentation at least 5 working days before paving

E. Submit daily plant production records and Quality Control data within 1 working day after completion of each day of paving.

1.6 QUALITY CONTROL AND QUALITY DEMONSTRATION

A. Quality Control is performed by Contractor or his representative. Perform QC sampling and testing of material in accordance with Section 01400 - Quality Requirements.

1. Submit QC data and plant daily production summary to the City at least 24 hours prior to the start of paving subsequent lots.
    a. Include component percentages and totalized quantities for the individual mix run for the following:
        i. Asphalt Binder
        ii. All aggregates, including RAP
        iii. Anti-Strip Ingredient
        iv. Water

B. A lot equals the number of tons of HMA placed during each production day.

C. Gradation and asphalt binder content

1. Gradation and Binder Content samples may be post-paver samples from the grade, truck samples from the plant or windrow samples.
2. Evaluate a lot on the average of all test results for the lot.
    a. Take at least one gradation and binder content sample for each 500 tons, or portion thereof.
3. Perform and report to the City Engineer gradation and asphalt binder content testing.
4. Lot is acceptable for Gradation/Asphalt Binder Content when test results for gradation and binder content are within the limits of Table 1.

D. Mix Volumetrics

1. Take one volumetric verification sample per 500 tons of mix, or fraction thereof.
    a. Determine mix maximum specific gravity.
    b. Compact in accordance with mix design parameters.
2. Calculate and report Effective Asphalt Content (by Volume), Air Void Content, VMA, VFA and Dust to Binder Ratio for each sample taken.

E. Density and Thickness Quality Demonstration

1. Demonstrate lot density and thickness based on the test results of 4 random density/thickness cores per lot.
    a. Random location is based on use of random number table, generator or other objective measure to establish both station and off-set for each sample.
    b. Density and thickness may be evaluated in nom-destructive formats. Obtain written permission from the City for non-destructive evaluation prior paving.
        i. Density is based on documented summary of results of 10 **randomly** located nuclear density tests using **core-correlated gauge specific to this mix.**
            (a). Submit random density locations to the City Engineer prior to paving.
            (b). One nuclear density test is the average of two determination of at least 1 minute, taken at right angles to each other over the same location.
        ii. Thickness is based on documented summary of minimum 10 random thickness checks with a depth probe during compaction efforts or ground penetrating radar after compaction efforts, including any corrective actions taken.

c. For lift thicknesses less than 2", use non-destructive format as detailed above.

2. Contractor obtains cores from random locations within two days after the pavement is placed.
   a. Move transversely to a point 1 ft from the edge of the pavement for In-place density if the random location for coring falls within 1 ft of the edge of the overall pavement section (outer part of shoulders).
   b. Fill core holes with HMA or high AC content cold mix and compact.
   c. Begin testing the cores within 24 hours for density acceptance.
3. Lot is acceptable for density when test results are within the limits of Table 1.
4. Lot is acceptable for thickness when:
   a. The average thickness of the lot is not more than ¼ inch less than the total thickness specified.
   b. No individual core shows a deficient thickness of more than ⅜ inch.
5. Deficient Thickness: Place additional material where lots are deficient in thickness.
   a. Use a minimum compacted lift of 3 times the nominal maximum aggregate size.

Table 1: Quality Control Acceptance Limits Gradation, Binder Content, Density

Parameter	Acceptable Limits
½ inch sieve for ¾ inch HMA ⅜ inch sieve for ½ inch HMA (percent passing by weight)	Lot Average*: Target Value 3.0% Individual Test: Target Value 6.0%
No. 8 sieve (percent passing by weight)	Lot Average*: Target Value 2.5% Individual Test: Target Value 5.0%
No. 50 sieve (percent passing by weight)	Lot Average*: Target Value 2.0% Individual Test: Target Value 3.0%
No. 200 sieve (percent passing by weight)	Lot Average*: Target Value 1.0% Individual Test: Target Value 2.0%
Total Asphalt Binder Content	Lot Average*: Target Value 0.2% Individual Test: Target Value 0.4%
Density Target Value: 93.5 percent of Mix Design Maximum Specific Gravity (Rice) (for design overlay thickness < 1.5" target is 92.5% of Rice)	Lot Average*: Target Value 2.0% Individual Test: Target Value 4.0%

* Lot Average not applicable to lots with only 1 test. Use Individual Test limits when evaluating lots with only 1 test.

1.7 ACCEPTANCE

A. The City will make acceptance decisions for all projects. The City may accept or reject a project if it is not up to the specifications included herein.

1. Project Definitions
   a. Capital Projects: Projects where City has contracted directly with the General Contractor for construction of the roadway.

b. Non-Capital Projects: All other projects, including Development, Permit and Utility work.

2. Acceptance Practices

a. For Capital projects, the City, or its representative, will perform testing for gradation, asphalt binder content, density, thickness and smoothness on samples taken by the contractor in the presence of the City or its representative.

i. Testing will be performed by an AMRL certified laboratory and WAQTC/UDOT TTQP certified technicians.

ii. For Capital projects with total tonnages equal to or larger than 1000 tons, the City will accept material based on Articles 1.07 B through 1.07 F. Projects less 1000 tons will be accepted based on Table 1 limits.

b. For the Non-Capital projects, the City may accept the lot based on results of the quality control test results and plant production records defined in Article 1.06.

i. The City will reject the lot if the Contractor QC data for density, gradation or binder content is outside the limits of Table 1.

ii. The City may perform partial or full acceptance testing on non-Capital projects in accordance with Articles 1.07B through 1.07E, Article 1.07H, and Article 1.07I.

(a). The City will reject the lot if the Acceptance data is outside the limits of Table 1, if calculated PT is less than 80%, or if True-Elevation tolerance of Article 7H is not met.

(i) 80% limit for PT is not applicable for small projects with total tonnages less than 1000 tons.

B. A lot equals the number of tons of HMA placed during each production day.

C. Gradation and asphalt binder content

1. The City Engineer will evaluate a lot on the test results of four samples with the following exceptions:

a. Compute disincentive using the test results from three samples if only three samples can be taken for the production day.

b. Add the lot to the next day's production if three random samples cannot be taken.

c. Add the lot to the previous day's production for the final day's production if three random samples cannot be taken.

d. The lot may be increased to include up to three production days when agreed upon in advance by both the Contractor and City Engineer when less than 900 tons are anticipated per production day.

2. Take samples at locations directed by the City Engineer or their representative. The City Engineer will inform the Contractor of the time and place of sampling not more than 15 minutes before the sampling.

a. The City takes immediate possession of the sample(s).

D. Mix Volumetrics

1. In conjunction with the gradation and binder content samples, the City will test for, calculate and report Air Void Content, VMA, VFA and Dust to Binder Ratio.

a. Laboratory compaction in accordance with mix design parameters.

b. Calculations will be based on sample maximum specific gravity.

E. Density and Thickness

1. Density Sampling and Testing
    a. For paving areas not containing paving Fabric: Contractor obtains cores within two days after the pavement is placed.
        i. The City Engineer will mark coring location for in-place density and joint density cores.
        ii. Move transversely to a point 1 foot from the edge of the pavement for in-place density if the random location for coring falls within 1 foot of the edge of the overall pavement section (outer part of shoulders).
        iii. Fill core holes with HMA or high AC content cold mix and compact.
        iv. The City Engineer will witness the coring operation, take possession of the cores immediately, and begin testing the cores for density acceptance.
    b. For paving areas with paving Fabric, the owner will perform density testing with a core- correlated nuclear gauge instead of cores.
2. Density Requirements
    a. The limits for in-place density are in accordance with Table 3.
    b. Use the average of the Maximum Specific Gravity tests for each lot.
3. Thickness Requirements
    a. The City will accept a lot for thickness when:
        i. The average thickness of all sub-lots is not more than 1/4-inch greater, nor 1/4-inch less than the total thickness specified.
        ii. No individual sub-lot shows a deficient thickness of more than 3/8-inch.
    b. Excess Thickness: The City Engineer may allow excess thickness to remain in place or may order its removal.
        i. For excess material left in place on unit price contracts, the City will not pay for any material above the upper thickness tolerance.
    c. Deficient Thickness: Place additional material where lots or sub-lots are deficient in thickness.
        i. Use Minimum compacted lift of 3 times the nominal maximum aggregate size.
    d. Thickness tolerances established above do not apply to leveling courses. Check final surfaces in stage construction.
    e. Thickness acceptance for thin lift projects less than 2 inches consists of checking thickness regularly with a depth probe during compaction efforts and taking corrective action as necessary.

F. For Capital Projects, the City will apply Disincentives for Gradation/Asphalt Content and In-Place Density. The City Engineer will compute Disincentive for each lot.

1. Compute disincentive for Gradation/Asphalt Binder and In-place Density according to Table 2.
2. Base the disincentive on Percent within Limit (PT) computation using Tables 3, 4, and 5.
    a. Evaluate with the appropriate number of tests “n” in Table 4.
3. Use lowest single value combined for gradation (each of the sieves) and asphalt binder content for calculating the gradation/asphalt binder content disincentive.
4. Use Table 5 to determine PT for in-place density.

Tables 2: Disincentive for Gradation, Asphalt Binder Content, and Density	
PT Based on Min. Four Samples	Disincentive (Dollars/Ton)
> 88	0.00
84-87	-0.26
80-83	-0.60
76-79	-0.93
72-75	-1.27
68-71	-1.60
64-67	-1.93
60-63	-2.27
<60	Reject

Tables 3: Upper and Lower Limit Determination	
Parameter	UL and LL
½ inch sieve for ¾ inch HMA ⅜ inch sieve for ½ inch HMA	Target Value 6.0%
No. 8 sieve	Target Value 5.0%
No. 50 sieve	Target Value 3.0%
No. 200 sieve	Target Value 2.0%
Asphalt Binder Content	Target Value 0.35%
Density	Lower Limit: Target Value - 2.0% Upper Limit: Target Value + 3.0%

Tables 4: Quality Index Values for Estimating Percent Within Limits										
PU/PL	**n=3**	**n=4**	**n=5**	**n=6**	**n=7**	**N=8**	**n=10**	**n=12**	**n=15**	**n=20**
100	1.16	1.50	1.75	1.91	2.06	2.15	2.29	2.35	2.47	2.56
99	1.16	1.47	1.68	1.79	1.89	1.95	2.04	2.09	2.14	2.19
98	1.15	1.44	1.61	1.70	1.77	1.80	1.86	1.89	1.93	1.97
97	1.15	1.41	1.55	1.62	1.67	1.69	1.74	1.77	1.80	1.82
96	1.15	1.38	1.49	1.55	1.59	1.61	1.64	1.66	1.69	1.70
95	1.14	1.35	1.45	1.49	1.52	1.54	1.56	1.57	1.59	1.61
94	1.13	1.32	1.40	1.44	1.46	1.47	1.49	1.50	1.51	1.53
93	1.12	1.29	1.36	1.38	1.40	1.41	1.43	1.43	1.44	1.46
92	1.11	1.26	1.31	1.33	1.35	1.36	1.37	1.37	1.38	1.39
91	1.10	1.23	1.27	1.29	1.30	1.31	1.32	1.32	1.32	1.33
90	1.09	1.20	1.23	1.24	1.25	1.25	1.26	1.26	1.27	1.27
89	1.08	1.17	1.20	1.21	1.21	1.21	1.21	1.21	1.22	1.22
88	1.07	1.14	1.16	1.17	1.17	1.17	1.17	1.17	1.17	1.17
87	1.06	1.11	1.12.	1.12	1.12	1.13	1.13	1.13	1.13	1.13
86	1.05	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
85	1.03	1.05	1.05	1.05	1.05	1.04	1.04	1.04	1.04	1.04
84	1.02	1.02	1.02	1.01	1.01	1.01	1.00	1.00	1.00	1.00
83	1.00	0.99	0.98	0.97	0.97	0.96	0.96	0.96	0.96	0.96
82	0.98	0.96	0.95	0.94	0.94	0.93	0.93	0.92	0.92	0.92
81	0.96	0.93	0.92	0.91	0.90	0.90	0.89	0.89	0.89	0.88
80	0.94	0.90	0.88	0.87	0.86	0.86	0.85	0.85	0.85	0.85
79	0.92	0.87	0.85	0.84	0.83	0.83	0.82	0.82	0.82	0.81
78	0.89	0.84	0.82	0.81	0.80	0.79	0.79	0.78	0.78	0.78
77	0.87	0.81	0.79	.0.78	0.77	0.76	0.76	0.75	0.75	0.75
76	0.84	0.78	0.76	0.75	0.74	0.73	0.72	0.72	0.72	0.72
75	0.82	0.75	0.73	0.72	0.71	0.70	0.69	0.69	0.69	0.68
74	0.79	0.72	0.70	0.68	0.67	0.67	0.66	0.66	0.66	0.65
73	0.77	0.69	0.67	0.65	0.64	0.64	0.62	0.62	0.62	0.62
72	0.74	0.66	0.64	0.62	0.61	0.61	0.60	0.59	0.59	0.59
71	0.71	0.63	0.60	0.59	0.58	0.58	0.57	0.56	0.56	0.56
70	0.68	0.60	0.58	0.56	0.55	0.55	0.54	0.54	0.54	0.53
69	0.65	0.57	0.55	0.54	0.53	0.52	0.51	0.51	0.51	0.50
68	0.62	0.54	0.52	0.51	0.50	0.50	0.48	0.48	0.48	0.48
67	0.59	0.51	0.49	0.48	0.47	0.47	0.46	0.45	0.45	0.45
66	0.56	0.48	0.46	0.45	0.44	0.44	0.43	0.42	0.42	0.42
65	0.53	0.45	0.43	0.42	0.41	0.41	0.40	0.40	0.40	0.39
64	0.49	0.42	0.40	0.39	0.38	0.38	0.37	0.37	0.37	0.37
63	0.46	0.39	0.37	0.36	0.35	0.35	0.35	0.34	0.34	0.34
62	0.43	0.36	0.34	0.33	0.33	0.33	0.32	0.31	0.31	0.31
61	0.39	0.33	0.31	0.30	0.30	0.30	0.29	0.29	0.29	0.28
60	0.36	0.30	0.28	0.27	0.26	0.26	0.25	0.25	0.25	0.25
<60	≤0.35	≤0.29	≤0.27	≤0.26	≤0.25	≤0.25	≤0.24	≤0.24	≤0.24	≤0.24

Enter table in the appropriate “number of tests” column and round down to the nearest value.

Table 5: Definitions, Abbreviations, and Formulas for Acceptance	
Term	Explanation
Target Value (TV)	The target values for gradation and asphalt binder content are given in the Contractor's volumetric mix design. See this Section article 1.4 for density target values.
Average (AVE)	The sum of the lot's test results for a measured characteristic divided by the number of test results–the arithmetic mean.
Sample Standard Deviations	The square root of the value formed by summing the squared difference between the individual test results of a measured characteristic and AVE, divided by the number of test results minus one.
Upper Limit (UL)	The value above the TV of each measured characteristic that defines the upper limit of acceptable production. (Table 3)
Lower Limit (LL)	The value below the TV of each measured characteristic that defines the lower limit of acceptable production (Table 3)
Upper Quality Index (QU)	QU = (UL - AVE)/s
Lower Quality Index (QL)	QL = (AVE - LL)/s
Percentage of Lot Within UL (PU)	Determined by entering Table 4 with QU.
Percentage of Lot Within LL (PL)	Determined by entering Table 4 with QL.
Total Percentage of Lot Within UL and LL (PT)	PT = (PU + PL) – 100
Disincentive	Determined by entering Table 2 with PT or PL.

All values for AVE, s, QU, and QL will be calculated to at least four decimal place accuracy, which will be carried through all further calculations. Rounding to lower accuracy is not allowed.

G. Rejected Lots: Rejected lots do not necessarily indicate bad material, rather insufficient data to perform proper acceptance. Submit an engineering analysis for all rejected lots.

1. Include in the analysis:
    a. A summary of the specific issues leading to rejection, including identification of any specific acceptance data being disputed.
    b. Justification for dispute of the specific acceptance data in question.
    c. An engineering evaluation of the expected performance of the pavement based on available project quality control or acceptance data other than acceptance data in question.
    d. Copies of all data supporting the engineering evaluation of expected performance.
    e. Summary of recommended changes to mitigate future occurrences of disputed results.
2. The City Engineer may allow a rejected lot to remain in place based on review and concurrence with engineering analysis.
    a. Capital Projects: A maximum of $25 per ton price reduction will be assessed. The City may adjust or remove the price reduction based on the results of the engineering analysis.
    b. Non-Capital Projects: No price reduction will be assessed. The City may require additional work by the contractor to mitigate concerns of any lot allowed to remain in place.

H. Variation from True Elevation: Construct final riding surface within 1/2 inch of plan elevation.

I. Smoothness

1. Limit all longitudinal and transverse pavement deviations to less than ⅛ inch from the lower edge of a 10-foot straightedge.
2. Meet smoothness requirements of Table 6.

Table 6: Roughness Tolerances

Speed Mph	Profile Roughness[d] (Inches/Mile), Maximum		Profile Deviation[c] Inches/25 feet
	IRI[a]	PI[b]	Maximum
Residential			
All Speeds	–	–	0.4
Arterials and Collectors			
0 to 30	120	50	0.4
31 to 45	90	35	0.4
45 +	70	21	0.3

(a) IRI (International Roughness Index), ASTM E 950. Use 1/4 car analysis.
(b) PI (Profile Index), ASTM E 1274. Use a zero blanking band.
(c) Profile deviation applies to bump and depression measurements.
(d) Evaluate PR lots based on average of two traces from each lot, in the direction of travel, approximately 2.5 feet from each edge of pass.

3. Smoothness is evaluated before the placement of preservation surfacing including: Thin Bonded Polymer Overlay, Microsurfacing, Slurry Seal, Bonded Wearing Course, Stone Matrix Asphalt or Chip Seal Coat.
4. Profile Roughness: Verify bumps and depressions are corrected so profile roughness index in each lot meets tolerance:
    a. Lot is 0.1 mile (528 feet long) for each paving pass. Add segments shorter than 250 feet to preceding lot. Treat partial segments longer than 250 feet as a lot.
    b. Perform trace on each paving pass, regardless of location in roadway.
        i. Exclude bridge decks from profile roughness evaluation. Profile deviation (bump) requirements still apply.
5. Profile Deviation: Verify “must grind” bumps and depressions are removed from the lot surface:
    a. Lot is area of total placement. No area is excluded.
    b. Begin traces 50 feet before edge of new pavement and end traces 50 feet after edge of new pavement. Areas (including the 50 feet end traces) exceeding profile deviation tolerances are “must grind” areas.
6. Correct all defects at no additional cost to the City.
    a. Correct defects across the entire width of the traffic lane or shoulder either by grinding or by surface replacement.
    b. Seal areas in HMA, and SMA that have been ground with a flush coat application.
        i. Use a CSS-1h, CSS-1, CQS-1, based on 2:1 dilution of emulsion concentrate (approximately 60% binder/40% water) to water.
        ii. Apply the emulsion at 0.11 ± 0.01 gal/yd2. Provide beginning and ending meter reading from applicator for application rate verification.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable City requirements for paving work on City streets.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Place asphalt mix when base/pavement surface and ambient temperatures are 50°F or higher.

1. Submit a cold-weather paving plan to the City for any work to be performed outside the above limits. Include modified procedures and practices to ensure proper compaction will be obtained.
2. The City determines and provides written acceptance if it is acceptable to place outside the above limits.

B. Do not place on surfaces that have standing water or are frozen.

PART 2 PRODUCTS

2.1 MATERIALS

A. Asphalt Binder: Use PG 64-28 conforming to APWA Standard Specifications Section 32 12 05 or UDOT Standards Specifications Section 02745.

B. Aggregate: Crusher processed virgin aggregate material consisting of crushed stone, gravel, or slag meeting Table 7.

1. Coarse aggregates
    a. Retained on No. 4 sieve
2. Fine aggregates
    a. Clean, hard grained, and angular
    b. Passing the No. 4 sieve

Table 7: Aggregate Properties – HMA			
Test Method	Test No.	Arterials and Collectors	Local streets
One Fractured Face	AASHTO T 335	95% minimum	90% minimum
Two Fractured Face	AASHTO T 335	90% minimum	80% minimum
Fine Aggregate Angularity	AASHTO T 304	45 minimum	
Flats or Elongates	ASTM D 4791, 3:1 ratio	20% maximum	
L.A. Wear	AASHTO T 96	35% maximum	
Sand Equivalent	AASHTO T 176 (Pre-wet method)	45 minimum	
Plasticity Index	AASHTO T 89 and T 90	Non-Plastic	
Unit Weight	AASHTO T 19	minimum 75 lb/cu ft	
Soundness (sodium sulfate)	AASHTO T 104	16% maximum loss with five cycles	
Clay Lumps and Friable Particles	AASHTO T 112	2% maximum	
Natural Fines	N/A	0%	

C. Meet gradation requirements in Table 8. **Use ½" gradation unless specifically directed otherwise by the City Engineer.**

Table 8: Aggregate Gradations (Percent Passing by Dry Weight of Aggregate)			
Sieve Size		¾ inch	½ inch
Control Sieves	1 inch	100.0	
	¾ inch	90.0 - 100.0	100.0
	½ inch	<90	90.0 – 100.0
	⅜ inch		<90
	No. 4	Provide target for Information Only	
	No. 8	23.0 - 49.0	28.0 - 58.0
	No. 16	Provide target for Information Only	
	No. 30		
	No. 50		
	No. 100		
	No. 200	2.0 - 8.0	– 10.0

D. Antistrip Agent: Hydrated Lime - AASHTO M 303, Type I in 3:1 slurry (water to lime) format.

E. Tack Coat: Homogeneous, Catonic Emulsified Asphalt, Grade CQS-1 or CQS-1h, conforming to Section 32 12 13.13 of APWA Standard Specifications.

2.2 ASPHALT PAVING MIXES AND MIX DESIGN

A. Perform Superpave Volumetric Mix Design according to Asphalt Institute Manual SP-2 and the following:

1. Comply with Table 9 and Table 10.

2. Use minimum 11.0% effective asphalt binder by volume of mix.
3. Incorporate hydrated lime as necessary to meet Hamburg Wheel Tracker Requirements.
4. Do not use mix designs more than 1 year old.

Table 9: Volumetric Design Gyrations				
Pavement Category	Compaction Parameters			Voids Filled with Asphalt (VFA) (%)
	$N_{initial}$ /% of G_{mm}*	N_{design} /% of G_{mm}*	N_{max} /% of G_{mm}*	
All Classes	7/ ≤ 90.5	75/ = 96.5	115/ ≤ 98	70 – 80

* G_{mm}: Theoretical maximum specific gravity of mix. Refer to AASHTO T 209.

Table 10: Volumetric Design Requirements	
HMA design mixing and compaction temperatures	As recommended by Binder Supplier, 325°F Maximum
Dust to Binder Ratio (by weight)	0.6 - 1.20 (Design) 0.6 - 1.40 (Production)
Voids in Mineral Aggregate (VMA) at N_{design} AASHTO R 35.9.2 using G_{sb} (dry) for virgin and recycled aggregates. Equation based on percent of total mix.	14.5% - 16.0% for ½ inch (report for information only – effective binder content and design air voids are primary design controls)
Hamburg Wheel Tracker AASHTO T 324, 50°C	Maximum 10 mm impression at 10,000 passes

B. Recycled Asphalt Pavement (RAP): Mix design shall contain 15% or less recycled asphalt binder from RAP by total weight of binder. Do not adjust virgin binder grade when adding RAP.

1. RAP aggregate is required to meet Table 7 with exception of Sand Equivalent

C. Submit proposed mix design of each class of mix for review at least 10 working days prior to beginning of work. Include the following.

1. Date of mix design.
2. Asphalt Binder source, type, chemical composition, and grade.
3. Effective and total binder target percentages, by weight **and by volume**, and calculated dust to effective binder ratio (by weight).
4. Compaction density at $N_{initial}$, N_{design}, and N_{max}.
5. Volumetric targets including air voids, voids in the mineral aggregate (VMA), and voids filled with Bituminous Binder (VFA).
6. Hamburg Wheel Tracker results and lime percentage
7. Target Grading Curve for aggregate, including all sieves listed in Table 9.
8. RAP properties including asphalt binder content and grade, and RAP percentage.
9. Aggregate source and physical properties as identified in Table 8. Test results shall not be older than 455 days from the date of submission.
10. 1Aggregate bulk and apparent specific gravities, percent absorption and blend percentage.

11. Optimum compaction temperature at the project site.

D. Warm Mix Asphalt

1. At the City's discretion, warm mix asphalt application based on foamed asphalt or surfactant based applications may be used.
2. In addition to meeting requirements of articles 2.02.A through 2.02.C above, include warm-mix process description and related modifications to laboratory testing procedures in submittal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads; and that the base course has been inspected and accepted by the City Inspector.

B. Perform redhead and string-line test, verify gradients and elevations of base are correct.

C. Locate, reference, and protect all utility covers, monuments, curb and gutter and other components and street fixtures affected by the paving operations.

D. Remove all moisture, dirt, sand, leaves, dust, mill remnants and other objectionable material from the prepared surface.

3.2 PREPARATION - TACK COAT

A. Apply tack coat with minimum 98% coverage.

B. Apply tack coat to all contact surfaces of curbs, gutters, existing pavement, manhole frames and other utility structures.

C. Apply tack coat to all longitudinal joints and between lifts.

D. Apply tack in accordance with Table 11, based on 2:1 dilution of emulsion concentrate (approximately 60% binder/40% water) to water. Provide beginning and ending meter reading from applicator for application rate verification.

Table 11: Minimum Tack Application Rates (gal/SY)	
Milled Surface	0.08
Existing HMA Surface	0.05
New HMA Surface (less than 48 hrs since placement)	0.03
Vertical and Contact Surfaces (Hand spray applications)	Minimum 98% Coverage

3.3 HMA PRODUCTION AND PLACING ASPHALT PAVEMENT

A. Dry aggregate material to an average moisture content of not more than 0.2 percent by weight. Mix uniformly; May be verified by AASHTO T 255. Adjust burners to avoid damage or soot contamination of the aggregate

B. Coat with asphalt binder 100 percent of the particles passing and 98 percent of the particles retained on the No. 4 sieve.

1. May be verified by AASHTO T 195.
2. Discontinue operation and make necessary corrections if material is not properly coated.

C. Maintain temperature of the HMA between identified limits for mixing and compaction as defined on Volumetric Mix Design Submittal.

1. The City Engineer will reject all materials heated over the identified limits.
2. Remove all material rejected by the City Engineer for overheating and dispose of in a legally acceptable manner.

3.4 CEASE PRODUCTION

A. Cease production when any two out of three consecutive lots meet one of the following criteria:

1. A net disincentive
2. Air voids at Ndes averaged for each lot are less than 2.5 or greater than 4.5 percent
3. Effective binder content averaged for each lot is not within Target Value ± 0.5 percent
4. Dust to binder Ratio exceeds limits in Table 11.

B. Submit a corrective action plan to the City Engineer before production continues indicating the changes in production procedures that will be implemented to correct the deficiencies.

3.5 PLACING ASPHALT PAVEMENT

A. Provide a compactable sloped edge adjacent to the next lane to be paved when full-width or Echelon paving is impractical and more than one pass is required. Echelon paving is the preferred method for constructing a longitudinal joint.

B. Adjust the production of the mixing plant and material delivery until a steady paver speed is maintained.

C. Offset longitudinal joints 6 to 12 inches in succeeding courses.

1. Place top course joint within 1 ft of the centerline or lane line.

D. Offset transverse construction joints at least 6 ft longitudinally.

E. Do not allow construction vehicles, general traffic, or rollers to pass over the uncompacted end or edge of freshly placed mix until the mat temperature drops to a point where damage or differential compaction will not occur.

F. Taper the end of a course subjected to traffic at approximately 50:1 (horizontal to vertical).

1. Remove the portion of the pass that contains the tapered end before placing fresh mix.

G. Use a motor grader, spreader box, or other City Engineer accepted spreading method for projects under 180 yd2, irregular areas, or for miscellaneous construction such as detours, sidewalks, and leveling courses.

H. Use a minimum compacted lift equal to 3 times the nominal maximum aggregate size.

I. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

J. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.6 CONTRACTOR INITIATED CHANGES IN MIX DESIGN

A. Changes in job mix gradation:

1. Submit a written request for a change in a job-mix gradation at least 48 hours prior changing. Include basis for requesting change. Submittal must meet requirements of Article 2.02 C.
2. Do not change until permission from City or its representative is received.

3.7 PROTECTION

A. Immediately after placement, protect pavement from injury or damage until surface temperature is less than 120 degrees F.

END OF SECTION

SECTION 02651

BITUMINOUS TYPE II SLURRY SEAL COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Bituminous Type II Slurry Seal coat for overlay.

1.2 RELATED SECTIONS

A. Section 1300 – Administrative Requirements

B. Section 1400 – Quality Requirements

1.3 REFERENCES

A. AI MS-19 - A Basic Asphalt Emulsion Manual; The Asphalt Institute – Latest Edition

B. APWA Standards and Specifications Section – 2012 Edition

C. ASTM C 29 - Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

D. ASTM C 88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

E. ASTM C 117- Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing

F. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

G. ASTM C 136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

H. ASTM D 242 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures

I. ASTM D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate

J. ASTM D 3319 - Standard Practice for Accelerated Polishing of Aggregates Using the British Wheel

K. ASTM D 3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal

L. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

M. ASTM D 5821 - Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate

N. ISSA A105 Guidelines

O. UDOT 2012 Standard Specifications

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures

B. Mix Design as per Article 2.01 D.

C. Laboratory Accreditation as per Article 2.01 B.

D. Field Quality Control data as per Article 3.6

1.5 FIELD QUALITY CONTROL

A. Perform Field Quality Control Sampling and Testing. Any repeatable sampling and testing approach is acceptable. Identify and correct any material not meeting the following Field Tolerances:

1. Residual Asphalt Content: ± 1% by dry weight of aggregate
2. Slurry consistency (ISSA TB #106): ±0.2” from mix design
3. Application Rate: ± 2 lb/yd2 (when surface texture does not vary significantly)

B. ASTM C 136: If sieve analysis shows stockpile 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. Submit daily summary to the City within 24 hours of completion of each day’s placement.

1.6 QUALITY ASSURANCE

A. Use a paving crew foreman that has completed at least three (3) projects of similar size and nature.

B. Use a laboratory that follows and complies with ASTM D 3740 and APWA Section 01 45 00 requirements.

C. Do not change accepted aggregate or emulsified asphalt source until City Engineer accepts new source and new mix design.

D. Remove any product found defective after installation and install accepted product at no additional cost to OWNER.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable City requirements for paving work on City streets, Section 1300 – Administrative Requirements.

PART 2 PRODUCTS

2.1 MATERIALS

A. Emulsified Asphalt Cement: Use quickset emulsified asphalt, CQS-1H, with minimum 2% SBR polymer solid based on mass of residual asphalt.

B. Aggregate: Use aggregate conforming to the following:

1. Material: Stone, slag, or other high quality particle or combination meeting Table 1.

Table 1 – Physical Properties			
Criterion	ASTM	Minimum	Maximum
Angularity (fractured faces), percent	D 5821	80	--
Wear (hardness or toughness), percent	C 131	--	35
Soundness (weight loss in 5 cycles), percent	C 88	--	10
Clay Content (sand equivalent) percent SS-II	D 2419	55	--
Polishing, BPN	D 3319	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 all non- local roadways.
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 Na2SO4.
d. Clay content before additives.

2. Gradation: Meet requirements of Table 2, ASTM C 136 on a dry weight and percent passing basis:

Table 2 – Master Grading Band Limits	
Sieve	Percent Passing
3/8 in.	100
No. 4	90 – 100
No. 8	65 – 90
No. 16	45 – 70
No. 30	30 – 50
No. 50	18 – 30
No. 100	10 – 21
No. 200	6 – 15
NOTES Portion retained on the No. 4 sieve clean and free of clay coatings. Portion passing No. 200 sieve includes mineral fill, ASTM C 117.	

C. Additives:

1. Mineral Filler: ASTM D 242
2. Portland cement, hydrated lime, limestone dust, fly ash, or aluminum sulfate to regulate setting time and improve workability.
3. Limestone dust, fly ash, or rock dust to alter aggregate gradation.

D. Mix Design:

1. Use an AMRL accredited laboratory.
2. Perform mix design in accordance with Table 3.

Tables 3: TESTS		
ISSA TEST NO. (ISSA A105 Guidelines)	DESCRIPTION	SPECIFICATION
ISSA TB-106	Slurry Seal Consistency	2cm Minimum 3cm Maximum
ISSA TB-139 For quick-traffic systems	Wet Cohesion 30 Minutes Minimum (Set) Wet Cohesion 60 Minutes Minimum (Traffic)	12 kg-cm Minimum 20 kg-cm Minimum
ISSA TB-109 For heavy-traffic areas only	Excess Asphalt by LWT Sand Abrasion	50 g/ft^2 Maximum (538 g/m^2 Maximum)
ISSA TB-114	Wet Stripping	Pass (90% Minimum)
ISSA TB-100	Wet-Track Abrasion Loss, One-hour soak	75 g/ft^2 (807 g/m^2)
ISSA TB-113	Mix Time**	Controllable to 180 Seconds Minimum

** Perform the mixing test and set-time test at the highest temperatures expected during construction.

E. Submit proposed mix design for review at least 10 working days prior to beginning of work. Include the following:

1. Date of mix design
2. Emulsion source and grade
3. Total emulsion target percentages.
4. Bulking effect of moisture content on unit weight – ASTM C 29
5. Stripping test results
6. Target Grading Curve for aggregate, including all sieves listed in Table 3.
7. Aggregate source and physical properties as identified in Table 2. Test results shall not be older than 455 days from the date of submission.
8. Aggregate bulk and apparent specific gravities, percent absorption and blend percentage.

F. Temporary Raised Pavement Markers:

1. Use Temporary Raised Pavement Markers as manufactured by Davidson Plastics Company.
2. Markers shall have polyurethane plastic bodies with reflective tape, clear flexible polyvinyl-chloride protective covers, and solid butyl rubber adhesive on bottom surface.
3. Markers shall be 2-inches high and 4-inches wide; and of the color selected by the City Engineer.

PART 3 EXECUTION

3.1 PREPARATION

A. General

1. Fat or bleeding pavements may require scratch course application.
2. Cracked or porous pavements may require thin SSI slurry surface treatment.
3. Asphalt concrete inlay may be required in rut deformations.

B. Surface Repair: Patch holes, raveled areas, and low areas with asphalt concrete.

C. Repair all cracks greater than 1/8” in width.

1. Remove plant material from cracks, edges and joints.
2. Blow cracks clean.
3. Seal cracks with crack sealant as per Article 2.3, UDOT Standard Specification 02745 – Asphalt Material. Use squeegee or other device to remove excess asphalt and provide flat surface.
4. Allow crack seal to cure a minimum of 24 hours before applying slurry seal.

D. Traffic Control:

1. Implement the notification and traffic control plan requirements. Do not proceed without certified flaggers.
2. Grind off existing pavement markings and lane striping. Use reflective tabs to mark striping location before applying slurry seal.

E. Cleaning:

1. Clean existing paved surfaces of all dirt, sand, dust and other objectionable material with use of power broom, prior to placing seal coat. Power broom shall be inspected and accepted by the City Engineer or City Inspector prior to use.
2. Remove loose material that may cause drag marks.
3. Do not flush water over cracked pavement or apply pressurized water to cracked Pavement.

F. Tack Coat:

1. Apply tack coat to high-absorbent, polished, oxidized, or raveled asphalt surfaces or to concrete or brick surfaces.
2. Apply tack coat and pave over concrete Cover Collars.
3. Use the same asphalt emulsion as used in slurry seal application.

3.2 PROTECTION

A. Protect trees, plants and other ground cover from damage.

B. Prune trees to allow equipment passage underneath, APWA Section 32 01 93. Repair tree damage at no additional cost to OWNER.

C. Install Invert Covers, APWA Section 01 71 13.

D. Mask Street Fixtures.

E. Protect curb, gutter, sidewalk and other structures from spatter, mar, or overcoat.

F. Protect slurry seal from traffic until seal has cured. Cure time depends on type of asphalt, mixture characteristics and weather.

3.3 PLACING TEMPORARY ROAD MARKERS

A. Prior to placing seal coat, install raised markers to mark striping location.

B. Install raised markers in accordance with the manufacturer's written instructions and recommendations.

C. Remove covers immediately after rolling is complete.

3.4 CONSTRUCTION EQUIPMENT

A. Paver: Us a continuous-flow mixing unit meeting the following:

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.

B. 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. Thirty (30) minutes maximum initial set time. Initial set occurs when blotting of the slurry seal surface yields only water (no emulsion).
2. No distress when exposed to traffic two (2) hours after placement.

3.5 PLACING SEAL COAT MATERIAL

A. Place seal coat in accordance with the following:

1. Use an application rate of 15 to 18 pounds per square yard.
2. Machine meter settings must match mix design.
3. Pre-wet existing pavement
4. Wait at least two (2) hours if an adjacent pass has broken and started to cure.
5. Apply slurry seal material such that, when cured, it presents a uniform, skid-resistant appearance with all cracks filled.
6. Do not apply lane marking tape or paint for traffic control until layout and placement has been verified with the City Engineer.

B. During application, water and additives may be adjusted (per mix design) for better consistency or set time. All other changes require a new mix design.

C. Operate equipment to meet the following conditions in the spreader box:

1. Do not exceed four (4) minutes total mixing time.
2. Do not add 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. Carry a sufficient amount of slurry in all parts of the spreader at all times so that full width and complete coverage is obtained with no streaks or narrow spots. Avoid overloading the spreader.

D. Apply seal coat in accordance with the following:

1. Dampen surface immediately before application of slurry seal. All surfaces are to be uniformly damp with no free water standing on the surface or in cracks when seal coat is applied.
2. If coarse aggregate settles to bottom of mix, remove slurry from pavement.
3. In areas where spreader box cannot be used, apply slurry by hand.

E. Install joints in accordance with the following:

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. Use construction paper or comparable products so all beginning and ending joint lines from each construction pass are straight.
5. Stop and correct paving operation if longitudinal or transverse joints have uncovered areas or unsightly appearance.

F. Install seal with edge and end lines meeting the following:

1. Mask off end of streets and intersections to provide straight lines.
2. Make straight lines along lip of gutter and shoulders. No runoff on these areas permitted.
3. Vary edge lines no more than two (2) inches per 100 feet.

3.6 FINISHING DETAILS

A. Do not create build-up when constructing longitudinal and transverse joints.

B. Place slurry seal adjacent to concrete pavements or concrete curb and gutter with a straight longitudinal edge. Do not allow over-lap on these areas. Remove slurry seal placed on concrete at no cost to the City.

C. Maintain straight lines at all locations.

D. Place slurry seal at side streets and intersections out to right-of-way line.

E. Use hand squeegees to spread slurry in areas that cannot be reached with slurry seal machine.

1. Lightly dampen areas before mix placement.
2. Provide complete and uniform coverage.

3. Avoid unsightly appearance by maintaining smooth surfaces and transitions during hand work.
4. Use the same type of finish in hand worked areas as applied by the spreader box.

3.7 REPAIR

A. Remove spatter or mar from curb and gutter, sidewalk, guard rails and guide posts at no additional cost to OWNER.

B. Remove slurry seal from Street Fixtures.

C. Make correction lines straight. Provide good appearance.

D. Fill any joints or cracks that are not covered by slurry seal. 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.

3.8 LIMITATIONS

A. Do not apply slurry seal during rain, when standing or flowing road surface moisture is present, or during other adverse weather conditions.

B. Do not apply slurry seal if either the pavement or air temperature is below 50 degrees F and falling. Slurry seal may be applied when both the pavement and air temperatures are above 45 degrees F and rising.

C. Do not apply slurry seal when the temperature is projected below 35 degrees F within 24 hours of placing slurry seal.

D. Cease slurry seal operations when weather or other conditions prolong opening road surface to traffic beyond two hours.

E. Keep traffic off roadway surface until the slurry seal has cured.

END OF SECTION

SECTION 02652

CONCRETE STREET IMPROVEMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete curb and gutter and appurtenant items.

B. Cast-in-place concrete waterways and appurtenant items.

C. Cast-in-place concrete sidewalks and appurtenant items.

D. Cast-in-place concrete driveway pavement and appurtenant items.

E. ADA ramps and appurtenant items.

F. Curb-cut type driveway entrances and appurtenant items.

G. Cast-in-place concrete speed tables.

1.2 RELATED SECTIONS

A. Section 02100 - Roadway and General Excavation.

B. Section 02115 - Structural Excavation.

C. Section 02116 - Fill and Backfill.

D. Section 02621 - Gravel Road Base.

E. Section 03300 - Cast-In-Place Concrete.

1.3 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete: As specified in Section 03300 - Cast-in-Place Concrete; using 3/4 inch maximum aggregate.

B. Concrete Reinforcement: As specified in Section 03300.

C. Gravel Base: As specified in Section 02621 - Gravel Road Base.

D. Expansion Joint Filler: Shall be 1/2-inch thick; conforming to ASTM D 1751 or AASHTO M 213. Joint filler shall be one-piece; and shall extend full width and depth of concrete section; 1/4-inch below and conforming to finished top surfaces of concrete items.

E. ADA Ramp Warning Panels.

1. Panels shall be detectable warning systems conforming to ADA, FHWA and all other applicable appurtenant regulations; designed for exterior use and surface application.
2. Panels shall be durable panels molded from polyurethane, with truncated domes, meeting both state and federal ADA guidelines. .
3. Panels shall be molded from high strength polyurethane.
    a. Submit manufacturer's literature describing products, installation procedures and routine maintenance; and three samples of surface applied mat to be supplied.
    b. Panels shall have slip resistance in wet and dry environments.
    c. Panel color shall be yellow; conforming to Federal Color # 33538. Color shall be homogenous throughout the mat.
4. Panels shall comply with Americans with Disabilities Act, Title 49, Section 4.29 2.
5. Mats shall be installed according to manufacturer's written instructions and recommendations.
    a. Mats shall be applied to concrete surfaces with heavy-duty elastomeric two-part polyurethane ground adhesive, as recommended by the manufacturer.
    b. Edges and seams shall be sealed with cyanoacrylate sealer, as recommended by the manufacturer.
    c. Low profile nylon expansion anchors shall be installed after mats are installed, according to the manufacturer's instructions and recommendations.
6. After mats have been installed, the mats shall be protected from damage as recommended by the manufacturer.
7. Mats shall be cleaned by method specified by manufacturer.
8. Panels shall be Detectable Warning Mats as manufactured by Detectable Warning Systems, Inc.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify excavation for concrete items is correct.

B. Verify that sub-base has been compacted and accepted by the City Engineer or City Inspector, and that gradients and elevations are correct.

C. Verify that all areas of collapsible soil have been identified and properly prepared for sub-base.

3.2 EARTHWORK

A. See Section 02100 - General Excavation and Section 02115 - Structural Excavation for requirements for excavating, backfilling and compacting; See Section 02116 - Fill and Backfill for requirements for filling and backfilling; and see Section 02621 - Gravel Road Base for requirements for gravel base.

B. Hand trim excavations for accurate placement of gravel base for concrete items.

C. Furnish, place, grade and compact untreated base course for concrete work, as indicated on the drawings.

1. Curb and Gutter: compacted thickness shall be 6 inches.

2. Waterways: compacted thickness shall be 6 inches.
3. Sidewalks: compacted thickness shall be 6 inches.
4. Driveway Pavement: compacted thickness shall be 6 inches.

D. Backfill around completed concrete items to required elevations, tamp in place and compact as required.

3.3 CONSTRUCTION

A. Form Work.

1. Forms shall be set to the required grade and lines, as indicated on the drawing; rigidly braced and secured.
2. Install sufficient quantity of forms to allow continuous progress of work; and so that forms can remain in place for at least 24 hours after placement of concrete.
3. Check completed form work for grade and alignment, before placing any concrete. Tolerances for form work shall not exceed 1/8-inch in 10 feet for the top of forms; and 1/4-inch in 10 feet for the vertical face.
4. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.

B. Concrete Placement.

1. Comply with applicable requirements of Section 03300 - Concrete for design, mixing and placement of concrete; and with the requirements herein.
2. Do not place concrete until subgrade and forms have been inspected and accepted for line and grade.
3. Moisten subgrade as required to provide a uniform dampened condition at time concrete is placed.
4. Place concrete using methods which will prevent segregation of concrete mix, and with as little re- handling as possible.
5. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint.
6. Consolidate concrete along the face of forms with an internal vibrator. Keep vibrator away from joint assemblies or side frames. Consolidate with care to prevent dislocation of reinforcement and joint materials.
7. Use only square-faced shovels for hand spreading and consolidation.
8. Where ADA ramps and curb-cut type driveway entrances are to be constructed, the curb of new curb and gutter shall be eliminated down to the limits and for the width indicated on the drawings; and the curb shall be sloped on each side of the ramp and driveway entrance.

C. Expansion/Construction Joints. Construct joints true-to-line, with face perpendicular to the surface of the concrete item and at right angle to centerline of the concrete item, unless shown otherwise. Joints shall be filled with joint filler material. The contractor must follow all included guidelines unless indicated otherwise on the drawings.

1. Curb and Gutter. Provide joints at a spacing not to exceed 100 feet, on center; unless indicated otherwise on the drawings. Construct joints by inserting a 1/8-inch thick steel division plate, matching cross-section of curb and gutter, into concrete; plate shall not extend into bottom 4-1/2 inches of the curb and gutter. Set division plate into plastic concrete and carefully remove after concrete has hardened.
2. Sidewalks. Provide joints at a spacing not to exceed 40 feet, on center; unless indicated otherwise on the drawings. Construct joints by inserting a 1/8-inch thick steel division plate into concrete; plate shall embedded 1/4 of sidewalk thickness, measured from the top of sidewalk. Set division plate into plastic concrete and carefully remove after concrete has hardened.
3. Driveway Pavement. Provide joints as indicated on the drawings; and where pavement abuts other concrete construction.
4. Speed Tables. Provide joints as indicated on the drawings; and where speed tables abut other concrete construction.
5. Cold Joint. Provide expansion joints at all start/stop locations.

D. Construction Joints. Construct construction joints true-to-line, with face perpendicular to the surface of the concrete item and at right angle to centerline of the concrete item, unless shown otherwise. The contractor must follow all included guidelines unless indicated otherwise on the drawings and as directed by the City Engineer.

1. Provide construction joints where required.
2. Curb and Gutter. Provide construction joints at a spacing not to exceed 10 feet, on center; unless indicated otherwise on the drawings.
3. Waterways. Provide construction joints to match the width of the sidewalk, on center; unless indicated otherwise on the drawings.
4. Sidewalks. Provide construction joints at a spacing not to exceed 5 feet, on center; unless indicated otherwise on the drawings.
5. Driveway Pavement. Provide construction joints at a spacing not to exceed 6 feet, on center; unless indicated otherwise on the drawings.
6. Speed Tables. Provide construction joints at a spacing not to exceed 10 feet, on center; unless indicated otherwise on the drawings.

E. Finishing and Ruling.

1. After striking off and consolidating concrete, smooth exposed surfaces by screeding and floating; adjust floating to compact surfaces and produce uniform texture.
2. After floating, check surfaces for trueness with a 10-foot long straightedge. Distribute concrete as required to remove surface irregularities; and refloat repaired surfaces to provide smooth, continuous surfaces with a tolerance of 1/4-inch when measured by the 10-foot long straightedge.
3. Work edges of gutters, waterways, sidewalks and driveway pavement, transverse joints, and contraction joints with an edging tool; and round to 1/4-inch radius, unless indicated otherwise.
4. Work edges of top back of curbs with an edging tool; and round to 1/2-inch radius, unless indicated otherwise.
5. Finishing:
    a. Curb and Gutter. After completion of floating and when excess moisture and

surface sheen has disappeared, trowel finish exposed surfaces smooth, free of trowel marks, and uniform in texture and appearance.

b. Waterways. After completion of floating and when excess moisture and surface sheen has disappeared, trowel finish exposed surfaces smooth, free of trowel marks, and uniform in texture and appearance. Surfaces shall be warped to match flow lines of gutters at each end of waterway, as indicated on the drawings.

c. Sidewalks. After completion of floating and when excess moisture and surface sheen has disappeared, broom finish exposed surfaces by pulling a fine-hair broom across concrete surfaces, perpendicular to line of traffic, until uniform in texture and appearance.

d. Driveway Pavement. Pavement shall be finished as specified for sidewalks; with rough flat finish.

e. Speed Tables. After completion of floating and when excess moisture and surface sheen has disappeared, trowel finish exposed surfaces smooth, free of trowel marks, and uniform in texture and appearance.

F. Form Removal and Repair Work.

1. Forms shall not be removed for at least 24 hours after concrete has been placed.
2. After form removal, clean ends of joints and point-up minor honeycombed areas.
3. Remove and replace areas or sections of concrete with major honeycomb areas.

G. Curing Concrete.

1. Protect and cure finished concrete, complying with applicable requirements of Section 03300 - Concrete.
    a. Use white colored cure.
2. Use moist-curing methods for initial curing, whenever possible.
3. A membrane-forming curing compound shall be used when required by the City Inspector; applied in accordance with the manufacturer's written instructions.

3.4 SPECIAL CONSTRUCTION

A. Curb-Cut Type Driveway Entrances. Driveway entrances shall consist of modifying the curb of 30 inch curb and gutter and warping surfaces of 6-inch thick concrete driveway pavement or concrete sidewalk for the width and to the configuration indicated on the drawings, as described herein. Contractor must follow all included guidelines unless indicated otherwise on the drawings and as directed by the City Engineer.

1. Curb of curb and gutter shall be eliminated down to the limits indicated on the drawings, and to the width of the existing driveway; and the curb shall be sloped on each side of the driveway as indicated.
2. Where there is a park strip between the sidewalk and back of curb and gutter, driveway pavement, 6-inches thick, shall be constructed between the sidewalk and the back of curb. The surfaces of the driveway pavement shall be shaped to form a smooth entrance from the curb-cut at the curb and gutter to the edges of the sidewalk, as indicated.
3. Where the sidewalk is adjacent to the back of curb and gutter, 6-inches thick sidewalk shall be constructed at the driveway entrance, as indicated. The surfaces of the sidewalk shall be shaped to form a smooth entrance from the curb-cut at the curb and gutter to the edge of the sidewalk adjacent to the property line, as indicated.

B. ADA Ramps. ADA ramps shall be constructed at curb and gutter radius sections at street intersections, as indicated on the drawings. Work shall consist of modifying the curb of 30 inch curb and gutter and warping surfaces of concrete sidewalk for the width and to the configuration indicated on the drawings. Contractor must follow all included guidelines unless indicated otherwise on the drawings.

1. Excavate as required to establish the proper sub-base for the gravel base for the ramp.
2. Furnish, place, grade and compact gravel base, 6-inches thick. Follow all current ADA requirements.
3. Curb of curb and gutter shall be eliminated down to the limits and to the width indicated on the drawings; and the curb shall be sloped on each side of the ADA ramp as indicated.
4. Where there is a park strip between the sidewalk and back of curb and gutter, concrete pavement, 5-inches thick, shall be constructed to match back of curb and gutter radius section and the ends of the sidewalk on each side of the ramp. The surfaces of the concrete pavement shall be shaped to form a smooth ramp from the curb-cut at the curb and gutter to the ends of the sidewalk, as indicated.
5. Where the sidewalk is adjacent to the back of curb and gutter, concrete pavement, 5-inches thick shall be constructed to match back of curb and gutter radius section and the ends of the sidewalk on each side of the ramp, as indicated. The surfaces of the concrete pavement shall be shaped to form the ADA ramp from the curb-cut at the curb and gutter to the ends of the sidewalk, as indicated.
6. Warning panels shall be installed as indicated on the standard drawings; according to the manufacturer's drawings, written instructions and recommendations.

C. Speed Tables. Speed tables shall be constructed as indicated on the drawings.

3.5 REPAIR AND MAINTENANCE

A. Contractor shall repair and maintain project curb and gutter, waterways, sidewalks, driveway pavement, driveway entrances, ADA ramps, and other concrete structures as required, during the guarantee period.

1. All repairs shall be made with materials similar and equal to those described in these specifications.
2. All construction shall be done as described in these specifications.

B. Contractor shall, at least one month before expiration of the guarantee period, make all such repairs as may be necessary to produce concrete items which will:

1. Conform substantially in contour to the concrete item as first constructed.
2. Be free from cracks or depressions showing disintegration of the concrete mixture of the concrete item.
3. Be free from all settlement of the surface of the concrete pavement holding water, or other settlements showing variation of 3/8-inch or more from the edge of a four-foot long straightedge.
4. Not have settled because of incomplete compaction of the subgrade.

C. When repairs, that are necessary to be made during the guarantee period, amount to more than fifty percent of a section between two expansion joints, the entire section shall be removed and disposed of; and that section shall be reconstructed in accordance with these

specifications.

3.6 PROTECTION OF CONSTRUCTED CONCRETE ITEMS

A. Protect concrete items of this section from damage by subsequent construction activities.

B. Replace damaged concrete items which cannot be repaired to a level accepted by the City Inspector.

3.7 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01400.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design to engineer and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C 39. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 50 cu yd or less of concrete placed.

F. Take two additional test cylinders during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each load at point of discharge; and perform slump test with each set of test cylinders taken.

1. If maximum slump for the application is exceeded, it will be assumed that the water content is excessive and the load shall be rejected.
2. If slump is less that the minimum for the application, a measured quantity of water may be added to the mix; quantity shall not exceed 1/6 gallon of water per bag of cement.
3. Water shall be added only in the presence of a City inspector and after a slump test has been made.
4. If concrete has been mixed for more than one hour, the loss of slump shall be considered as being caused by setting of concrete; water shall not be added, and the load shall be rejected.

H. Perform test to determine air content in accordance with ASTM C 231; a minimum of one test shall be done each time a slump test is made. Air content shall be within specified limits.

END OF SECTION

SECTION 02724

AUTOMATIC SPRINKLING SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Complete automatic sprinkling system, including:

1. Pipe and fittings.
2. Valves, valve boxes, and appurtenant items.
3. Automatic controller, control valves, valve boxes, wires and appurtenant items.
4. Sprinkler heads and appurtenant items.
5. Connections to water main lines.

B. System design and testing.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching for Pipe Work: Excavating, pipe bedding, backfilling and compacting.

B. Section 02115 - Excavation: Excavating for structures and appurtenant items.

C. Section 02116 - Fill and Backfill: Pipe bedding and excavation backfilling.

D. Section 02586 - Backflow Preventer Station.

E. Section 03300 - Cast-in-Place Concrete: Concrete for structures and thrust blocks.

1.3 REFERENCES

A. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ASTM A 234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

C. ASTM D 1785 - Standard Specification for Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.

D. ASTM D 2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.

E. ASTM D 2241 - Standard Specification for Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series).

F. ASTM D 2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.

G. ASTM D 2466 - Standard Specification for Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedules 40.

H. ASTM D 2564 - Standard Specification for Solvent Cement for Poly Vinyl Chloride (PVC) Plastic Piping Systems.

I. ASTM D 2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.

J. ASTM D 3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastromeric Seals.

K. ASTM D 3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.

L. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association; (ANSI/AWWA C104/A21.4).

M. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; (ANSI/AWWA C105/A21.5).

N. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; (ANSI/AWWA C111/A21.11).

O. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; (ANSI/AWWA C151/A21.51).

P. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; American Water Works Association.

Q. AWWA C504 - Rubber Seated Butterfly Valves; American Water Works Association.

R. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS; American Water Works Association; (ANSI/AWWA C508/C508a).

S. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; (ANSI/AWWA C509/C509a).

T. AWWA C515 - Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service; American Water Works Associations: (ANSI/AWWA C515).

U. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; (ANSI/AWWA C600).

V. STM D2774 - Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.

W. W AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution; American Water Works Association; (ANSI/AWWA C900/C900a).

X. X AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 4 inch through 63 inch, for Water Distribution;

Y. American Water Works Association.

Z. Y Use the latest issue of the above reference standards as of the date of the Project.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, controllers, sprinkler heads, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of pipe lines, valves, controllers, sprinkler heads, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 SYSTEM DESIGN

A. The sprinkling system shall be designed to provide adequate coverage to all areas to be watered.

B. Project drawings of the system shall be submitted to the City Engineer, showing design and general layout of pipe distribution system and sprinkler heads required to provide complete coverage and uniform distribution.

1. Drawings shall indicate pipe sizes, control valves, quick-coupling valves, automatic controller, control wiring, electrical service line, connections to water mains, backflow preventers, filters, and all appurtenant items.
2. Pipe system for spray heads shall have minimum pipe size of 3/4-inch; rotor pop-up sprinklers shall have minimum pipe size of 3/4-inch; and impact rotor pop-up or rotors above I-40 shall have minimum pipe size of 1-inch.
3. Quick-coupling valves shall be placed in the system where indicated on the drawings.
4. Drawings shall show system design pressures and PVC pipe classifications (either Schedule 40 or Schedule 80). A pipe size over 4” shall utilize gasketed joints.

C. Design a pipe distribution system to provide sufficient water to each of the heads. Spray Heads and Rotator Heads shall be on separate zones.

D. The Contractor may modify the layout of heads to better fit project conditions with notification and City approval; providing that complete coverage and uniform distribution is maintained.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with City's requirements as described herein.

B. A third party audit by a certified irrigation auditor verifying the distribution uniformity (DU) of the system is 70% for the rotors and 50% for spray heads. Testing results to be submitted prior to start of warranty period for new development in accordance with the City’s land development code.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves, controllers, heads, and appurtenant items in shipping containers with labeling in place.

1.8 OPERATING AND MAINTENANCE DATA

A. Provide complete As-Builts for entire system. Also Provide an 8 ½"x 11" laminated zone map illustrating each zone by color and zone number.

B. Provide instructions covering full operation, care and maintenance of system and controls; and manufacturer's parts catalog.

C. Instruct City's designated maintenance personnel in the proper operation of the system, including adjustment of sprinkler heads.

D. Submit 3 copies of written instructions recommending procedures to be established by the City Engineer for the maintenance of the system from year to year.

1. Submit at least 30 days before the expiration of required one year guarantee period.
2. Provide information in the manuals that include the following:
    a. Written index near front of Manual listing location in the Manual of all emergency data regarding the installation;
    b. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of the nearest vendor of replacement parts; and
    c. Copy of all guarantees and warranties issued on the installation showing all dates of expiration.

PART 2 PRODUCTS

2.1 GENERAL

A. All sprinkler heads, control valves, quick-coupling valves, automatic controllers and appurtenant items for the sprinkling system shall be supplied by the same supplier.

2.2 WATER SUPPLY AND DISTRIBUTION PIPE

A. PVC Pipe: AWWA C900 DR 18.

1. Fittings: AWWA C111, cast iron.
2. Joints: ASTM D 3139 compression gasket ring.

B. Polyethylene Pipe: ASTM D 3035, for 160 psig pressure rating:

1. Fittings: AWWA C901, molded or fabricated.
2. Joints: Compression.

C. High Density Polyethylene Pipe: AWWA C906:

1. Material: PE 4710 High Density Polyethylene (HDPE) meeting ASTM D3350 cell classification of 345434C.
2. Fittings: AWWA C906, molded or fabricated; or mechanical joint ductile iron fittings.
3. Joints: Butt fusion.

D. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water Service" in large letters for all plastic pipe.

2.3 SPRINKLING SYSTEM DISTRIBUTION AND LATERAL PIPE

A. PVC Pipe: ASTM D 1785, Schedule 40 or 80, as required.

1. Fittings: ASTM D 2466, Schedule 40 or 80, as required.
2. Joints: Cemented with Primer and solvent weld, using I.P.S. Brand, purple primer and grey solvent weld or approved equal. Red Hot Blue not permitted.
3. Schedule 80 pipe shall be used between stop & waste valves and master valves; and Schedule 40 pipe shall be used downstream from master valves.

B. Polyethylene Pipe: ASTM D 3035, for 160 psi pressure rating:

1. Fittings: AWWA C901, molded or fabricated.
2. Joints: Compression.

C. The minimum pipe size for distribution and lateral pipes to be 3/4-inch.

2.4 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves Up To 3 Inches:

1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, IPS ends, and handwheel.
2. Product: Powell U.S. Bronze Gate Valves.
3. Substitutions: See Section 01600 - Product Requirements.

C. Gate Valves 3 Inches and Over:

1. AWWA C500, iron body, bronze trim, non-rising stem with square nut, single wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, mechanical joint or flanged ends as indicated, and cast iron valve box.
3. AWWA C515, ductile iron, bronze trim, non-rising stem with square operating nut, single ductile iron wedge, mechanical joint or flanged ends as indicated, and cast iron valve box.
4. Product: Mueller Gate Valves or Resilient Seat Gate Valves, or American Flow Control Series 2500 Resilient Seat Gate Valves; with appropriate type Pacific States Cast Iron Valve Box.

D. Ball Valves Up To 2 Inches:

1. Brass body, teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, compression inlet end, compression outlet, with control rod, valve key, and extension box.
2. Treat the Ball Valve and Handle to prevent moisture from metal causing corrosion.

E. Swing Check Valves from 2 Inches to 24 Inches:

1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.
2. Product: Mueller Swing-Type Check Valve.

F. Butterfly Valves from 2 Inches to 24 Inches:

1. AWWA C504, iron body, bronze disc, resilient replacement seat, mechanical joint or flanged ends as indicated, manual worm gear operator, and cast iron valve box where required.
2. Underground manual operators shall be totally enclosed, factory grease packed and sealed, bronze worm gear operators with self-locking gearing; stops shall be provided to prevent over travel of valve disc.
3. Valve operator shall be geared to close valves slowly. Number of turns to close valve from full open position shall be: 32 turns for 10-inch and smaller valves, 52 turns for 12-inch thru 16-inch valves, and 76 turns for 18-inch thru 24-inch valves. Closing times for larger valves must first be accepted by the City Engineer.
4. Product: Mueller "Lineseal III" Butterfly Valve with appropriate type Pacific States Cast Iron Valve Box.

G. Corporation Stops: shall be type for connecting to copper or polyethylene pipe; Mueller No. H- 15000 for up to 2-inch service line.

H. Air Release Valves: shall be combination air release valves; APCO Combination Air Release Valves, or of size indicated on the drawings.

2.5 SPRINKLER HEADS

A. Part Circle Rotor Pop-Up Sprinklers.

1. Part circle rotor pop-up sprinklers shall be a single nozzle gear drive type, capable of covering the design radius at the site pressure with a discharge rate as recommended by the manufacturer; and shall have an infinitely adjustable arc of coverage from 40° to 360°. Spacing design shall be based on a 10-20% reduction of manufacturer recommendation.
2. Sprinkler case shall be constructed of rugged ABS plastic. The internal assembly shall include water-lubricated gear drive, pressure-activated wiper seal, SAM check device and heavy duty screen. The rotation of the sprinkler shall be accomplished by a gear drive.
3. The sprinkler nozzle shall have an outlet trajectory of 25° from the horizontal, with adjustment screw.
4. The sprinkler shall have a heavy-duty stainless steel retract spring to ensure positive pop-down. Pop-up height shall be not less than 6 inches; and the inlet shall be one-inch (FNPT).
5. The sprinkler shall be constructed so that all internal parts, including inlet screen, are accessible through the top of the sprinkler case without disturbing the soil around the case. The sprinkler shall have a rubber cover and vandal resistant cover screws.
6. Sprinklers shall be Part Circle Rotor Pop-up Sprinklers, of the appropriate size and type, as manufactured by Rain Bird Sprinkling Mfg. Corporation, Hunter Industries.

B. Full Circle Rotor Pop-Up Sprinklers.

1. Full circle rotor pop-up sprinklers shall be a single nozzle gear drive type, except for Hunter I-40 Opposing Nozzles, capable of covering the design radius at the site pressure with a discharge rate as recommended by the manufacturer.
2. Full circle sprinklers shall have the same construction as the part circle sprinklers described above.
3. Sprinklers shall be Full Circle Rotor Pop-up Sprinklers, of the appropriate size and type, as manufactured by Rain Bird Sprinkling Mfg. Corporation or Hunter Industries.

C. Full/Part Circle Rotor Pop-Up Sprinklers.

1. Rotor pop-up sprinklers shall have full or part circle capabilities in one unit; and shall be a single nozzle, water lubricated, turbine drive type with internal impact speed reduction, capable of covering the design radius at the site pressure with a discharge rate as recommended by the manufacturer.
2. Part circle sprinkler shall have an infinitely adjustable arc of coverage from 25° to 350°. The sprinkler shall not reverse direction during continuous operation in the full circle mode. Arc adjustment shall not require any tools.
3. The sprinkler case shall be constructed of rugged ABS plastic. The sprinkler shall include a stainless steel locking set-screw at cap threads to provide vandal resistance and a "Seal-A-Matic" (SAM) device built onto the inlet screen shall hold back 8 feet of elevation change to prevent puddling. The sprinkler shall have a non-strippable drive mechanism and shall permit manual rotation of the pop-up stem; and shall have a pressure-activated, multi-function, soft elastomer wiper seal that positively seals against the nozzle flange to keep debris out of the rotor and to clean debris from the pop-up stem as it retracts. The sprinkler range nozzle shall have an outlet trajectory of 23° from the horizontal. The sprinkler shall have a screen attached to the drive housing to filter inlet water and prevent the nozzle from clogging.
4. Sprinklers shall have a heavy-duty stainless steel retract spring to ensure positive pop-down. Pop- up height shall be not less than 5 5/8-inch; and the bottom inlet shall be 3/4-inch (FNPT).
5. Sprinklers shall be constructed so that all internal parts, including inlet screen, are accessible through the top of the sprinkler case without disturbing the soil around the case. The sprinkler shall have a rubber cover and vandal resistant cover screws.
6. Sprinklers shall be Full/Part Circle Pop-up Rotor Sprinklers, of the appropriate size and type, as manufactured by Rain Bird Sprinkling Mfg. Corporation, Hunter Industries.

D. Sprinkler Types and Spacing.

1. Large Area Rotors: Hunter I-40 at ~~50~~ 45 foot maximum spacing.
2. Medium Area Rotors: Hunter I-20 at ~~35~~ 30 foot maximum spacing.
3. Spray Heads: Rainbird # 1806 for turf areas; # 1812 for shrub beds.
    a. East to west park strips: provide 120 percent coverage; 12 foot spacing typical, or 15' Nozzels.
    b. North to south park strips: provide 100 percent coverage; 15 foot spacing typical.
    c. Built in check valves required if elevation changes from one head to next head.
    d. No Adjustable Arc Nozzles, Fixed Arc Nozzles only.
    e. No MP Rotator Nozzles.
    ~~e.~~ f. Bottom inlet only

4. Drip Systems: Hunter PCN Nozzles, series bubbler nozzles placed adjacent to plants higher in grade to allow flow to root zones of the plant.
    a. Compatible with Pro Spray bodies or 1800 heads.
    b. No fixed risers for bubblers.
    c. Pop-Ups/spray head bodies with PCN bubbler nozzles.~~s with spray heads~~
5. Type of landscape areas will determine flow requirements.
    a. P.R.V., if needed, use an individual pressure regulating device, such as an accuset.

2.6 ELECTRIC CONTROL VALVES

A. Electric remote control valves shall be normally closed 24 VAC, 60 cycle, solenoid actuated globe pattern design capable of having a flow rate as required with a pressure loss not to exceed 1.5 psi. The valve pressure rating shall not be less than 200 psi.

B. Valve body and bonnet shall be constructed of heavy-duty glass-filled UV resistant nylon and have stainless steel studs and flange nuts; diaphragm shall be of nylon reinforced nitrile rubber.

C. Valve shall have both internal and external manual open/close control, for manually opening and closing the valve without electrically energizing the solenoid. The valve's internal bleed shall prevent flooding of the valve box.

D. Valves shall house a fully-encapsulated, one-piece solenoid. The solenoid shall have a captured plunger with a removable retainer for easy servicing, and a leverage handle for easy turning. The 24 VAC, 60 Hz solenoid shall open with 19.6 VAC minimum at 200 psi. At 24 VAC, average inrush current shall not exceed 0.41 amps.

E. Valves shall have a brass flow control stem for accurate manual regulation and/or shut off of outlet flow. The valve must open or close in less than one minute at 200 psi, and less than 30 seconds at 20 psi.

F. Valves shall have a self-cleaning stainless steel screen designed for use in dirty water applications.

G. Valve construction shall be such as to provide for all internal parts to be removable from the top of the valve without disturbing the valve installation.

H. Control valves shall be Electric Remote Control Plastic Scrubber Valves, of the appropriate size and type, as manufactured by Rain Bird Sprinkling Mfg. Corporation, Hunter ICV Control Valves with Filter Sentry.

2.7 QUICK-COUPLING VALVES

A. Quick-coupling valves shall be a 1" minimum one piece type; constructed on heavy cast brass. The cover shall be a durable, self-closing, and locking rubber cover. The valves shall be opened and closed by a brass key of the same manufacturer, having an appropriate outlet. The valve throat shall have a keyway with detent positions for regulating flow.

B. Quick-coupling valves shall be Model 3-RC, as manufactured by Rain Bird Sprinkling Mfg. Corp

2.8 CONTROL WIRE

A. Control wire shall be UF No. 14 gauge or larger; conforming to the requirement of Section 05123. For two wire systems, shall use Maxi-cable 14-2 paired 14 awg double jacketed wire. Control wire to be placed in ¾-1" conduit with sweep elbows into each valve box. For multiple wire pats, each path shall~~to~~ be colored differently. Polypipe is acceptable for two wire conduit.

2.9 SPRINKLING SYSTEM CONTROLLER

A. Sprinkling system controller shall be capable of fully automatic or manual operation of the system.

B. The controller shall operate on a 17 VAC, plus or minus 10%, power input; and be capable of operating four 24 VAC electric remote control valves per station. The controller shall have a reset circuit breaker to protect it from power overload.

C. The controller shall be constructed such that all internal parts are accessible through the controller door without disturbing the cabinet installation.

D. The controller shall be a WeatherTRAK ETPro3-~~0~~CH2o-~~0~~2W two-wire controller, of the appropriate size and type, and CWM enclosure (cold rolled steel coated wall mount). Other enclosure options include: SWM (Stainless Wall Mount), SPT (Heavy Duty Stainless pedestal), CWM-CPED (Light Duty Coated Pedestal).

~~D.~~E. The decoders shall be WeatherTRAK H2O-2, installed with each solenoid valve.

~~E.~~F. The enclosure for the controller shall be a combined 120/240 volt commercial meter socket with enclosure, as required.

1. The enclosure unit shall have a compact, double door, front and back design; to provide viewing and programming convenience.
    a. Construction shall be 100 percent stainless steel; finish shall be brushed stainless steel.
    b. The unit shall be weather and vandal resistant, NEMA TYPE 3R rated, with three-point locking system; and shall be UL listed.
    c. The unit shall have a 10-year limited warranty.
2. Meter section:
    a. UL listed, E.U.S.E.R.C. 308 accepted commercial meter socket, 100 amp rated, with test block bypass provision.
    b. Hinged viewing window to provide convenient access for metering agency.
    c. Shall include 100 amp load center with 8 positions.
    ~~c.~~d. Surge/line protection shall be WeatherTRAK WT2W-LSP. Line surge protection required for every five valves or 500 ft along the two-wire path.
3. The enclosures shall be Strong Box Metered Stainless Steel Combination Enclosure, Model SB- 24SS / 120/240 V, as required and as manufactured by V.I.T. Products, Inc.

2.10 MISCELLANEOUS ITEMS

A. Miscellaneous appurtenant items shall be provided as indicated on the drawings or as required to complete the sprinkler system.

2.11 PIPE BEDDING AND BACKFILL MATERIALS

A. Bedding: As specified in Sections 02112 and 02116.

B. Backfill: As specified in Sections 02112 and 02116.

2.12 ACCESSORIES

A. Service Clamps: shall be bronze, double-strap type; Mueller No. H-16134, for up to 2 inch service lines.

B. Concrete for Thrust Restraints: Concrete type specified in Section 03300.

C. Manhole and Cover: Refer to Section 02340.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall furnish all labor, materials and equipment as required to construct the complete automatic, underground sprinkling system, as described herein and as shown on the design drawings, as indicated on the submittal drawings; and shall furnish and install all supplementary and miscellaneous items, appurtenances, and devices incidental to or necessary for a workable and complete sprinkling system installation.

B. All material shall be installed according to the manufacturer's written instructions and recommendations.

C. The Contractor shall test the entire sprinkling system to assure proper operation prior to final inspection with City representation for systems check~~.~~

3.2 EXAMINATION

A. Verify that design drawings conform to project conditions.

B. Verify that existing water main sizes and locations are as indicated on the drawings.

3.3 PREPARATION

A. Cut pipe ends square, ream pipe ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges, mechanical joints or mechanical couplings.

3.4 TRENCHING

A. Trenching for the sprinkling system shall be done to ensure proper grades, slopes and alignment; and to provide minimum cover over main lines of 24-inches and 12-inches over laterals.

B. See Section 02112 and Sections 02115 and 02116 for additional requirements.

C. Hand trim excavation for accurate placement of pipe to elevations indicated.

D. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required area of thrust restraint bearing on subsoil as indicated on the drawings.

E. Backfill around sides and to top of pipe zone with pipe bedding material, tamp in place and compact to required density.

F. Backfill trench from top of pipe zone to top of trench with trench backfill material, tamp in place and compact to required density.

3.5 INSTALLATION - PIPE

A. Group piping with other piping work whenever practical, per City Standard LS-11.

B. Establish elevations of buried piping to ensure not less than 2 feet of cover over main lines and 12 inches over laterals; or as indicated on the drawings.

C. Install pipe to indicated elevation to within tolerance of one inch.

D. Install ductile iron piping and fittings to AWWA C600.

E. Install PVC pressure pipe and fittings to ASTM D2774.

F. Install pipe lines to line and grade indicated.

G. Install pipe to allow for expansion and contraction without stressing pipe or joints.

H. Slope water pipe and position drains at low points.

I. Install trace wire above top of PVC and PE pipe; coordinate with Section 02112.

3.6 INSTALLATION - VALVES

A. Set valves on concrete block.

B. Center and plumb valve box over valve operating nut. Set box cover flush with finished grade.

3.7 INSTALLATION - CONTROL VALVES

A. Install control valves where and as shown on the submittal drawings.

1. Each control valve shall have threaded unions installed immediately upstream and downstream of all valves.
2. Each control valve shall have its own isolation valve, immediately upstream of the first union. No “Action” ~~union~~ manifolds allowed. ~~or “Action” union ball valves.~~
3. Install only one control valve per rectangular box. Valve box to be Carsen Jumbo size, or approved equal by the City.
4. Use of male adapters are prohibited.

B. Set valves on concrete block.

C. Center and plumb valve boxes and brace over valves. Set box cover flush, not level, with finished grade. All valve lids to have label of the assigned zone number.

3.8 INSTALLATION - QUICK-COUPLING VALVES

A. Quick-coupling valves shall be installed where and as shown on the submittal drawings.

B. Quick-coupling valves are to be installed in the system to provide the Owner access so that the system can be winterized by blowing out the system with compressed air; therefore, the valves shall be located as indicated on the drawings.

3.9 INSTALLATION - AUTOMATIC CONTROLLER

A. The controller and remote control valves shall be ~~of the same manufacturer~~compatible, having similar operational and adjustment features.

B. The controller shall have a weatherproof panel enclosure; with the controller mounted on a pedestal, where and as indicated on the drawings; in such a manner that all normal adjustments can be conveniently made by the operator.

C. The controller shall be properly grounded in accordance with local codes.

D. Control wire shall be installed from the controller to all control valves and other equipment as required for proper operation of the sprinkling system.

3.10 WIRE AND ELECTRICAL WORK

A. Electrical control and ground wire shall be suitable for sprinkler control cable of sizes indicated on the drawings and as recommended by the manufacturer or supplier.

B. Use Type "UF", 600 volt, stranded or solid copper, single conductor wire, with PVC insulation and bearing UL-approved for direct underground burial, for connecting the automatic remote control valves to the automatic controller.

1. Use wire with 4/64-inch insulation, minimum covering of ICC-100 compound for positive weatherproofing protection.
2. 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.
3. Control or "hot" wires shall be red and all common or "ground" wires shall be white.

C. Make all connections with UL acceptance 3M DBRY-6 type seal to make a waterproof connection.

D. ~~Bury wires underneath main line pipe when in the same trench as the pipe.~~Verify that all wire types and installation procedures conform to NEC and local codes.

3.11 INSTALLATION - SPRINKLER HEADS

A. Flush the sprinkler system thoroughly to remove all foreign materials prior to the installation of sprinkler heads.

B. Install rotor pop-up heads with a swing joint connection, as indicated on the drawings.

1. All swing joints shall consist of three 90 degree Schedule 40 PVC street ells and Schedule 80 nipples with a minimum length of 12 inches.
2. Size of swing joint pipe and fittings shall be as shown on the drawings.

C. Install spray heads as indicated on the drawings.

3.12 BACKFLOW PREVENTER STATION

A. Provide Reduce Pressure Zone (RPZ) where and as indicated on the drawings; see Section 02586.

3.13 CONNECTIONS TO EXISTING WATER LINES

A. Connection to existing water lines shall be made where and as indicated on the drawings. The sizes of pipe, fittings, valves and appurtenant items required to make connection shall correspond to the sizes of existing pipe and of project pipe.

B. Excavate to existing pipe line at point of connection; determine actual conditions of existing pipe and all fittings and appurtenant items required to make the connection; and have all materials needed on site prior to any shut down or cutting into existing pipe lines.

C. Connections that involve cutting into existing pipe lines include: cutting and removing sections of existing pipe and fittings as required; cleaning and preparing ends of existing pipe as required for connection; furnishing and installing all new pipe, fittings and valves required to make the connection of project pipe to the existing pipe as indicated; and all appurtenant work required to complete the connection.

D. Connection into existing pipe lines under pressure include: furnishing and installing mechanical joint tapping sleeve of the appropriate size on the existing pipe at point of connection; furnishing and installing tapping valve, with valve box, on sleeve; tapping existing pipe with drilling machine and equipment, without interrupting flow in existing pipe line; and all appurtenant work required to complete the connection.

E. Connection to existing pipe line shall be made at such times and within the time limits and according to the directions as agreed to between the Contractor and the City Engineer.

3.14 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Pressure test water piping to 1.25 times pipe line working pressure in psi.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to City.

3.15 OPERATIONAL TESTING

A. Provide the City Engineer or City Inspector with seven days written notice of sprinkling operational system test.

B. Test shall consist of the operation of the entire system through one cycle of controller for propose of checking coverage and assuring of absence of leaks.

1. Repair water lines, valves, or connections which show evidence of leakage.

C. After all repairs or replacements have been made and accepted by the City Engineer or City Inspector, repeat the above required test.

END OF SECTION

SECTION 02725

RESTORING WETLANDS AREAS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Restoration of wetlands areas.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

1.3 REFERENCES

A. Standards of Official Seed Analysis of North America.

1.4 DEFINITIONS

A. Weeds: Includes Cheatgrass (Bromus Tectorum), Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel and Phragmites.

1.5 SUBMITTALS

A. See appropriate sections of the Contract Documents for submittal procedures.

B. Certification: Submit certification of grass species and location of seed source.

1.6 QUALITY ASSURANCE

A. Seed Vendor: Company specializing in seed with minimum five years' experience, and certified by the State of Utah.

B. Installer Qualifications: Company accepted by the seed vendor.

1.7 REGULATORY REQUIREMENTS

A. Comply with the requirements of the U.S. Army Corps of Engineer for work within wetlands areas.

B. Comply with regulatory agencies for fertilizer and herbicide composition.

C. Provide certificate of compliance from authority having jurisdiction indicating acceptance of fertilizer and herbicide mixture.

PART 2 PRODUCTS

2.1 MATERIALS

A. Wetlands Seed Mix.

1. Seed Mix. Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by the Association of Seed Analysis of North America. Provide seed of species, mechanically premixed to the specified proportions, with minimum percentages of purity, germination and maximum percentages of weed seed as certified. Seed Mix shall be a blend of the listed seeds, as supplied by Granite Seed Company of Lehi, Utah.
2. Standards. Seed mix shall comply with “Standards of Official Seed Analysis of North America”; for 85% purity, 80% germination and 1% (maximum) weed seed.
3. Submit seed vendor's certified statement for each seed mixture required; stating botanical and common name, percentage by weight, and percent of purity, germination and weed seed for each seed species.
4. Provide Wetland seed mix of the following species and with proportions as accepted by the Corps of Engineers:
    a. Nebraska Sedge (Carex nebrascensis)
    b. Baltic Rush (Juncus balticus)
    c. Redtop (Agrostic alba)
    d. Garrison Creeping Foxtail (Alopecurus Arundinaceus)
5. Sow the seed mix in quantities to provide pure, live seed at the coverage rate of 20 pounds per acre.
6. Delivery. Seed shall be delivered to the site in original unopened containers, bearing the dealer’s guaranteed analysis and germination percentage and a certificate or stamp or release by a County agriculture commissioner.

B. Fertilizer: Recommended for seed mix, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated by analysis.

C. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

2.2 TESTS

A. Provide analysis of topsoil fill under provisions of Section 01400.

B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.

C. Testing is not required if recent tests within six months are available for imported topsoil. Submit these test results to the testing laboratory for acceptance. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this section.

3.2 PREPARATION

A. Prepare sub-grade in accordance with Section 02112.

B. Place topsoil, where required, in accordance with Section 02112 and Section 02100.

3.3 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to seeding.

C. Apply fertilizer no more than 48 hours before installing erosion control mat and seeding.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.4 RESTORATION OF WETLANDS AREAS

A. Restore existing wetlands areas that are disturbed or damaged by project trenching operations or structural excavations, as indicated on the drawings. Wetlands areas shall be as classified by the U.S. Army Corps of Engineers, following field reconnaissance and testing; and shall be to the limits designated by the City Engineer.

1. Restoration shall be done according to the wetlands permit included with the accepted project drawings.
2. Remove the top 2 feet of top soil material and store separately from other excavated material.
3. After the lower portions of trench or excavations are backfilled with acceptable materials and compacted, the stockpiled top soil material shall be placed in the upper portion of the trench or excavations and compacted.
4. Top of restored top soil shall match adjacent ground surfaces.
5. Restoration of wetlands areas shall include preparation of seedbeds and seeding the areas to be restored.
6. Condition of restored wetlands areas shall match original conditions.

B. Planting.

1. Preparation.
    a. Till area to be planted to a depth of not less than 4 inches prior to seeding; and to a homogeneous mixture of fine texture, free of lumps and clods.
    b. Grade planting areas to provide smooth, even surfaces with a loose, uniformly fine texture. Roll and rake and remove ridges and fill in depressions as required.
    c. Moisten prepared areas by sprinkling before planting, if soil is dry. Water thoroughly and allow surface to dry off before planting. Do not create muddy soil condition.
2. Seeding.
    a. Seed shall be applied by hydraulic method with a hydro-seeder at the coverage rate recommended by the seed vendor. Seeding may be done using spreader or seeding machine, at the rate indicated and as recommended by the seed vendor. Do not use wet, moldy or damaged seed.
    b. Distribute seed evenly over entire area by sowing equal quantities in two opposite directions.
    c. Seeding shall not be performed when the wind velocity exceeds 5 miles per hour, or is determined detrimental to the uniform distribution of seed.

3. All materials must be available for inspection prior to application.
4. Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.
5. All landscaping will be covered by a warranty for a period of one year.
    a. Seeded Areas. At the end of the warranty period, seeded areas shall have 70 percent coverage of full, established growth; free of all noxious weeds.
    b. At end of warranty period, replant areas showing root growth failure, bare or thin spots, and eroded or settled areas within 10-days of written notice. Plant with materials of like kind and size, planted in the next growing season, with a new warranty commencing on the date of planting. All corrective work will be at no additional cost to the Owner.

END OF SECTION

SECTION 02726

LANDSCAPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparation of subsoil.

B. Fertilizing.

C. Seeding

D. Maintenance.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

B. Section 02100- Roadway and General Excavation: Slopes protection and topsoil placement.

1.3 REFERENCES

A. Standards of Official Seed Analysis of North America.

B. ANSI Z60.1, American Standard for Nursery Stock.

1.4 DEFINITIONS

A. Weeds: Includes Cheatgrass (Bromus Tectorum), Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Phragmites.

1.5 SUBMITTALS

A. See appropriate sections of the Contract Documents for submittal procedures.

B. Certification: Submit certification of grass species and location of seed source.

C. Maintenance Data: Include maintenance instructions, cutting method and maximum height; types, application frequency and recommended coverage of fertilizer.

D. NOI permit and Erosion Control Plan per section 01700.

1.6 QUALITY ASSURANCE

A. Seeds.

1. Vendor: Company specializing in supplying seed with a minimum five years' experience, and certified by the State of Utah.

2. Installer Qualifications: Company accepted by the seed vendor.

B. Trees and Shrubs.

1. Vendor: Company specializing in growing and cultivating trees and shrubs with a minimum five years' experience, and certified by the State of Utah.

2. Installer Qualifications: Company specializing in installing and planting trees and accepted by tree supplier.

1.7 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating acceptance of fertilizer and herbicide mixture.

1.8 MAINTENANCE AND SERVICE

A. Furnish service and maintenance of seeded or sodded areas prior to acceptance onto warranty as well as up to the end of warranty when applicable. Seeded areas shall have a 100 percent coverage of full, established growth, free of all weeds, prior to acceptance onto warranty.

PART 2 PRODUCTS

2.1 MATERIALS

A. Lawn Seed.

~~A.~~1. Seeded area is to be irrigated, maintained, and kept weed free by the contractor until the turf is fully established with a root depth of 4 inches before acceptance by the City and/or start of the ~~it enters~~ warranty period per the City's land development code.

~~1.~~2. Lawn Grass Mix. Lawn grass seed shall be fresh, clean, new crop seed; mechanically premixed to the specified proportions. Lawn grass seed shall be a blend of the following seeds: Kentucky Bluegrass, 80%, Rye Grass, 20%; planted at a rate of 3.0 pounds per 1000 square feet.

~~2.~~3. Standards. Grass seeds shall comply with "Standards of Official Seed Analysts of North America," published by the Association of Official Seed Analysts, most recent edition; for 85% purity, 80% germination and 1% (maximum) weed seed (68% PLS).

~~3.~~4. Delivery. Seed shall be delivered to the site in original unopened containers, bearing the dealer's guaranteed analysis and germination percentage and a certificate or stamp or release by a County agriculture commissioner.

~~4.~~5. Seed to be applied by hydraulic method shall be mixed with wood fiber mulch, fertilizer and polymer at 50 pounds per 100 square feet.

~~5.~~6. Fertilizer: Recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated by analysis.

~~6.~~7. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

B. Trees: Shall be Grade A trees of the type acceptable to the City Engineer; with deciduous 2 ½" caliper, ornamental 1 ½" caliper, and evergreen 6' tall. Trees shall be grown in climatic

conditions similar to those in locality of the Work; with branching, configuration and cane requirements as indicated in ANSI Z60.1, American Standard for Nursery Stock. Provide trees of normal growth and uniform heights, according to the species, with straight trunks and well developed leaders, laterals and roots. Provide legible labels attached to tree indicating botanical genus, species, and size. The following trees are acceptable to the City of Saratoga Springs for Landscaping Dedicated to the City, other trees may be considered on a case by case basis:

Recommended Tree & Plant Palate

PUBLIC PLANTING						
	SPECIFIC NAME (BOTANICAL)	**TYPE**	**SIZE** (H X SPREAD)	**PATTERN**	**PRODUCE/ COLOR IN BLOOM**	**SPECIAL INSTRUCTIONS**
Large Shade Trees > 50 ft	Bloodgood London Plane Tree *(Platanu Acerifolia 'Bloodgood')*		60' x 60'	Allee Regular Clustered	1/3" berry/ N/A	Tolerates Salt, Yellow fall color
	Bur Oak* *(Quercus Macrocarpa)*		60' x 60'	Allee Regular	Nut/ N/A	Tolerant of Urban conditions, soil adaptable
	Sycamore Maple *(Acer psuedoplatanus)*		60' x 40'	Allee Regular	Samara/ N/A	Tolerates alkaline and salt conditions
	Silver Linden* *(Tilia Tomentosa)*		60' x 40'	Allee Regular Clustered	N/A / Yellow green	Green leaf surface, silver underside. Tolerant of heat/drought.
	Expresso Kentucky Coffee Tree *(Gymnocladus dioica 'Expresso')*		60' x 40'	Allee Regular Clustered	1/3" berry / N/A	Tolerates wide range of conditions/salt
	Emerald Queen Norway Maple* *(Acer platanoides 'Emeral Queen')*		50' x 40'	Allee Regular Clustered	Smara/ N/A	Tolerant of Urban conditions, soil adaptable
	Accolade Hybrid Elm *(Ulmus x "Accolade')*		50' x 40'	Allee Regular	Samara / N/A	Pollution/ Salt/ drought tolerant
	Crimson King Maple *(Acer Platanoides 'Crimson King')*		45' x 40'	Allee Regular Clustered	Samara/ N/A	Well adapted to extremes in soils. Withstands hot, dry condition.
	Magyar Maidenhair Tree* *(Ginko Biloba 'Magyar')* **Male Species Only**		50' x 30'	Regular, Clustered	N/A / N/A	Tolerates high ph, salt, urban conditions. Excellent yellow fall color.
	Catalpa *(catalpa speciosa)* **Podless Only**		50' x 30'	Allee Regular Clustered	White	Attractive flower, withstands dry, alkaline conditions.
	Austrian Pine *(Pinus nigra)*		50' x 30'	Clustered	Cone	Can withstand urban conditions and alkaline soils.
	Scotch Pine *(Pinus sylvestris)*		40' x 30'	Clustered	Cone	Can withstand urban conditions and alkaline soils.
	Cottonwood *(Populus sargentii)* **cottonless variety**		80' x 50'	Regular	N/A / N/A	Great fall color. Tolerant of poor soils/salt/drought

	English Columnar Oak *(Quercus robur "fastigiata')*		60' x 15'	Allee Regular Clustered	Acorn/ Red	Prefers well drained soil and alkaline conditions.

*Indicates trees suitable for parkstrips

PUBLIC PLANTING						
	SPECIFIC NAME (BOTANICAL)	**TYPE**	**SIZE** (H X SPREAD)	**PATTERN**	**PRODUCE/ COLOR IN BLOOM**	**SPECIAL INSTRUCTIONS**
Medium Shade Trees 45 ft to 50 ft	Queen Elizabeth Hedge Maple *(Acer Campestre 'Queen Elizabeth")*		45' x 45'	Regular Clustered	N/A / N/A	Pollution/salt/ drought tolerant
	Rocky Mountain Juniper (*Juniperus scopulorum*)		40' x 15'	Regular Clustered	Cone / N/A	Drought tolerant/native
	Shangri-La Maidenhair Tree* (*Ginko biloba 'Shangri-la'*)		45' x 25'	Allee Regular Clustered	Seed / N/A	Males should be planted, excellent yellow fall color
	Armstrong Maple* (*Acer freemanii)*		45' x 15'	Allee Regular Clustered	Samara / N/A	Distinctly upright, soil adaptable
	Common Hackberry* (*Celtis occidentalis*)		40' x 30'	Regular Clustered	1/3" Berry / N/A	Tolerates drought/pollution/poor soils/ salt
	Little Leaf Linden* (*Tilia cordata*)		40' x 25'	Allee Regular Clustered	N/A / Yellow green	Tolerant of urban conditions, soil adaptable
	Sensation Box Elder* *(Acer negundo 'Sensation')*		30' x 30'	Allee Regular Clustered	Samara / N/A	Tolerant of urban conditions/ poor soils/ salt
	Thornless Honeylocust* *(Gleditsia triacanthos var. inermis)*		30' x 25'	Regular Clustered	Samara / N/A	Brilliant red fall color
	Gamble Oak *(Quercus gambelii)*		25' x 20'	Clustered	Acorns / N/A	Native/great red fall color/
	Big Tooth Maple *(Acer grandidentatum)*		30' x 20'	Clustered	Samara / N/A	Great red fall color/requires well drained soil
	Sky Rocket Juniper *(Juniperus scopulorum 'Skyrocket')*		20' x 3'	Allee Regular Clustered	Cones / N/A	Drought tolerant/withstands alkaline conditions
	Frontier Elm *(Ulmus x 'frontier')*		30' x 25'	Allee Regular Clustered	N/A / N/A	Resistant to Dutch Elm disease

*Indicates trees suitable for parkstrips

PUBLIC PLANTING						
	SPECIFIC NAME (BOTANICAL)	**TYPE**	**SIZE** (H X SPREAD)	**PATTERN**	**PRODUCE/ COLOR IN BLOOM**	**SPECIAL INSTRUCTIONS**
Small Shade Trees <25 ft	Service Berry *(Amelanchia sp.)*		25’ x 20’	Regular, Clustered	Nut/ White	Cream white fragrant flower, tolerates poor soils.
	Tatarian Maple * *(Acer Tataricum)*		25’ x 20’	Clustered	Samara / N/A	Tolerates cold, drought, high ph soils. Excellent red fall color.
	Lavalle Hawthorn* *(Crataegus x lavallei)*		25’ x 20’	Clustered	1/2” berry (persistent) white	Bronzy or coppery-red fall color with bright red persistent berries into winter.
	Canada Red Chokecherry *(Prunus virginiana ‘Canada Red’)*		25’ x 20’	Allee, Regulalr, Clustered	1/3” berry white	Soil adaptable, tolerant of urban conditions, very attractive foliage.
	Amur Maackia *(Maackia amurensis)*		20’ x 20’	Allee, Regular, Clustered	1/3” berry / white	Bronzy or coppery-red fall color with bright red persistent berries into winter.
	Flowering Plum *(Prunus cerasifera ‘Thundercloud’)*		20’ x 15’	Allee, Regular, Clustered	N/A / pink flowers	Purple leaf. Tolerant of urban conditions.
	Crabapple *(Malus ‘Indian Magic’)*		20’ x 20’	Allee, Regular, Clustered	Orange berry/ Deep pink blossoms	Persistent fruit. Tolerates urban conditions.
	Crabapple *(Malus ‘prairifire’)*		20’ x 20’	Allee, Regular, Clustered	Red berry/ Red Blossoms	Persistent fruit. Tolerates urban conditions.

*Indicates trees suitable for parkstrips

PUBLIC PLANTING						
	SPECIFIC NAME (BOTANICAL)	**TYPE**	**SIZE** (H X SPREAD)	**PATTERN**	**PRODUCE/ COLOR IN BLOOM**	**SPECIAL INSTRUCTIONS**
Hedge	Karl Foerster Feather Reed Grass *(Calamagrostis x acutiflora ‘Karl Foerster’)*		4’	Formal Massing	Seed heads/ White/Gold	Very attractive as a hedge in formal massings
	Blue Mist Spirea *(Caryolteris x clandonenesis)*		3 – 5’	Formal Massing	N/A / Blue/Purple	Flowers in summer/early fall
	Rubber Rabbit Brush *(Chrysothamnus nauseosus)*		4’	Informal Grouping	N/A / Yellow	Yellow fall cover/seeds and cover for birds
	Red Osier Dogwood (*Cornus sericea*)		8 – 15’	Informal Grouping	White berries / White	Attractive winter red twigs
	Hedge Cotoneaster *(Cotoneaster lucida)*		4 – 6’	Informal Grouping	Black berries / White	Dark green lustrous leaves in summer
	Mormon Tea *(Ephedra nevadensis)*		2 – 4’	Informal Grouping	N/A / N/A	Drought tolerant/evergreen
	Forsythia (*Forsythia*)		4 – 6’	Formal Massing	N/A / Yellow	Early spring flowers are powerful in large massing

	Rose of Sharron *(Hibiscus syriacus)*		6 – 12’	Formal Massing	N/A / White/Pink/ Purple/Blue	Showy flowers in summer
	Utah Honeysuckle (*Lonicera utahensis*)		3 – 5’	Formal Massing	Small red berries / white	Traditional pioneer plant
	Maiden Hair Grass (*Miscanthus sinensis*)		6’	Formal Massing	Seed heads / Bronze/Purple	Very attractive as a hedge in formal massings.
	Heavy Metal Switch Grass *(Panicum virgatum ‘Heavy Metal’)*		5’	Formal Massing	Seed heads / gold	Upright/stiff habit
	Mock Orange *(Philadelphus coronarius)*		8’	Formal Massing	N/A / White	Traditional pioneer plant, fragrant flowers
	Purple Leaf Sand Cherry (*Prunus x cistena*)		8’	Formal Massing	N/A / White	Red/purple leaves
	Squawbush Sumac (*Rhus trilobata*)		4 – 6’	Informal Grouping	Small red pubescent berries / White	Excellent red fall color
	Golden Currant (*Ribes aureum*)		3’	Formal Massing	Yellow spring berries / Yellow	Red fall color/fruit for birds
	Wild Rose (*Rosa woodsii*)		2 – 6’	Informal Grouping	Rosehips / Pink/magenta	Drought tolerant
	Sutherland Gold Elderberry *(Sambucus racemosa ‘Sutherland Gold’)*		8’	Formal Massing	Red/Black berries / White	Edible fruit/attractive yellow foliage
	Snow Berry *(Symphoricarpas alba)*		3’	Informal Grouping	White berries / White	Showy white berries
	Amur Maple (*Acer ginnala*)		10’ - 20’	Formal Massing	Samara / N/A	Excellent Red Fall Color
	Utah Serviceberry *(Amelanchier utahensis)*		6 – 15’	Informal Grouping	Red/purple/ black pome / White	Important food source for wildlife
	Boxwood *(Buxus sempervirens)*		2 – 4’	Formal Massing	N/A / N/A	Evergreen shrub
	River Birch *(Betula occidentalis ‘font clump’)*		15 – 20’	Informal Cluster	Catkin / N/A	Wet conditions/ Attractive red bark
	Hicks Yew *(Taxus x media)*		4 – 10’	Formal Massing	N/A / N/A	Evergreen shrub
	American Cranberry Bush Viburnum (*Viburnum trilobum ‘Bailey Compact’*)		4’	Formal Massing	N/A / N/A	Rounded formal habit

*Indicates trees suitable for parkstrips

PUBLIC PLANTING						
	SPECIFIC NAME (BOTANICAL)	**TYPE**	**SIZE** (H X SPREAD)	**PATTERN**	**PRODUCE/ COLOR IN BLOOM**	**SPECIAL INSTRUCTIONS**
Ground Cover	Bugleweed *(Ajuga)*		4”	Formal Massing	N/A / Blue/ purple	Many cultivars are well adapted to region.
	Basket of Gold *(Alyssum)*		8” to 12”	Informal Grouping	N/A / Yellow Flower	Early spring bloomer
	Compinkie Rockcress *(Arabis alpine ‘Compinkie’)*		6”	Informal Grouping	N/A / Deep Rose	Evergreen foliage
	Kinnikinnik *(Arctostaphylos uva ursi)*		6” to 8”	Informal Grouping	Red Berries/ N/A	Evergreen, excellent red fall color.
	Rockcress *(Aubrieta)*		4” to 6”	Formal Massing	N/A / Magenta	Drought tolerant once established.
	Chocolate Flower *(Berlandiera lyrata)*		18”	Informal Grouping	N/A / Yellow	Drought tolerant once established.
	Poppy Mallow *(Callirhoe involucrata)*		2” to 4”	Informal Grouping	N/A / Magenta	Aggressive spreader. Attractive when paired with Berlandiera
	Snow in Summer *(Cerastium arvense)*		4” to 6”	Formal Massing	N/A / White	
	Dwarf Tickseed *(Careopsis ‘nana’)*		6” to 8”	Formal Massing	N/A / Gold	Late spring bloomer.
	Hardy Ice Plant *(Delosperma)*		4” to 6”	Informal Grouping	N/A / Varies	
	Yarrow *(Achillea millefolium)*		2’ x 2’	Informal Massing	N/A / Yellow Flowers	Drought tolerant.
	Sulphur Flowers *(Eriogonum umbrellatum aureun)*		5”	Informal Grouping	N/A / Yellow	Summer bloomer
	Goblin Blanket Flower *(Gaillardia ‘Goblin’)*		12”	Informal Grouping	N/A / Yellow/Red	Heavy reseeder
	Mountain Boxwood *(Pachistima myrsinides)*		8”	Informal Grouping	N/A / N/A	Evergreen
	Sedum *(Sedum)*		4” to 12”	Informal Grouping	N/A / Varies	Many cultivars are well adapted to region
	Scarlet Globemallow *(Sphaeralcea coccinea)*		6” to 12”	Informal Grouping	N/A / N/A	
	Lambs Ear *(Stachys Byzantine “Helen Von Stein’)*		8” to 10 “	Informal Grouping	N/A / Rose-purple	
Small Shrub	Silvermound Sage *(Artemesia schmidtiana)*		10” to 12”	Formal Massing	N/A / N/A	Uniform Mounding shape
	Black Sage *(Artemisia nova)*		18”	Informal Grouping	N/A / N/A	Drought tolerant once established.

	Creeping Potentilla *(Potentilla neumanniana)*		12”	Formal Massing	N/A / Yellow	Slow growing creeping form
	Dwarf Mugo Pine *(Pinus Mugo Mops)*		3’ x 3’	Formal Massing	Cone/ N/A	Evergreen
Perennial	Blue Flax		15”	Formal Massing	N/A / Blue	Heavy reseeder

*Indicates trees suitable for parkstrips

2.2 TESTS

A. Provide analysis of topsoil fill under provisions of Section 01400.

B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.

C. Testing is not required if recent tests are available for imported topsoil. Submit these test results to the testing laboratory for acceptance. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this section.

3.2 PREPARATION

A. Prepare sub-grade in accordance with Section 02116.

B. Place topsoil where required.

C. Top of sod or soil to be one-inch below edge of sidewalks, curb & gutter, ball courts, mow strips and other concrete surfaces.

D. Place topsoil to the following compacted thicknesses:

a. Areas to be seeded with grass: 6 inches.
b. Areas to be sodded: 4 inches.
c. Areas for shrub beds: 18 inches.
d. Areas for flower beds: 12 inches.

3.3 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to seeding.

C. Apply fertilizer no more than 48 hours before installing erosion control mat and seeding.

D. Lightly water to aid the dissipation of fertilizer.

3.4 PLANTING SEED

A. Seeding.

~~A.~~ Turf only. Seeded area is to be irrigated, maintained, and kept weed free by the contractor until the turf is fully established with a root depth of 4 inches prior to acceptance by the City and/or prior to start of the warranty period per the City's land development code.

1. Landscaped Areas. Landscaped areas shall be seeded with grass seed and sod, as required, as described herein.

B. Seeding shall not be performed when the wind velocity exceeds 5 miles per hour, or is determined detrimental to the uniform distribution of seed.

C. Till areas to be planted to a depth of not less than 4-inches prior to seeding.

D. Grade planting areas smooth, even surface with a loose, uniformly fine texture. Roll and rake and remove ridges and fill in depressions as required.

E. Moisten prepared seeding area by sprinkling to a depth of six inches before planting; the area shall be surface dry at the time of application. Do not create a muddy soil condition.

F. Seed shall be applied by hydraulic method with a hydro-seeder at the coverage rate recommended by the seed vendor. Seed may be applied by broadcast or drilled method at the recommended coverage by the seed vendor.

G. Seeded areas shall have a 100 percent coverage of full, established growth that is free of all weeds.

H. Rate of Application.

1. Lawn Grass seed mix shall be applied at rate of ~~3~~ 4 pounds per 1000 square feet.

I. All materials must be available for inspection prior to application.

J. Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.5 PLANTING TREES

A. Trees. Trees shall be planted where accepted by the City.

B. Trees shall be planted during normal planting season.

1. Excavate only for depth of root ball. The excavated area for tree planting shall be at least two times the diameter of the root ball, or as recommended by the supplier.
2. Place trees for final orientation review by the City Engineer prior to backfilling the root ball.
3. Installation of trees shall be done according Drawing No. LS-13; and as recommended by the supplier. Backfill material shall be acceptable to the supplier and inspected and accepted by the City Inspector.

4. After installation, trees shall be pruned as required, complying with ANSI A300.
5. Trees shall be protected as recommended by the supplier.

3.6 LANDSCAPED AREAS

A. Landscaped areas that are to be covered with landscaping bark, rocks or other materials, shall be treated with herbicide to kill weeds to control weed growth.

B. Landscaped areas shall be watered with the most efficient type sprinkler system available that meets all other City specifications.

C. Landscaped areas shall have a 100 percent coverage free of all weeds. Prior to acceptance, areas showing root growth failure, bare or thin spots, and eroded or settled areas shall be replanted. Plant with materials of like kind and size. All corrective work will be at no additional cost to the Owner.

3.7 MAINTENANCE REQUIREMENTS FOR LANDSCAPED AREAS DURING WARRANTY PERIODS

A. Turf.

1. General: Maintain seeded areas prior to acceptance as well as through the warranty period when applicable. Supply additional topsoil, where necessary, including areas affected by erosion or settlement.
2. Watering: Water to ensure uniform seed germination and to keep surfaces of soil damp. Apply water slowly so soil will not puddle or crust.
3. Fertilizing:
    a. Fertilize during planting; and two weeks after planting.
    b. Fertilize formulation to be determined from soil analysis taken yearly.
4. Mowing:
    a. Cut lawn grass for the first time when it reaches a height of 3-inches.
    b. After first mowing, water to moisten soil from 3-inches to 5-inches deep.
    c. After first mowing, mow on a 7-day cycle, preferably on Thursdays or Fridays.
    d. Use string trimmers on all hardscape edging, posts, utilities, etc. on the same day as mowing.
    e. Use metal blade edgers against concrete/turf areas one time per month.
5. Grading: Roll when required to remove minor depressions or irregularities.
6. Control Growth of Weeds: Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
    a. Apply 2-4-D chemical for control of broadleaf weeds. Apply when conditions are most beneficial for control of weeds, usually mid-April and mid-September.
7. Reseeding: Immediately replace seed to areas which show deterioration or bare spots.
8. Protection: Protect seeded areas with warning signs during maintenance period. When necessary, erect temporary fences or barriers to control pedestrians.
9. Turf areas shall have 100 percent coverage of full, established growth that is free of all weeds.

B. Trees.

1. General: Maintain trees prior to acceptance as well as through the warranty period when applicable. Supply additional top soil where areas have been affected by erosion or settlement.
2. Maintain tree health immediately after planting. Trim only dead or broken branches; remove clippings and dead branches from the site. Control diseases.
    a. ~~Prune dead and broken branches only during first year. For deciduous trees, remove branches less than 5 feet above grade during the second year.~~
3. Watering:
    a. After planting, keep ground continuously moist until healthy growth is established.
    b. Thereafter, deep root water trees two times per month during first year of establishment.
    c. Deep root watering is required for coniferous trees during winter months.
4. Weeding: Uproot and remove weeds completely. Do not allow growth and germination of weed seeds. Fill in large holes caused by weeding with top soil and rake smooth.
    a. Maintain weed free tree rings with 3-inch mulch depth. Tree rings to have 2 foot radius.
5. Protection: Protect trees against traffic by erecting temporary barriers and warning signs. Replant damaged trees.
6. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep wire tight. Repair or replace accessories where required.

C. Aeration. Aerate turf areas a minimum of two times per year; in the spring and in the fall. Core aerate; leave cores and break up if needed.

D. Irrigation System.

1. Repair all breaks immediately.
2. Perform weekly inspections and make needed adjustments.
3. Make seasonal adjustments to controllers as needed.

E. Erosion and Settlement. Repair trench settling, ruts, and rivulets caused by mowing equipment, irrigation and/or precipitation immediately.

3.8 WARRANTY

A. All landscaping will be covered by a warranty for a period of one year.

B. Seeded Areas. At the end of the warranty period, seeded areas shall have a 100 percent coverage of full, established growth; free of all noxious weeds, as defined in this section's definitions.

1. At end of warranty period, replant areas showing root growth failure, bare or thin spots, and eroded or settled areas within 10-days of written notice. Plant with materials of like kind and size, planted in the next growing season, with a new warranty commencing on the date of planting. All corrective work will be at no additional cost to the Owner.

C. Trees. Warranty for trees shall include death, unhealthy conditions, or if trees die from poor planting practices. Replace any unsatisfactory or dead tree within 10-days of written notice. Provide replacement trees of same size and species, planted in the next growing season,

with a new warranty commencing on the date of planting. All corrective work will be at no additional cost to the Owner.

END OF SECTION

SECTION 02727

RESTORING NATIVE AREA

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparation of subsoil.

B. Fertilizing.

C. Seeding

D. Maintenance.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

1.3 REFERENCES

A. Standards of Official Seed Analysis of North America.

B. ANSI Z60.1, American Standard for Nursery Stock.

1.4 DEFINITIONS

A. Weeds: Includes Cheatgrass (Bromus Tectorum), Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Phragmites.

1.5 SUBMITTALS

A. See appropriate sections of the Contract Documents for submittal procedures.

B. Certification: Submit certification of grass species and location of seed source.

C. Maintenance Data: Include maintenance instructions, cutting method and maximum height; types, application frequency, and recommended coverage of fertilizer.

1.6 QUALITY ASSURANCE

A. Seeds.

1. Vendor: Company specializing in supplying seed with a minimum five years' experience, and certified by the State of Utah.
2. Installer Qualifications: Company accepted by the seed vendor.

B. Trees and Shrubs.

1. Vendor: Company specializing in growing and cultivating trees and shrubs with a minimum five years' experience, and certified by the State of Utah.
2. Installer Qualifications: Company specializing in installing and planting trees and accepted by tree supplier.

1.7 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating acceptance of fertilizer and herbicide mixture.

1.8 MAINTENANCE SERVICE

A. Furnish service and maintenance of seeded or sod areas up to the end of warranty.

PART 2 PRODUCTS

2.1 MATERIALS

A. ~~Restoring Native Grass Seed.~~BioNative Sod.

1. ~~Native Grass Mix. Native grass seed shall be fresh, clean, new crop seed; mechanically premixed to the specified proportions. Native grass seed shall be a blend of the following seeds:~~BioNative sod supplied from BioGrass Sod Farms, Inc. or equivalent sod comprised of Idaho Bentgrass seed, and Utah native wheat grass seed; Streambank Wheatgrass, Western Wheatgrass and Thickspike Wheatgrasss with 98% purity and grown in with NanoGro fertilizer for thicker density and establishment.

~~1.~~

~~TYPE 2: Grass Mix (Tall)~~		~~%~~	
~~Quick Guard (Sterile tricale hybrid)~~		~~21.74%~~	
~~Crested Wheatgrass (Agropyron cristatum)~~		~~15.21%~~	
~~Slender Wheatgrass (Agropyron trachcaulum)~~		~~19.57%~~	
~~Bluebunch Wheatgrass (Agropyron spicatum)~~		~~13.04%~~	
~~Intermediate Wheatgrass (Agropyron intermedium)~~		~~13.05%~~	
~~Green Needlegrass (Stipa virdula)~~		~~5.43%~~	
~~Western Wheatgrass (Agropyron smithii)~~		~~5.44%~~	
~~Sheep Fescue (Fesctuca Ovina)~~		~~3.48%~~	
~~Sandberg Bluegrass (Poa sandbergii)~~		~~2.61%~~	
~~Sand Dropseed (Sporobolus Crytandrus)~~		~~0.43%~~	
~~Totals~~		~~100.00%~~	

TYPE 3: Grass Mix (Short)	BROADCAST	%	
Blue Grama (Bouteloua gracilla)	4.0	30.77%	
Sheep fescue (festuca ovina)	5.0	38.46%	
Sandberg Bluegrass (Poa sandbergii)	4.0	30.77%	
Totals	13.0	100.00%	

2. Standards. Grass seeds shall comply with "Standards of Official Seed Analysts of North America," published by the Association of Official Seed Analysts, most recent edition; for 85% purity, 80% germination and 1% (maximum) weed seed (68% PLS).

3. Delivery. Seed shall be delivered to the site in original unopened containers, bearing the dealer's guaranteed analysis and germination percentage and a certificate or stamp or release by a County agriculture commissioner.

4. Seed to be applied by hydraulic method shall be mixed with wood fiber mulch, fertilizer and polymer at 50 pounds per 100 square feet.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this section with no existing weeds.

3.2 PREPARATION

A. Prepare sub-grade in accordance with Section 02116.

B. Place topsoil where required. Surface must be free of rock greater than 3 inches in diameter and free of trash and debris.

3.3 PLANTING SEED

A. Seeding.

1. Off-Site Restoration. All off-site work through areas that are covered with native grasses shall be reseeded with native grass seed, as required, as described herein.

B. Seeding shall not be performed when the wind velocity exceeds 5 miles per hour, or is determined detrimental to the uniform distribution of seed.

C. Till areas to be planted to a depth of not less than 4-inches prior to seeding.

D. Grade planting areas smooth, even surface with a loose, uniformly fine texture. Roll and rake and remove ridges and fill in depressions as required.

E. Moisten prepared seeding area by sprinkling to a depth of six inches before planting; the area shall be surface dry at the time of application. Do not create a muddy soil condition.

F. Seed shall be applied by hydraulic method with a hydro-seeder at the coverage rate recommended by the seed vendor. Seed may be applied by broadcast or drilled method at the recommended coverage by the seed vendor.

~~G. Rate of Application.~~

~~1. Native Grass seed mix shall be applied at a supplier acceptable rate to obtain 70% growth and acceptance at end of warranty period.~~

~~H. All materials must be available for inspection prior to application.~~

~~I. Restore prepared areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.~~

~~3.4~~3.3 MAINTENANCE REQUIREMENTS FOR NATIVE AREA DURING WARRANTY PERIODS

A. Furnish service and maintenance of restored area until 70% coverage is established.

B. Area must be free of signs of erosion and evasive species.

C. Area must be kept free of litter and mowed and trimmed as required in the fall of each year.

D. Irrigation System ~~may~~ will be required in order to obtain 70% vegetative coverage.

E. Irrigation System

1. Repair all breaks immediately.
2. Perform weekly inspections and make needed adjustments.
3. Make seasonal adjustments to controllers as needed.

F. Erosion and Settlement. Repair trench settling, ruts, and rivulets caused by mowing equipment, irrigation and/or precipitation immediately.

~~3.5~~3.4 WARRANTY

A. All landscaping will be covered by a warranty for a period of one year.

B. Seeded Areas. At the end of the warranty period, seeded areas shall have a 70 percent coverage of full, established growth; free of all weeds.

1. At end of warranty period, replant areas showing root growth failure, bare or thin spots, and eroded or settled areas within 10-days of written notice. Plant with materials of like kind and size, planted in the next growing season, with a new warranty commencing on the date of planting. All corrective work will be at no additional cost to the Owner.

END OF SECTION

SECTION 02752

CHIP SEAL COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for applying emulsified asphalt, followed with an application of cover material and bituminous fog seal.

B. Cover materials.

1.2 RELATED SECTIONS

A. Section 01300 – Administrative Requirements

B. Section 01400 – Quality Requirements

1.3 REFERENCES

A. ASTM C 88: Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

B. ASTM C 117: Amount of Material Finer than 0.075 mm Sieve in Aggregate.

C. ASTM C 131: Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

D. ASTM C 136: Sieve Analysis of Fine and Coarse Aggregates.

E. ASTM C 142: Clay Lumps and Friable Particles in Aggregates.

F. ASTM D 5: Penetration of Bituminous Materials.

G. ASTM D 36: Softening Point of Bitumen (Ring-and-Ball Apparatus).

H. ASTM D 242: Mineral Filler for Bituminous Paving Mixtures.

I. ASTM D 1664: Coating and Stripping of Bitumen-Aggregate Mixtures.

J. ASTM D 2170: Kinematic Viscosity of Asphalts (Bitumens).

K. ASTM D 2419: Sand Equivalent Value of Soils and Fine Aggregate.

L. ASTM D 3319: Accelerated Polishing of Aggregates Using the British Wheel.

M. ASTM D 3628: Selection and Use of Emulsified Asphalts.

N. ASTM D 3740: Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

O. ASTM D 3910: Design, Testing, and Construction of Slurry Seal.

P. ASTM D 4791: Flat or Elongated Particles in Coarse Aggregate.

Q. ASTM D 5281: Determining the percentage of Fractured Particles in Coarse Aggregate.

R. UDOT Standard Specifications (Latest Ed.)

1.4 SUBMITTALS

A. See Section 01300 – Administrative Requirements, for submittal procedures.

B. Mix Design as per Article 2.04.

C. Laboratory Accreditation as per Article 1.06 B.

D. Field Quality Control data as per Article 1.05 C and 1.05 D.

E. Traffic Control Plan as per APWA Section 015526

F. Asphalt bill of ladings. Identify weight of asphalt, weight of emulsified asphalt (after water has been added) in accordance with Article 1.05 E and 1.05 F.

1.5 FIELD QUALITY CONTROL

A. Perform Field Quality Control Sampling and Testing in accordance with the following.

1. Asphalt Emulsion. Lot size is one (1) day production with 1500 SY sublots.
    a. Perform and Document at least one visual inspection per sublot. Place binder uniformly with no ridging and no bare spots.
    b. Perform and Document one yield test based on applicator meter readings and field measurements per sublot.
2. Aggregate Gradation. Lot size is one (1) day production with 500 ton sublots. Take and test at least one gradation sample per sublot. ASTM C136.
3. Aggregate Application. Lot size is one (1) day production with 1500 SY sublots.
    a. Perform and Document at least one visual inspection per sublot. Place aggregate uniformly with no ridging and no bare spots.
    b. Perform and Document one yield test based on delivery tonnage and field measurements per sublot.
4. Aggregate Embedment. Lost size is one (1) day production with 1500 SY sublots. Perform and document at least one visual inspection per sublot.
    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 of at least 5 large particles reveals large particles are embedded in the asphalt binder on their flat side to a depth of 50 percent to 70 percent.

B. Identify and correct any materials or processes not meeting requirements of this specification.

C. Submit daily summary of Quality Control efforts to the City within 24 hours of completion of each day’s placement.

D. Submit all documentation verifying asphalt application rates, chip application rates, and other calibration verification for applied materials during the chip seal operations to the to the City within 24 hours of completion of each day’s placement.

E. Provide vendor's bill of lading certifying the emulsion meets the requirements of Article 2.01.

F. Provide vendor's bill of lading certifying the flush coat material was diluted according to Article 2.02

1.6 QUALITY ASSURANCE

A. Use a paving crew foreman that has completed at least three (3) projects of similar size and nature.

B. Use an AMRL accredited laboratory that follows and complies with ASTM D 3740 and APWA Section 01 45 00 requirements.

C. Do not change source of asphalt emulsion or aggregate until City accepts new source and new mix design.

D. Reject product that does not meet requirements of this Section.

E. Remove any product found defective after installation and replace at no additional cost to OWNER.

1.7 ACCEPTANCE

A. Acceptance is by lot.

B. Opening chip seal surface to traffic does not constitute acceptance.

C. Lot will be acceptable if:

1. Average gradation of each sieve for lot is within the Target Grading Band for that sieve, and;
2. Number of samples in lot with any sieve measurement outside of the Target Grading Band does not exceed two (2), and;
3. Material on 200 sieve gradation does not exceed allowable.
4. Chip Seal Emulsion and Flush Coat emulsion Bills of Lading demonstrate conformance.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable City requirements for paving work on City streets, Section 01300 – Administrative Requirements.

PART 2 PRODUCTS

2.1 CHIP SEAL EMULSIONS

A. Use the following Cationic Emulsions according to UDOT Sections 02745 – Asphalt Materials.

1. Posted Speed ≤25mph: CRS-2A
2. Posted Speed ≤45mph: LMCRS-2
3. Posted Speed >45mph: CRS-2P

B. Use HFRS-2P according to UDOT Section 02745 – Asphalt Materials if source aggregate has demonstrated historic incompatibility with cationic emulsions.

2.2 FLUSH COAT

A. Flush Coat: Homogeneous, Catonic Emulsified Asphalt, Grade CQS-1 or CQS-1h, conforming to Section 32 12 13.13 of the APWA Standard Specifications, diluted two parts concentrate to one part water by the Manufacturer.

2.3 COVER MATERIAL

A. Use crusher processed virgin aggregate consisting of natural stone, gravel, or slag according to Table 1.

Table 1: Chip Seal Cover Material Properties

Unit Weight	AASHTO T 19	3100 lb/ft, max
One Fractured Face	AASHTO T 335	95% minimum
Two Fractured Faces	AASHTO T 335	90% minimum
LA wear	AASHTO T 96	30% maximum
Soundness	AASHTO T 104	10% maximum
Flats & Elongates (1:3)	ASTM D 4791	10% maximum
Polishing	AASHTO T 278, T 279	31 minimum

NOTES
Wear of aggregate retained on No. 8 sieve.
Soundness for combined coarse and fine aggregate measured using five (5) cycles.

B. Meet gradation limits in Table 2. Refer to AASHTO T 27 and T 11.

Table 2: Gradation Limits

Sieve Size	Percent Passing	
	Type I – ¼"	Type II – ⅜"
½ in		100
⅜ in	100	95-100
¼ in	95-100	0 - 15
No. 8	0 - 3	0 - 3
No. 200	0 – 1.5	0 - 1.5

2.4 MIX DESIGN

A. Mix Design: Provide the following. Allow CITY 10 days to evaluate the submittal.

1. Date of mix design. IF older than 60 days from date of submission, recertify mix design.
2. Type and grade of asphalt emulsion to be used (if not specified).
3. Target grading curve for the aggregate used.
4. Aggregate physical properties (this section Article 2.3). The information is for suitability of source and not for project control. Test results shall not be older than 455 days from the date of submission.
5. Asphalt and aggregate compatibility documentation.
6. Initial asphalt and aggregate application rates.

7. Fog seal application rate (if applicable).

2.5 BLOTTER MATERIAL

A. Blotter material – granular materials meeting Table 3 when testing according to ASTM C136.

Table 3: Granular Materials	
Sieve Size	Percent Passing
No. 4	90 to 100
No. 10	25 to 80
No. 200	0 to 15

2.6 TEMPORARY RAISED PAVEMENT MARKERS

A. Use Temporary Raised Pavement Markers as manufactured by Davidson Plastics Company.

B. Markers shall have polyurethane plastic bodies with reflective tape, clear flexible polyvinyl-chloride protective covers, and solid butyl rubber adhesive on bottom surface.

C. Markers shall be 2-inches high and 4-inches wide; and of the color selected by the City Engineer.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean the road surface of all dirt, sand, dust, and other objectionable material to the satisfaction of the City.

B. Protect all structures including but not limited to guardrail, guideposts, concrete barriers, all drains, and parapet walls.

C. Cover manholes, valve boxes, drop inlets, and other service utility entrances before placing any chip seal coat.

D. Protect curb, gutter, and sidewalk from spatter, mar or overcoat.

E. Protect trees, plants and other ground cover from damage. Prune trees to allow equipment passage underneath. Repair tree damage at no additional cost to OWNER.

F. Stockpile blotter material at a site within 20 minutes delivery time of each road section being chip sealed. Have application equipment on site before beginning chip seal work.

1. Stockpiling of blotter material may be waived upon City acceptance if blotter material can be obtained and ready to spread within 20 minutes of a road section being chip sealed.
2. Equipment to spread blotter material is subject to inspection by the City.

G. Traffic Control:

1. Implement the notification and traffic control plan requirements. Do not proceed without certified flaggers.

2. Grind off existing pavement signs and lane striping. Use reflective tables to mark striping location before applying chip seal.

H. Protect chip seal from traffic until seal has cured. Cure time depends on type of asphalt emulsion and weather.

3.2 LIMITATIONS

A. Complete all work between May 15, and August 31.

B. Do not place chip seal coat if surface moisture is present.

C. Place seal coat when:

1. Pavement temperature is between 70 and 136 degrees F.
2. Air temperature is between 50 and 110 degrees F.
3. Forecasted temperature is not expected to be below 40 degrees F within 3 days after placement.

D. Do not apply any bituminous asphalt after 6:00 p.m. if temperatures in this Section, article 3. 2, paragraph C cannot be maintained throughout all night time hours.

E. Do not open to traffic the same day chip seal coat is placed.

1. Sweep and open to traffic no earlier than 6:00 a.m. the day following placement of cover material.

F. Apply bituminous flush coat material after receiving acceptance from the City but no earlier than 6 days after application of the cover material.

1. Apply bituminous flush coat material when the air temperature in the shade is 50 degrees F and rising and the pavement temperature is 70 degrees F and rising.
2. Do not apply bituminous flush coat material during fog, rain, or other adverse conditions.

G. Allow at least 7 calendar days after completing flush coat before applying permanent pavement markings.

3.3 TEMPORARY PAVEMENT MARKINGS

A. Prior to placing seal coat, install raised markers to mark striping location.

B. Install raised markers in accordance with the manufacturer’s written instructions and recommendations.

C. Remove covers immediately after rolling is complete.

3.4 EQUIPMENT

A. Use distributor trucks according to the following requirements:

1. Tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of the tank contents.

2. Insulated tanks capable of storing the binder at temperatures that allow the binder to remain consistent with the appropriate viscosity for proper application rates
    a. Use tanks equipped with baffles to prevent pressure surges resulting from the asphalt sloshing in the tank when starting and stopping.
    b. Use trucks equipped with devices to provide for accurate and rapid correlation and control of the amount of bituminous material being applied with that of the truck or distributor gauges.
3. Constant volume circulation pumps and heaters to maintain a pressurized system so binder will be uniformly heated.
    a. Circulation pump must spray a constant volume for the entire length of the spray bar for each application.
4. Spray bar nozzles designed to provide an appropriate fan width to provide uniform transverse distribution without corrugation or streaking.
    a. Adjust the spray bar height to provide uniform distribution of binder across the application width and triple lapping of the binder on the pavement surface
    b. Use a fully circulating spray bar with a positive shutoff valve.
5. Computerized rate control system allowing the operator to control all distributor operations from the cab to include:
    a. Pressure regulation of the material application and automatic rate control adjustment to the unit ground speed.
        i. 1) Hydrostatic system capable of maintaining a tolerance of +/- 0.3 gal/yd2
    b. Spray bar height and width adjustment and shut off of individual spray bar sections.

B. Use a self-propelled aggregate (chip) spreader specifically designed and manufactured for chip seal operations, equipped with the following:

1. Computerized controls that will apply a uniform, even layer of aggregate across the full width of the binder and adjust output to the unit ground speed.
    a. Use gates adjustable to drop the correct amount of aggregate +/- 1 lb/yd2.
2. Variable width spreader with hydraulic control extension and adjustable discharge gates.
3. Spreading hopper with a minimum capacity to cover a full lane of travel plus 1 ft/pass.
4. Spinner broadcast type of aggregate spreader not allowed.

C. Use sufficient number of dump trucks to circumvent any interruption in the supply of chips to the spreader.

1. Use tandem axle dump trucks or larger or conveyor discharge trucks to minimize the number of hook-ups.
2. Use dump trucks with matching hitches and compatible with the aggregate spreader to provide smooth hook-ups and to minimize any spillage when loading the hopper.
3. Use trucks in good mechanical condition and that do not leak.
    a. Use truck tires that do not pick up binder or aggregate when driving on the new surface.

D. Use at least three articulating type pneumatic rollers for rolling operations.

1. Use rollers weighing between 8 tons minimum and 12 tons maximum with a minimum width of 6 ft.
2. Use rollers with pneumatic tires of equal size diameter and having treads satisfactory to the City.
3. Inflate tires so that the entire roller width area is compacted by either the rear-axle tires or the front-axle tires.
    a. Inflate tires to 90 psi, +/- 5 psi.

E. Sweeping equipment:

1. Use rotary brooms with nylon or steel bristles or pickup or vacuum brooms for pavement cleaning or brooming operations.
    a. Keep downward pressure to a minimum.
    b. Use water as requested by the City if excessive dust is generated during sweeping operations.
    c. Use pickup or vacuum sweepers in urban areas where aggregate accumulates in gutters or where removal is required from the edge of the shoulder.
    d. Do not dislodge embedded aggregate when brooming chip sealed roadway.

F. Blotter Material Equipment

1. Apply blotter material using a truck mounted spinner broadcast spreader.

G. All equipment is subject to inspection by the City.

3.5 ASPHALT MATERIAL/COVER MATERIAL APPLICATION

A. Apply asphalt material at a rate sufficient to obtain 50 percent chip embedment before the rolling operation and 70 percent chip embedment after rolling operation.

1. Adjust application rates throughout the project depending on existing conditions.

B. Apply the asphalt emulsion at a minimum temperature of 145 degrees F.

C. Do not apply asphalt material if material does not spray through the distributor in a uniform way and remain in place on the roadway.

D. Place building paper adjacent to the transverse construction joint before starting each spraying operation.

1. Maintain the control valve to act instantaneously both at start-up and cut-off.

E. Locate longitudinal joints within 6 inches of the traffic lane line location.

1. Construct meet lines with no skip or voids between adjacent passes.
2. Do not place a double thickness of cover material.

F. Calibrate the spreader at the beginning of each day and as often as necessary to comply with Table 4.

G. Apply the aggregate within +1 to −2 pounds per square yard of mix design:

1. Use a damp chip but not saturated. (Note: If water can be seen running out of the haul truck, the chips are too wet).
2. For polymer and latex modified emulsions, apply chips immediately.
3. For other emulsions, maintain a distance of not more than 100 feet between distributor and chip spreader.
4. Maintain the chip spreader speed so that chips do not bounce or roll during application.
5. Spread larger aggregate first.
6. Hand broom cover material if necessary to distribute aggregate uniformly over the pavement surface.

Table 4: Approximate Spread Rates	
Unit Weight lbs/ft^3	Application Rate lbs/yd^2
60 – 65	17
65 – 70	18.4
70 -75	19.8
75 – 80	20.7
80 – 85	22.1
85 – 90	23.5
90 – 95	24.9
95 – 100	25.8

3.6 SURFACE ROLLING

A. Use at least three pneumatic-tire rollers in a longitudinal direction to roll surface after the cover material has been spread.

B. Roll at least three passes to seat the cover material.

1. A pass is defined as traveling in one direction only.

C. Control bleeding with blotter material.

D. Set the roller speed to prevent bounding or skidding. Do not exceed 5 mph.

1. Reduce roller speeds during directional changes to prevent surface tearing.

E. Synchronize the speed of the distributor and chip spreader with that of the rolling operation.

1. Begin initial rolling, consisting of one complete coverage, immediately behind the chip spreader.
2. Begin secondary rolling, consisting of second and third coverage, immediately after completing initial rolling.
3. Synchronize all operations to keep rolling operations within 2,500 feet of the ongoing chip seal application.

F. Sweep excess cover material off the roadway after the emulsion has set.

1. Remove excess cover material to the satisfaction of the City before opening the roadway to traffic.

G. Repair all damage to the seal coat before opening the roadway to traffic.

3.7 BITUMINIOUS FLUSH COAT APPLICATION

A. Clean the surface of all dirt, sand, dust, loose chips, and other objectionable material to the satisfaction of the City before applying bituminous flush coat.

B. Apply the bituminous flush coat at a rate of 0.11, ± 0.01 gal/yd2.

1. Keep traffic off the flushed surface until the bituminous material has set sufficiently to prevent tracking or pick-up.

3.8 REPAIR

A. Remove spatter or mar from curb, gutter and sidewalk at no additional cost to OWNER.

B. Remove chip seal form street fixtures.

C. Remove any product found defective after installation and replace at no additional cost to OWNER.

D. Fill any joints or cracks that are not covered by chip seal coat. 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.

END OF SECTION

SECTION 02821

VINYL FENCING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: PVC Fencing and Gates

B. Related Sections: Section(s) related to this section include:

1. Division 3: Concrete
2. Division 2: Site Construction
    a. 02300- Earthwork

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM D256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
2. ASTM D 638 Standard Test Method for Tensile Properties of Plastics.
3. ASTM D 648 Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
4. ASTM D792 Standard Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
5. ASTM D790 Standard Test Method for Flexural Properties of Unreinforced and Reinforce Plastics and Electrical Insulating Materials.
6. ASTM D4216 Standard Specification for Rigid Poly Vinyl Chloride (PVC) and Related PVC and Chlorinated Poly Vinyl Chloride (CPVC) Building Products and Compounds.
7. ASTM F694 Standard Specification for Rigid Poly Vinyl Chloride (PVC) Exterior Profiles Used For Fencing.

1.3 DEFINITIONS

A. Posts: Vertical structure support members of the fence/gate system.

B. Rails: Horizontal structural support members of the fence/gate system.

C. Pickets: Vertical members between the bottom and top rails.

D. Aluminum Channel: Structural supports inside rails.

E. Galvanized Steel Channel: Structural support inside rails.

1.4 SYSTEM DESCRIPTION

A. The contractor shall provide a complete PVC fencing/gate system of the design, style and strength defined herein. Fencing and gate components are comprised of Section 02821 profiles made of extruded, rigid polyvinylchloride (PVC). This PVC material is specially

formulated for outdoor use with superior color hold and impact resistant properties after extended outdoor exposure. The system shall include all posts, rails, pickets, caps, metal inserts, and accessory items necessary to complete the installation.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract.

B. Product Data: Submit product data for specified products.

C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, and finish colors. Include details showing fabrication and installation of rails and pickets, including plans, elevations, sections, details of components, and attachments to other units of work, if required.

D. Samples: Submit selection and verification samples for finishes, colors, and profiles if requested.

E. Quality Assurance Submittals: Submit the following:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties. Include copies of selected test reports by independent laboratories verifying the compliance of fencing components and systems with applicable building codes upon request.
2. Compliance Reports: Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction. Provide evidence that the polyvinyl chloride fencing systems are in compliance with applicable building code in effect for the project.
3. Certificates: Product certificates signed by the manufacturer certifying that materials comply with specified performance characteristics and criteria and physical requirements.

F. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals Section 02821 includes methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
2. Warranty: Warranty documents specified herein.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Polyvinyl Chloride Fencing Fabricator/Installer Qualifications: Engage a licensed fabricator to ensure successful completion of project.
2. Ensure consistent quality standards of PVC fence accessories, fittings and fasteners are maintained throughout the project.
3. Manufacturer Qualifications: Manufacturer should be capable of providing field service representation during construction and should be capable of approving acceptable installer and application methods.

1.7 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to material handling damage and accumulation of dirt and grime, at temperature and humidity conditions recommended by manufacturer. Handle and store product according to recommendations. Store in original packaging whenever possible until components are required on the project.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

B. Project Warranty: Refer to Conditions of the Contract for project warranty provisions used with their permission. The manufacturer is responsible for technical accuracy.

C. Manufacturer's Warranty: Submit, for City's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights City may have under Contract Documents.

PART 2 PRODUCTS

2.1 PVC FENCING & GATE SYSTEMS

A. Manufacturer: Vinyl products are manufactured from 100% new vinyl. The base ingredient is rigid PVC (polyvinyl chloride) homopolymer compound with a high level of titanium dioxide pigment for long- term UV resistance and impact modifiers for strength. The formulation is similar to that of vinyl siding and windows, which have more than 20 years of proven long-term durability and structural integrity.

1. Post Profile Types and Sizes: As indicated on detail.
2. Rails Profile Types and Sizes: As indicated on detail.
3. Pickets Profile Types and Sizes: As indicated on detail.
4. Caps Profile Types and Sizes: As indicated on detail.
5. Finishes: Smooth, soft gloss.
6. Colors: Titanium dioxide is the main ultraviolet light inhibitor in the PVC material used to manufacture these products. Since it is a white pigment, dark colors are not practical or possible. Decorative cap rails are available with a selection of architectural accent colors in high performance acrylics.
7. Product System Testing: Provide PVC fencing system that complies with the following physical and chemical properties:
    a. ASTM D256 – Izod impact greater than 5 ft-lb/in (2.1 N*m/m) at 23 degrees C.
    b. ASTM D638 – Tensile strength 6290 psi (43 MPa).

c. ASTM D638 – Tensile modulus 430,000 psi (2963 MPa).
d. ASTM D648 – Deflection temperature 67 degrees C.

2.2 PRODUCT SUBSITITUTIONS

A. Substitutions: Substitutions of sections or modifications of details, or both, and the reasons therefor shall be submitted for acceptance by the City Engineer.

2.3 ACCESSORIES

A. PVC Fence System Materials:

1. General: Posts, rails, pickets, post caps, and picket caps shall comply with ASTM D4216, Class 143354311122.
2. Posts: One piece extruded square profile size per detail.
3. Rails: One piece extruded square profile size per detail.
4. Pickets and Panels: One piece extruded profile size per detail.
5. Post Caps Molded: Specify to fit the selected post profile
    a. Sizes per detail
    b. Styles per detail
6. Rail Caps Molded: Specify to fit the selected post profile.
    a. Sizes per detail
    b. Styles per detail
7. Picket Caps Molded: Specify to fit the selected post profile.
    a. Sizes per detail
    b. Styles per detail
8. Gate Components size per detail.
9. Aluminum/Galvanized Steel Reinforcement Insert type and size per detail.
10. Miscellaneous Component type and size per detail.
11. Fasteners per detail.

2.4 RELATED MATERIALS

A. Related Materials: Refer to other sections listed in Related Sections Paragraph herein for related materials.

B. Adhesive and Cement:

1. Adhesive: PVC based adhesive with the same UV properties.
2. Products: Subject to compliance with requirements, provide the following:
    a. “Quik-Crete”

2.5 FABRICATION SECTION

A. General: Fabricate fencing systems to comply with requirements indicated for design, dimensions, details, finish and member sizes, including wall thickness, but not less than those required to support structural loads.

2.6 SOURCE QUALITY

A. Source Quality: Obtain PVC fencing system products.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with product data, including product technical bulletins, product catalog installation instructions, product carton instructions for installation, or design/detail drawings.

3.2 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installing in accordance with that manufacturer's instructions.

3.3 PREPARATION

A. All new installation shall be laid out by the contractor in accordance with the consultation plans.

3.4 INSTALLATION

A. Depending upon the style of fence being installed, set fence posts on 8' centers. Posts shall be placed 30" in the ground and set in concrete.

B. Gate posts and corner posts on all fences and line posts on taller fences shall be reinforced with cement and two No. 4 rebar members. Concrete should not contact rails to allow for expansion.

C. Place assembled fence sections into position and slide rails into posts. The rails are secured into posts by tabs which are notched into the rails and catch on the inside wall of the posts. Top rails may be further secured with a #8-3/4" screw through the rail, inside the post.

D. Install gates using bolt-on hardware supplied by the manufacturer.

3.5 FIELD QUALITY REQUIREMENTS

A. Site tests to be performed during and/or after product installation.

B. Inspection requirements to be performed after product installation.

1. Site visits: 2 site visit inspections.

3.6 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace products that have installed and are damaged. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and dispose of in a legally acceptable manner.

END OF SECTION

SECTION 02824

ORNAMENTAL IRON FENCING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Ornamental Iron Fencing

1. Fence framework, panels, and accessories.
2. Anchoring of posts to Concrete Retaining Walls.

B. Related Sections: Section(s) related to this section include:

1. Division 2: Site Construction
    a. 02821 - PVC Fencing
2. Division 3: Concrete:
    a. 03300 - Cast-in-Place Concrete

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM B117 Practice for Operating Salt-Spray (Fog) Apparatus.
3. ASTM D523 Test Method for Specular Gloss.
4. ASTM D714 Test Method for Evaluating Degree of Blistering in Paint.
5. ASTM D822 Practice for Conducting Tests on Pain and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
6. ASTM D1654 Test method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
7. ASTM D2244 Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
8. ASTM D2794 Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
9. ASTM D3359 Test Method for Measuring Adhesion by Tape Test.
10. 1ASTM F2408 Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.3 SUBMITTALS

A. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

C. Manufacturer’s Installation Instructions: Indicate installation requirements, post foundation,

and anchor bolt templates.

D. Proposed fencing pattern and color.

1.4 PROTECT RECORD DOCUMENTS

A. Accurately record actual locations of property perimeter posts relative to property lines.

1.5 QUALITY ASSURANCE

A. Contractor shall provide laborers and supervisors who are thoroughly familiar with the type of constructions involved and materials and techniques specified.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Sections with minimum five years' experience.

1.7 PRODUCT HANDLING AND STORAGE

A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.8 QUALIFICATIONS

A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 20 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufactures warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 PRODUCTS

2.1 GENERAL

A. Fencing shall be 6-foot ornamental iron fencing.

B. Fencing shall be Ameristar E-Coated Rakeable fencing.

2.2 FABRICATION

A. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.

B. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to-rail intersection by Ameristar's proprietary fusion welding process, thus completing the rigid panel assembly (Note: The process produces a virtually seamless, spatter-free-good-neighbor appearance, equally attractive from either side of the panel).

C. The manufactured panels and posts shall be subjected to an inline electrode position coating (E-Coat) process consisting of a multi-stage pretreatment/wash (with zinc phosphate), followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be black. The coated panels and posts shall be capable of meeting the performance requirements in the ASTM F2408 standard.

D. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for Industrial weight fences under ASTM F2408.

2.3 FITTINGS AND HARDWARE

A. Use manufacturer recommended fittings and hardware.

PART 3 EXECUTION

3.1 PREPARATION

A. Drill holes into concrete retaining wall to provide anchoring location.

B. All new installation shall be laid out by the contractor in accordance with the construction plans.

C. Anchor posts into concrete wall with manufacturer recommended bolting system.

3.2 FENCE INSTALLATION

A. Fence posts shall be spaced 3-3\4” on center, plus or minus ½”. For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer.

3.3 FENCE INSTALLATION MAINTENANCE

A. When cutting/drilling rails or posts, adhere to the following steps to seal the exposed steel surfaces:

1. Remove all metal shaving from cut area.
2. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry.
3. Apply 2 coats of custom finish paint matching fence color.

B. Failure to seal exposed surfaces per steps 1-3 above will negate warranty.

C. Manufacturer recommended spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that pain pens be used to prevent overspray.

END OF SECTION

SECTION 02828

MISCELLANEOUS EQUIPMENT FOR PLAYGROUNDS AND OTHER AREAS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Acceptable equipment and materials for playgrounds, open space areas and miscellaneous other areas.

1.2 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on equipment, materials, and appurtenant items.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of installed equipment, materials and appurtenant items. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with City's requirements as described herein.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store all equipment, materials and appurtenant items in shipping containers with labeling in place.

1.5 OPERATING AND MAINTENANCE DATA

A. Provide instructions covering full operation, care and maintenance of system and controls; and manufacturer's parts catalog.

B. Instruct City's designated maintenance personnel in the proper maintenance of all equipment, materials, and appurtenant items.

C. Submit 3 copies of written instructions recommending procedures to be established by the City Engineer for the maintenance of the equipment, materials and appurtenant items from year to year.

1. Submit prior to expiration of required one year guarantee period.
2. Provide information in the manuals that include the following:
    a. Written index near front of Manual listing location in the Manual of all emergency data regarding the installations;
    b. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of the nearest vendor of replacement parts; and
    c. Copy of all guarantees and warranties issued on the installation showing all dates of expiration.

PART 2 PRODUCTS

2.1 GENERAL

A. All equipment, materials, and appurtenant items shall be as manufactured accepted by the City Engineer.

B. All equipment, materials and appurtenant items shall be inspected and accepted by the City prior to installation.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall furnish all labor, materials and equipment as required to install the equipment, materials and appurtenant items for playgrounds, open space areas, and other miscellaneous areas, as described herein and as shown on the design drawings, as indicated on the submittal drawings; and shall furnish and install all supplementary and miscellaneous items, appurtenances, and devices incidental to or necessary for completion of the installations.

B. All material shall be installed according to the manufacturer's written instructions and recommendations.

C. The Contractor shall test the installations to assure proper operation.

D. All playground equipment shall be installed by personnel certified by manufacture.

3.2 EXAMINATION

A. Verify that design drawings conform to project conditions.

3.3 ELECTRICAL WORK

A. All required electrical work shall be done as specified in Division 5.

3.4 FIELD QUALITY CONTROL

A. A third party certified playground safety inspector (CPSI) shall perform a field inspection and testing in accordance with Section 01400.

B. The third party audit shall be submitted to the city in accordance with section 01400.

C. If tests indicate that installations do not meet specified requirements, remove installations, replace and retest at no cost to City.

3.5 OPERATIONAL TESTING

A. Where required, provide the City Engineer or City Inspector with seven days written notice of operational tests.

B. After all repairs or replacements have been made and accepted by the City Engineer or City Inspector, repeat the required tests.

END OF SECTION

DIVISION 03

CONCRETE

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete form work.

B. Floors and slabs on grade.

C. Concrete foundation walls and vaults.

D. Concrete reinforcement.

E. Joint devices associated with concrete work.

F. Miscellaneous concrete elements, including equipment pads, thrust blocks, manholes, and other miscellaneous items.

G. Concrete curing.

1.2 REFERENCES

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.

B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International.

D. ACI 305R - Hot Weather Concreting; American Concrete Institute International.

E. ACI 306R - Cold Weather Concreting; American Concrete Institute International.

F. ACI 308 - Standard Practice for Curing Concrete; American Concrete Institute International.

G. ACI 309R - Guide for Consolidation of Concrete; American Concrete Institute.

H. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.

I. ACI 347 - Guide to Form work for Concrete; American Concrete Institute.

J. ASTM A 185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

K. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

L. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

M. ASTM C 33 - Standard Specification for Concrete Aggregates.

N. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

O. ASTM C 94 - Standard Specification for Ready-Mixed Concrete.

P. ASTM C 143 - Standard Test Method for Slump of Hydraulic Cement Concrete.

Q. ASTM C 150 - Standard Specification for Portland Cement.

R. ASTM C 171 - Standard Specification for Sheet Materials for Curing Concrete.

S. ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

T. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.

U. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

V. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

W. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.

X. ASTM C 881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

Y. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

Z. ASTM C 1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.

AA. ASTM D 994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

BB. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

CC. COE CRD-C 572 - Corps of Engineers Specifications for Polyvinylchloride Waterstop; Corps of Engineers.

DD. Use the latest issue of the above reference standards as of the date of the Project.

1.3 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data & Mix Designs: Submit manufacturers' data on manufactured products and mixes.

C. Samples: Submit one, four inch long sample of waterstops and construction joint devices.

D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.

E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.4 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Acquire cement from same source and aggregate from same source for entire project.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.1 FORM WORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
3. Form Ties: Snap-Off type that will leave no metal within 1-1/2 inches of concrete surface. Use of tie wire as form ties will not be permitted.

2.2 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).

1. Deformed billet-steel bars.
2. Unfinished.

B. Welded Steel Wire Fabric: ASTM A 185, plain type.

1. Coiled Rolls or flat sheets.
2. Mesh Size and Wire Gage: As indicated on drawings.

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage.
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
3. Provide galvanized or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C 150, Type IIA - Air Entraining Portland type.

B. Cement: ASTM C 150, Type V - Sulfate Resistant Portland type when exposed to sewage.

C. Fine and Coarse Aggregates: ASTM C 33.

D. Fly Ash: ASTM C 618, Class F.

E. Calcined Pozzolan: ASTM C 618, Class N.

F. Water: Clean and not detrimental to concrete.

G. Synthetic Fiber Reinforcement: Comply with ASTM C 1116; 1/2 inch length.

2.4 ADMIXTURES

A. Air Entrainment Admixture: ASTM C 260.

B. Chemical Admixtures: ASTM C 494, Type D - Water Reducing and Retarding.

2.5 CONCRETE ACCESSORIES

A. Epoxy Bonding System: ASTM C 881, type as required by project conditions.

B. Non-Shrink Grout: ASTM C 1107; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. Minimum Compressive Strength at 48 Hours: 2,400 psi.
2. Minimum Compressive Strength at 28 Days: 7,000 psi.

C. Moisture-Retaining Cover: ASTM C 171; clear polyethylene or white burlap-polyethylene sheet.

D. Liquid Curing Compound: ASTM C 309, Type 1, with white pigment.

2.6 JOINT DEVICES AND MATERIALS

A. Waterstops: PVC type, COE CRD-C 572.

B. Joint Filler: ASTM D 1751; use full depth, Asphalt impregnated fiberboard or felt, 1/2 inch thick; tongue and groove profile.

C. Hydrophilic Waterstops: DuraJoint Expand-Tite EXP 100, as manufactured by Four Seasons Construction Products, Inc.; of the recommended type and size.

1. Primer: as recommended by the manufacturer.

2.7 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add accepted admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

C. Fibrous Reinforcement: Where indicated, add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.

D. Normal Weight Concrete:

1. Compressive Strength, per ASTM C 39 at 28 days: 4,000 psi.
2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
3. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
4. Cement Content: Minimum 592.2 pound per cubic yard; 6.3 bag mix.
5. Water-Cement Ratio: Maximum 48 percent by weight.
6. Total Air Content: 4 to 8 percent for concrete exposed to freezing and thawing; and 2 to 4 percent for other concrete; per ASTM C 173.
7. Maximum Slump: 4 to 2 inches for structures; 3 to 1 1/2 inches for blocks and pavement.
8. Maximum Aggregate Size: one inch.

2.8 MIXING

A. Transit Mixers: Comply with ASTM C 94.

B. During hot weather or under other conditions contributing to rapid setting of concrete, mixing times will be reduced as follows:

1. When air temperature is between 85 and 90 degrees (F), reduce mixing time and delivery time from 90 minutes to 75 minutes.
2. When air temperature is above 90 degrees (F), reduce mixing time and delivery time to 60 minutes.

C. Provide batch ticket for each batch used in the work. Ticket shall indicate project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

A. Form work: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Forms shall be full depth, mortar tight, properly aligned, as indicated, to produce concrete surfaces meeting the surface requirements specified herein.

C. Forms shall be constructed so they can be removed without hammering on or prying against concrete, and without damaging concrete in any way.

D. Verify that forms are clean before applying release agent.

E. Coordinate placement of joint devices with erection of concrete form work and placement of form accessories.

F. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

G. In locations where new concrete is doweled to existing work, drill holes in existing concrete,

fill holes with epoxy bonding agent, and insert steel dowels.

H. The City Inspector’s review of form work will not relieve the Contractor from any responsibility as to the adequacy of the form work, shoring and bracing design. All form work installed by the Contractor shall be solely at his risk. The City Inspector’s review will not lessen or diminish the Contractor's liability.

I. Alignment and Tolerances. Form work shall be designed and constructed so that concrete surfaces of finished structures will comply with the tolerances specified in ACI 347; and will conform to the following:

1. Vertical Alignment: maximum allowable variation, from bottom to top of a wall, is plus or minus 3/8 inch.
2. Plumb: maximum allowable variations as follows:
    a. In plumb and surfaces of columns and walls is plus or minus 1/4 inch in any 10-feet of length; and a maximum of one-inch for entire length.
    b. In plumb for exposed corner, control-joint grooves, or other conspicuous lines is plus or minus 1/4 inch in any 20-feet of length; and a maximum of 1/2-inch for the entire length.
3. Wall Thickness: shall not vary more than minus 1/8 inch or plus 1/2 inch.
4. Level or Grade: maximum variation from level or grade indicated shall not exceed plus or minus 1/4 inch in any 10-feet of length; or plus or minus 3/8-inch in any 20-feet of length.
5. Distance: maximum variation in distance between walls, columns, or other members shall not exceed plus or minus 1/4 inch in any 10-feet of length; and not more than one-inch total variation.

3.3 INSTALLING REINFORCEMENT

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install wire fabric in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.4 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify City Inspector not less than 24 hours prior to commencement of placement operations. No concrete shall be placed until all form work, construction joints, reinforcing steel, and other items have been completed.

D. Before placing concrete, inspect and complete form work installations, reinforcing steel placement, and items to be embedded or cast-in.

E. Notify other crafts involved in ample time to permit installation of their work; cooperate with other trades in setting such work

F. All dirt, chips, sawdust, debris, mud, water and other foreign matter shall be removed from within forms or within excavated areas adjacent to forms before any concrete is placed.

G. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

H. Separate slabs on grade from vertical surfaces with 1/4 inch thick joint filler.

I. Install joint devices in accordance with manufacturer's instructions.

J. Concrete shall be conveyed from mixer to forms as rapidly as possible within specified time limits; and by methods that will prevent segregation of concrete mix.

K. Concrete shall be placed within 15 minutes after it has been discharged from mixer.

L. Provide adequate equipment and labor for conveying concrete to ensure a continuous flow of concrete at delivery point.

M. Concrete shall be deposited as close as possible to its final position in the forms; there shall be no vertical drop greater than 8 feet, except where suitable equipment is provided to prevent segregation of concrete and where specifically authorized.

N. Deposit concrete so that it will be effectively consolidated in horizontal layers not more than 12 inches thick; except that all slabs shall be placed in single layer.

O. Where placement consists of several layers, place each layer while the preceding layer is still plastic to avoid cold joints, and within 30 minutes after placement of preceding layer.

P. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

Q. Place concrete continuously between predetermined expansion, control, and construction joints.

R. Do not interrupt successive placement; do not permit cold joints to occur.

S. Do not use concrete which becomes non-plastic or unworkable, does not meet the required quality control limits, or which has become contaminated by foreign materials. Do not use re-tempered concrete. Remove rejects concrete from the project site and dispose of in a legally acceptable manner.

T. Place floor slabs in checkerboard or saw cut pattern indicated.

U. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

V. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft.

W. Concrete shall not be placed in water; nor shall water be allowed to rise over freshly placed concrete until the concrete has set sufficiently to prevent its being damaged thereby.

3.5 CONSOLIDATING

A. Consolidate each layer of concrete immediately after placement with internal vibrators in

accordance with ACI 309, except for slabs 4 inches thick or less.

B. Vibrators shall be inserted vertically at uniform spacing over entire area of placement; spacing to be approximately 1-1/2 times radius of action of vibrator. Vibrators shall penetrate rapidly to bottom of layer being placed, and at least 6 inches into the preceding layer.

C. Vibrators shall be supplemented by hand spading adjacent to forms on exposed surfaces. Concrete shall be compacted and well worked into all corners and angles in forms, and around reinforcement and embedded items.

3.6 FORM REMOVAL

A. Forms shall be removed in a manner that will prevent damage to concrete and ensure complete safety of the structure.

B. Forms shall not be removed until inspected and accepted by the City Inspector.

C. Form work for columns, walls and other members not supporting weight of concrete may be removed when concrete has attained sufficient strength to resist damage from removal operation; but not before at least 48 hours after concrete placement.

D. Form work for columns, walls, roof slabs, and other members supporting weight of concrete may not be removed until concrete has attained sufficient strength to carry imposed loads as determined by compression tests, and not until inspected and accepted by the City Inspector.

3.7 CONCRETE FINISHING

A. Repair and patch surface defects, including tie holes, on all surfaces immediately after removing form work.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with Carborundum brick or other abrasive, not more than 24 hours after form removal.
2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:

1. Wood float surfaces that will receive trowel finish or other finishes, as indicated.
2. Steel trowel surfaces that will be left exposed.
3. Broom finish exterior concrete to provide non-slip finish.

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:50 nominal.

F. All exposed edges to be chamfered; 3/4 inches minimum.

3.8 CURING AND PROTECTION

A. Comply with requirements of ACI 308 and immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than 7 days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:

1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-fog spray, saturated burlap, or other accepted method.
2. Begin final curing after initial curing but before surface is dry.
    a. Moisture-retaining cover: Seal in place with waterproof tape or adhesive.
    b. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.9 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01400.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design to engineer and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C 39. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 50 cu yd or less of concrete placed.

F. Take two additional test cylinders during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test for each load at point of discharge; and perform slump test with each set of test cylinders taken.

1. If maximum slump for the application is exceeded, it will be assumed that the water content is excessive and the load shall be rejected.
2. If slump is less that the minimum for the application, a measured quantity of water may be added to the mix; quantity shall not exceed 1/6 gallon of water per bag of cement.
3. Water shall be added only in the presence of the City Inspector and after a slump test has been made.

4. If concrete has been mixed for more than one hour, the loss of slump shall be considered as being caused by setting of concrete; water shall not be added, and the load shall be rejected.

H. Perform test to determine air content in accordance with ASTM C 231; a minimum of one test shall be done each time a slump test is made. Air content shall be within specified limits.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to City Engineer and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the City Engineer or Inspector. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of City Engineer or Inspector for each individual area.

3.11 SCHEDULE - CONCRETE TYPES AND FINISHES

A. Structure Not Exposed to View: 4,000 psi 28 day concrete; form finish surface, with honeycomb and holes filled and repaired.

B. Exposed Structures: 4,000 psi 28 day concrete; air entrained, smooth rubbed finish.

END OF SECTION

DIVISION 04

FINISHES

SECTION 04900

PAINTS AND COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

C. Painting materials and methods for conduit identification specified in Section 16075.

D. See Schedule - Surfaces to be finished, at end of section.

1.2 REFERENCES

A. ASTM D 16 - Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products.

B. ASTM D 4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood- Base Materials.

C. NPCA (US) - Guide to U.S. Government Paint Specifications; National Paint & Coatings Association.

D. SSPC (PM1) - Steel Structures Painting Manual, Vol. 1, Good Painting Practice; Society for Protective Coatings.

E. SSPC (PM2) - Steel Structures Painting Manual, Vol. 2, Systems and Specifications; Society for Protective Coatings.

F. Use the latest issue of the above reference standards as of the date of the Project.

1.3 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products.

C. Samples: Submit one paper chip samples, 2 x 2 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.

D. Manufacturer's Instructions: Indicate special surface preparation procedures.

E. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years' experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable International Fire and Building Codes for flame and smoke rating requirements for products and finishes.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Paints:

1. Benjamin Moore & Co.
2. Sherwin-Williams Co.

B. Substitutions: See Section 01600 - Product Requirements.

2.2 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:

1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.

2. For good flow and brushing properties.
3. Capable of drying or curing free of streaks or sags.

B. Colors to be selected by the Owner from the manufacturer's standard colors and shall be accepted by the City Planner.

2.3 PAINT SYSTEMS - EXTERIOR

A. Paint WE-OP-3A - Wood, Opaque, Latex, 3 Coat:

1. One coat of latex primer sealer.
2. Semi-gloss: Two coats of latex enamel.

B. Paint ME-OP-3A - Ferrous Metals, Unprimed, Latex, 3 Coat:

1. One coat of latex primer.
2. Semi-gloss: Two coats of latex enamel.

C. Paint ME-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:

1. One coat of latex primer.
2. Semi-gloss: Two coats of latex enamel.

D. Paint ME-OP-2A - Ferrous Metals, Primed, Latex, 2 Coat:

1. Touch-up with zinc chromate primer.
2. Semi-gloss: Two coats of latex enamel.

E. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:

1. Touch-up with zinc chromate primer.
2. Semi-gloss: Two coats of latex enamel.

F. Paint MgE-OP-3A - Galvanized Metals, Latex, 3 Coat:

1. One coat galvanize primer.
2. Semi-gloss: Two coats of latex enamel.

G. Paint MgE-OP-3L - Galvanized Metals, Latex, 3 Coat:

1. One coat galvanize primer.
2. Semi-gloss: Two coats of latex enamel.

2.4 PAINT SYSTEMS - INTERIOR

A. Paint WI-OP-3A - Wood, Opaque, Latex, 3 Coat:

1. One coat latex primer sealer.
2. Semi-gloss: Two coats of latex enamel.

B. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:

1. One coat of latex primer sealer.
2. Semi-gloss: Two coats of latex enamel.

C. Paint CI-OP-3A - Concrete/Masonry, Opaque, Latex, 3 Coat:

1. One coat of block filler.
2. Semi-gloss: Two coats of latex enamel.

D. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:

1. One coat of block filler.
2. Semi-gloss: Two coats of latex enamel.

E. Paint MI-OP-3A - Ferrous Metals, Unprimed, Latex, 3 Coat:

1. One coat of latex primer.
2. Semi-gloss: Two coats of latex enamel.

F. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:

1. One coat of latex primer.
2. Semi-gloss: Two coats of latex enamel.

G. Paint MgI-OP-3A - Galvanized Metals, Latex, 3 Coat:

1. One coat galvanize primer.
2. Semi-gloss: Two coats of latex enamel.

H. Paint MgI-OP-3L - Galvanized Metals, Latex, 3 Coat:

1. One coat galvanize primer.
2. Semi-gloss: Two coats of latex enamel.

I. Paint CI-OP-3Af - Concrete/Masonry, Latex Floor Enamel, 3 Coat:

1. One coat of alkali resistant primer.
2. Gloss: Two coats of latex floor enamel.

J. Paint CI-OP-3E - Concrete/Masonry, Epoxy Enamel, 3 Coat:

1. One coat of catalyzed epoxy primer.
2. Gloss: Two coats of catalyzed epoxy enamel.

K. Paint GI-OP-3A - Gypsum Board/Plaster, Latex, 3 Coat:

1. One coat of latex primer sealer.
2. Semi-gloss: Two coats of latex enamel.

L. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:

1. One coat of latex primer sealer.
2. Semi-gloss: Two coats of latex enamel.

M. Paint GI-OP-3LA - Gypsum Board/Plaster, Latex-Acrylic, 3 Coat:

1. One coat of latex primer sealer.
2. Semi-gloss: Two coats of latex-acrylic enamel.

2.5 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Plaster and Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.
4. Exterior Wood: 15 percent, measured in accordance with ASTM D 4442.
5. Concrete Floors: 8 percent.

3.2 PREPARATION

A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Concrete Floors to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

I. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

J. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

K. Interior Wood Items to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

L. Exterior Wood to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied. Back prime concealed surfaces before installation.

3.3 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat.

E. Sand wood surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

3.4 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Refer to Section 15075 and Section 16075 for schedule of color coding of equipment, duct work, piping, and conduit.

B. Paint shop-primed equipment, where indicated.

C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

D. Finish equipment, piping, conduit, and exposed duct work in utility areas in colors according to the color coding scheme indicated.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.5 FIELD QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for general requirements for field inspection.

B. Owner will provide field inspection.

3.6 CLEANING

A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site. Dispose of any such waste material in a legally acceptable manner.

3.7 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:

1. Items fully factory-finished unless specifically noted.
2. Fire rating labels, equipment serial number and capacity labels.
3. Stainless steel items.

B. Paint the surfaces described below under Schedule - Paint Systems.

C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.

1. Paint all insulated and exposed pipes, conduit, boxes, mechanical equipment, and electrical equipment occurring in finished areas, unless otherwise indicated.
2. Paint shop-primed items occurring in finished areas.

D. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

3.8 SCHEDULE - PAINT SYSTEMS

A. Concrete, Concrete Block, Brick Masonry: Finish all surfaces exposed to view, as indicated.

1. Interior: CI-OP-3L, semi-gloss.

B. Gypsum Board: Finish all surfaces exposed to view.

1. Interior Ceilings and Bulkheads: GI-OP-3L, flat.
2. Interior Walls: GI-OP-3A, semi-gloss.

C. Wood: Finish all surfaces exposed to view.

1. Exterior trim and frames: WE-OP-3A.
2. Interior trim and frames: WI-OP-3A, semi-gloss.

D. Steel Fabrications: Finish all surfaces exposed to view.

1. Exterior: ME-OP-3A, gloss; finish all surfaces, including concealed surfaces, before installation.
2. Interior: MI-OP-3L, gloss.

E. Galvanized Steel: Finish all surfaces exposed to view, as indicated.

F. Shop-Primed Metal Items: Finish all surfaces exposed to view, as indicated.

1. Finish the following items:
    a. Mechanical equipment.
    b. Electrical equipment.

END OF SECTION

DIVISION 05

ELECTRICAL

SECTION 05060

GROUNDING AND BONDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding electrodes and conductors, equipment grounding conductors, and bonding to complete grounding system consisting of:

1. Existing metal underground water pipe.
2. Metal frame of the building.
3. Concrete-encased electrode.
4. Rod electrodes.
5. Plate electrodes.
6. Active electrodes.

1.2 REFERENCES

A. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; latest edition.

B. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.3 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 25 ohms or less.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittals procedures.

B. Product Data: Provide for grounding electrodes and connections.

C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Project Record Documents: Record actual locations of components and grounding electrodes.

F. Certificate of Compliance: Indicate acceptance of installation by authority having jurisdiction.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70, Article 250.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 ELECTRODES

A. Grounding electrode system and grounding electrode conductor. NFPA 70, Article 250, Part III.

2.2 CONNECTORS AND ACCESSORIES

A. Grounding electrode system and grounding electrode conductor. NFPA 70, Article 250, Part VII.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

B. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.2 INSTALLATION

A. Install ground electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground.

B. Foundation Electrodes: No. 4.

C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing where indicated. Bond steel together.

D. Provide bonding to meet requirements described in Quality Assurance of this section.

E. Bond together reinforcing steel and metal accessories in pool and fountain structures; in accordance with NFPA 70, Article 250, Part IV and Article 680.

F. Install transient suppression plate where indicated.

G. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing. NFPA 70, Part VII.

H. Interface with lightning protection system. NFPA 70, Article 250.106.

3.3 FIELD QUALITY CONTROL

A. Owner will provide field inspection in accordance with Section 01400.

B. Inspect and test in accordance with NETA STD ATS except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.13.

END OF SECTION

SECTION 05070

HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Conduit and equipment supports.

B. Anchors and fasteners.

1.2 REFERENCES

A. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

B. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.3 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer’s catalog data for fastening systems.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MATERIALS

A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

B. Supports: Fabricated of structural steel or formed steel members; galvanized.

C. Anchors and Fasteners:

1. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
2. Steel Structural Elements: Use beam clamps, or welded fasteners.
3. Concrete Surfaces: Expansion anchors.
4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.

5. Sheet Metal: Use sheet metal screws.
6. Wood Elements: Use wood screws.

PART 3 EXECUTION

3.1 INSTALLATION

A. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".

1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
2. Obtain permission from City Engineer before drilling or cutting structural members.

B. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

C. Install surface-mounted cabinets and panel boards with minimum of four anchors.

D. In wet and damp locations use steel channel supports to stand cabinets and panel boards 1 inch off wall. In corrosive environments such as wet wells, chlorine rooms, pools, etc. supporting means such as strut and conduit straps shall be made of 316 stainless steel, fiberglass, or equal. Steel structural supports shall have an anti-corrosion epoxy coating or equal.

E. Use sheet metal channel to bridge studs above and below cabinets and panel boards recessed in hollow partitions.

END OF SECTION

SECTION 05075

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates and labels.

B. Wire and cable markers.

C. Conduit markers.

D. Field-painted identification of conduit.

1.2 RELATED SECTIONS

A. Section 04900 - Paints and Coatings.

1.3 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittals procedures.

B. Product Data: Provide catalog data for nameplates, labels, and markers.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.

1. Arc Flash Risk Assessment Labeling: Durable printed moisture and sunlight resistant adhesive label containing the following information-

a. A square box with black lettering on orange background containing the word ‘warning’ or red background containing the word ‘danger’ as appropriate

b. Calculated available fault current

c. System nominal voltage

d. Equipment name

e. Name and circuit number of upstream source feeding equipment

f. Calculated level of arc flash PPE required

g. Approach boundary dimensions

~~A.~~h. Information shall be obtained from an incident energy analysis and the method of calculation and data to support the information for the label shall be furnished to, and accepted by the City Engineer prior to affixing the label.

B. Locations:

1. Each electrical distribution and control equipment enclosure.

C. Letter Size:

1. Use 1/8 inch letters for identifying individual equipment and loads.

D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations, and appurtenant items.

2.2 WIRE MARKERS

A. Description: tape type wire markers or heat shrink.

B. Locations: Each conductor at panel board gutters, pull boxes, outlet boxes, and junction boxes and each load connection.

C. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings. 120/208-240 vault.

D. Phase ID: Black, red, blue, white, green, 120/208 - 240 volt and brown, orange, yellow, grey, green 277/480 volt. Insulated conductors sized AWG 6 and smaller shall have continuous colored outer insulation along its entire length. Conductors sized AWG 4 and larger shall be permitted to be field identified with at least 6 inches of phase tape neatly wrapped at all terminations, condulets, pull boxes, and similar.

2.3 CONDUIT MARKERS

A. Location: Furnish markers for each conduit longer than 6 feet.

B. Spacing: 20 feet on center.

2.4 UNDERGROUND WARNING TAPE

A. Description: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.2 INSTALLATION

A. Install nameplates and labels parallel to equipment lines.

B. Secure nameplates to equipment front using screws.

C. Identify underground conduits using underground warning tape. Install one tape per trench at 12 inches below finished grade.

END OF SECTION

SECTION 05123

BUILDING WIRE AND CABLE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wire and cable for 600 volts and less.

B. Wiring connectors and connections.

1.2 RELATED SECTIONS

A. Section 02112 - Trench Excavation.

B. Section 02115 - Excavation.

C. Section 02116 - Fill and Backfill: Bedding and backfilling.

D. Section 05075 - Electrical Identification.

1.3 REFERENCES

A. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; latest edition.

C. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for each wire and cable type.

C. Test Reports: Indicate procedures and values obtained.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency.

E. Project Record Documents: Record actual locations of components and circuits.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 WIRING REQUIREMENTS

A. Concealed Dry Interior Locations: Use only building wire with Type THHN insulation in raceway.

B. Exposed Dry Interior Locations: Use only building wire with Type THHN insulation in raceway.

C. Wet or Damp Interior Locations: Use only building wire with Type XHHW.

D. Exterior Locations: Use only building wire with Type THWN insulation in raceway.

E. Underground Installations: Use only building wire with Type XHHW-2 insulation in raceway.

F. Use stranded copper conductor for feeders and branch circuits.

G. Use stranded copper conductors for control circuits.

H. Use copper conductor not smaller than 12 AWG for power and lighting circuits.

I. Use copper conductor not smaller than 16 AWG for control circuits.

J. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet~~.~~ or calculated minimum size required by NFPA 70 for purposes of required voltage drop, whichever is greater.

K. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet or calculated minimum size required by NFPA 70 for purposes of required voltage drop, whichever is greater.~~.~~

L. Conductor sizes are based on copper.

2.2 BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: NFPA 70, Type THHN.

2.3 WIRING CONNECTORS

A. Solderless Pressure Connectors:

B. Spring Wire Connectors:

C. Compression Connectors:

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire and cable has been completed.

C. Verify that raceway installation is complete and supported.

D. Verify that field measurements are as indicated.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

A. Route wire and cable as required to meet project conditions.

1. Wire and cable routing indicated is approximate unless dimensioned.
2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.

B. Install wire and cable in accordance with the NECA "Standard of Installation."

C. Use wiring methods indicated.

D. Pull all conductors into raceway at same time.

E. Use suitable wire pulling lubricant.

F. Protect exposed cable from damage.

G. Use suitable cable fittings and connectors.

H. Neatly train and lace wiring inside boxes, equipment, and panel boards.

I. Clean conductor surfaces before installing lugs and connectors.

J. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

K. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

L. Identify and color code wire and cable under provisions of Section 16075. Identify each conductor with its circuit number or other designation indicated.

3.4 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.3.1.

END OF SECTION

SECTION 05131

CONDUIT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Conduit, fittings and conduit bodies.

1.2 RELATED SECTIONS

A. Section 05060 - Grounding and Bonding.

B. Section 05070 - Hangers and Supports.

C. Section 05075 - Electrical Identification.

D. Section 05138 - Boxes.

1.3 REFERENCES

A. ANSI C80.1 - American National Standard Specification for Rigid Steel Conduit -- Zinc Coated; latest edition.

B. ANSI C80.3 - American National Standard Specification for Electrical Metallic Tubing -- Zinc Coated; latest edition.

C. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies; National Electrical Manufacturers Association; latest edition.

E. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association; latest edition.

F. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80); National Electrical Manufacturers Association; latest edition.

G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; latest edition.

H. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittals procedures.

B. Product Data: Provide for metallic conduit, flexible metal conduit, liquid tight flexible metal conduit, metallic tubing, nonmetallic conduit, flexible nonmetallic conduit, nonmetallic tubing, fittings, and conduit bodies.

C. Project Record Documents: Accurately record actual routing of conduits larger than 2 inches.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept conduit on site. Inspect for damage.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

C. Protect PVC conduit from sunlight.

PART 2 PRODUCTS

2.1 CONDUIT REQUIREMENTS

A. Conduit Size: Comply with NFPA 70.

1. Minimum Size: 3/4 inch unless otherwise specified.

B. Underground Installations:

1. More than Five Feet from Foundation Wall: Use schedule 40 non-metallic conduit or schedule 80 thickwall non-metallic conduit.
2. Within Five Feet from Foundation Wall: Use plastic coated GRC conduit or thickwall GRC rigid conduit with corrosion tape.
3. In or Under Slab on Grade: Use schedule 40 conduit or schedule 80 thickwall non-metallic conduit.
4. Minimum Size: 1 inch.

C. Outdoor Locations Above Grade: Use rigid steel conduit or electrical metallic tubing.

D. In Slab Above Grade:

1. Use rigid steel conduit.
2. Maximum Size Conduit in Slab: one inch; 3/4 inch for conduits crossing each other.

E. Wet and Damp Locations: GRC, RSC.

F. Dry Locations:

1. Concealed: Use rigid steel conduit or electrical metallic tubing.
2. Exposed: GRC or RSC.

G. Corrosive Locations such as wet wells, chlorine rooms, pools, etc.: PVC coated GRC or RMC

~~2.~~

2.2 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

1. No Aluminum

C. Conduit must be threaded, no threadless fittings.~~thread/OSS fittings.~~

2.3 PVC COATED METAL CONDUIT

A. Description: NEMA RN 1; rigid steel conduit with external PVC coating, ~~20~~ 40 mil thick and 2 mil urethane interior lining and thread coating.

B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.4 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction.

B. Fittings: NEMA FB 1.

2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket.

B. Fittings: NEMA FB 1.

2.6 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron compression type.

2.7 NONMETALLIC CONDUIT

A. Description: NEMA TC 2; Schedule 40 PVC and Schedule 80 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.2 INSTALLATION

A. Install conduit in accordance with NECA Standard of Installation.

B. Install nonmetallic conduit in accordance with manufacturer's instructions.

C. Arrange supports to prevent misalignment during wiring installation.

D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

F. Fasten conduit supports to building structure and surfaces under provisions of Section 05070.

G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

H. Do not attach conduit to ceiling support wires.

I. Arrange conduit to maintain headroom and present neat appearance.

J. Route exposed conduit parallel and perpendicular to walls.

K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

L. Route conduit in and under slab from point-to-point.

M. Maintain adequate clearance between conduit and piping.

N. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.

O. Cut conduit square using saw or pipe cutter; de-burr cut ends.

P. Bring conduit to shoulder of fittings; fasten securely.

Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

R. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.

S. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch size.

T. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

U. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic.

V. Provide suitable pull string, rated for 200 pounds tensile strength, in each empty conduit except sleeves and nipples.

W. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

X. Ground and bond conduit as required.

Y. Identify conduit under provisions of Section 05075.

END OF SECTION

SECTION 05138

BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall, ceiling, and floor outlet boxes.

B. Pull and junction boxes.

1.2 RELATED SECTIONS

A. Section 05139 - Cabinets and Enclosures.

B. Section 05140 - Wiring Devices: Wall plates in finished areas.

1.3 REFERENCES

A. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies; National Electrical Manufacturers Association; latest edition.

C. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports; National Electrical Manufacturers Association; latest edition.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; latest edition.

E. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc., as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.

B. Cast Boxes: NEMA FB 1, Type FD, Malleable Iron. Provide gasketed cover by box manufacturer. Provide threaded hubs.

C. Wall Plates for Finished Areas: As specified in Section 05140.

2.2 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 16139.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:

1. Material: Galvanized cast iron.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover and screws.

D. In-Ground Cast Metal Box: NEMA 250, Type 6, outside flanged, recessed cover box for flush mounting:

1. Material: Galvanized cast iron.
2. Cover: Smooth cover with neoprene gasket and stainless steel cover screws.
3. Cover Legend: "ELECTRIC".

~~3.~~E. Corrosive environments shall use NEMA type 4X or type 12 boxes of fiberglass or stainless steel construction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

3.2 INSTALLATION

A. Install boxes in accordance with NECA "Standard of Installation."

B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.

C. Coordinate installation of outlet boxes for equipment connected under Section 05155.

D. Set wall mounted boxes at elevations to accommodate mounting heights specified in section for outlet device.

E. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.

1. Adjust box locations up to 10 feet if required to accommodate intended purpose.

F. Orient boxes to accommodate wiring devices oriented as specified in Section 05140.

G. Maintain headroom and present neat mechanical appearance.

H. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

I. Locate outlet boxes to allow luminaries positioned as shown on reflected ceiling plan.

J. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

K. Use flush mounting outlet box in finished areas.

L. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

M. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.

N. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

O. Use stamped steel bridges to fasten flush mounting outlet box between studs.

P. Use adjustable steel channel fasteners for hung ceiling outlet box.

Q. Do not fasten boxes to ceiling support wires.

R. Support boxes independently of conduit.

S. Use gang box where more than one device is mounted together. Do not use sectional box.

T. Use cast outlet box in exterior locations exposed to the weather and wet locations.

U. Large Pull Boxes: Use hinged enclosure in interior dry locations, Nema 12 cast metal box in other locations.

3.3 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused box openings.

3.4 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 05139

CABINETS AND ENCLOSURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hinged cover enclosures.

B. Cabinets.

C. Terminal blocks.

D. Accessories.

1.2 RELATED SECTIONS

A. Section 05070 - Hangers and Supports.

1.3 REFERENCES

A. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; latest edition.

C. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks; National Electrical Manufacturers Association; latest edition.

D. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard data for enclosures and cabinets.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

1.6 MAINTENANCE MATERIALS

A. Furnish two of each key.

PART 2 PRODUCTS

2.1 HINGED COVER ENCLOSURES

A. Construction: NEMA 250, Type 4 steel enclosure.

B. Covers: Continuous hinge, held closed by flush latch operable by screwdriver.

C. Provide interior metal back panel for mounting terminal blocks and electrical components; finish with white enamel.

D. Enclosure Finish: Manufacturer's standard enamel.

2.2 CABINETS

A. Boxes: Galvanized steel (NEMA 4).

B. Backpan: Provide metal back pan for mounting terminal blocks. Paint white enamel.

C. Fronts: Steel, flush type with concealed trim clamps, door with concealed hinge, and flush lock keyed to match branch circuit panelboard. Finish with gray baked enamel.

D. Provide metal barriers to form separate compartments wiring of different systems and voltages.

E. Provide concrete housekeeping pad 4" thick ~~accessory feet~~ for free-standing equipment.

2.3 TERMINAL BLOCKS

A. Terminal Blocks: NEMA ICS 4.

B. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.

C. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 600 volts.

D. Provide ground bus terminal block, with each connector bonded to enclosure.

2.4 ACCESSORIES

A. Plastic Raceway: Plastic channel with hinged or snap-on cover.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with NECA Standard of Installation.

B. Clearances in accordance to NFPA70E.

C. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner under the provisions of Section 05070.

D. Install cabinet fronts plumb.

E. In locations where splashing may occur due to water leaks, or locations that are otherwise considered damp or wet, cabinets should only be penetrated in bottom to reduce equipment damage caused by ingress of water. If conduits originate from above cabinet or enclosure, they should be routed beside cabinet and brought into bottom by use of wireway, liquidtite, or similar means.

~~D.~~F. In corrosive areas such as wet wells, chlorine rooms, pools, etc., enclosures and cabinets should be of NEMA type 4X or type 12 construction. If fiberglass is used, bond bushings

3.2 CLEANING

A. Clean electrical parts to remove conductive and harmful materials.

B. Remove dirt and debris from enclosure.

C. Clean finishes and repair damage.

END OF SECTION

SECTION 05140

WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Device plates and decorative box covers.

1.2 RELATED SECTIONS

A. Section 05138 - Boxes.

1.3 REFERENCES

A. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

B. NEMA WD 1 - General Requirements for Wiring Devices; National Electrical Manufacturers Association; latest edition.

C. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; latest edition.

D. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Manufacturer's Installation Instructions.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 WALL SWITCHES

A. Wall Switches: NEMA WD 1, Heavy Duty, AC only general-use snap switch.

1. Body and Handle: Ivory plastic with toggle handle.
2. Ratings:
    a. Voltage: 120 volts, AC.
    b. Current: 20 amperes.

2.2 RECEPTACLES

A. Receptacles: NEMA WD 1, Heavy duty.

1. Device Body: Ivory plastic.
2. Ratings:
    a. Voltage: 120 volts, AC.
    b. Current: 20 amperes.
3. Configuration: NEMA WD 6, type as specified and indicated.

B. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory Requirements (20 AMP).

2.3 WALL PLATES

A. Decorative Cover Plates: Stainless Steel.

B. Jumbo Cover Plates: Stainless Steel.

C. Weatherproof Cover Plates: Gasketed cast metal hinged.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that outlet boxes are installed at proper height.

B. Verify that wall openings are neatly cut and will be completely covered by wall plates.

C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install in accordance with NECA "Standard of Installation."

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Install receptacles with grounding pole on bottom.

E. Connect wiring device grounding terminal to outlet box with bonding jumper.

F. Install decorative plates on switch, receptacle, and blank outlets in finished areas. Include printed label denoting circuit number and panel of origin.

G. Connect wiring devices by wrapping conductor around screw terminal.

H. Use jumbo size plates for outlets installed in masonry walls.

I. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, on surface mounted outlets and label.

3.4 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 01400.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify that each receptacle device is energized.

E. Test each receptacle device for proper polarity. Indicate that voltage drops are within limits required by NFPA 70 by means of voltage drop load testing at each receptacle location and document tested values. Test documents shall be furnished to City Engineer or designee at final inspection.

F. Test each GFCI receptacle device for proper operation.

3.5 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.6 CLEANING

A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 05155

EQUIPMENT WIRING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical connections to equipment.

1.2 RELATED SECTIONS

A. Section 05131 - Conduit.

B. Section 05123 - Building Wire and Cable.

C. Section 05138 - Boxes.

D. Section 05140 - Wiring Devices.

1.3 REFERENCES

A. NEMA WD 1 - General Requirements for Wiring Devices; National Electrical Manufacturers Association; latest edition.

B. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; latest edition.

C. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

1.6 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation of equipment.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.

1. Attachment Plug Construction: Conform to NEMA WD 1.
2. Cord Construction: NFPA 70, Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

B. Disconnect Switches: As specified in applicable Sections and in individual equipment sections.

C. Wiring Devices: As specified in Section 05140.

D. Flexible Conduit: As specified in Section 05131.

E. Wire and Cable: As specified in Section 05123.

F. Boxes: As specified in Section 05138.

2.2 EQUIPMENT CONNECTIONS

A. Electrical equipment shall be connected as indicated:

1. Electrical Connection: Flexible conduit where required.
2. Electrical Connection: Cord and plug (NEMA 6-20R).
3. Provide field-installed disconnect switch.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

~~I.~~J. Tighten electrical connections to manufacturer recommended torque values. For all busbars and wires 4AWG or larger, document applied torque values for each fastener and lug screw and apply a witness mark of anti-sabotage lacquer to each. Furnish torque value sheet to City Engineer or designee at final inspection.

END OF SECTION

SECTION 05210

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Meter bases.

1.2 REFERENCES

A. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

B. NFPA 70 - National Electrical Code; National Fire Protection Association.

C. RMP 6 State ESR.

1.3 SYSTEM DESCRIPTION

A. Service Entrance: as acceptable to the electrical utility company.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide ratings and dimensions of transformer cabinets and meter bases.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with utility company written requirements and NFPA 70.

1. Maintain one copy of each document on site.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Meter: Furnished by utility company.

B. Utility Transformer Pad: Prefabricated precast concrete transformer pad with cable pit or vault as required by utility company.

C. Other Components: As required by utility company.

PART 3 EXECUTION

3.1 PREPARATION

A. Arrange with utility company to obtain permanent electric service to the Project.

B. Verify that field measurements are as indicated on utility company drawings.

3.2 INSTALLATION

A. Install service rack, weatherhead, transformer pad, metering transformer cabinets, and meter base as required by utility company.

B. Install in accordance with NECA "Standard of Installation" & NFPA 70, RMP 6 State ESR.

END OF SECTION

SECTION 05412

ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fusible switches.

1.2 REFERENCES

A. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

B. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; latest edition.

C. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; latest edition.

D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; latest edition.

E. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.3 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide switch ratings and enclosure dimensions.

C. Project Record Documents: Record actual locations of enclosed switches.

1.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.

C. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Fusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.

1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
2. Handle lockable in OFF position.

3. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses.

B. Enclosures: NEMA KS 1.

1. Interior Dry Locations: Type 1.
2. Exterior Locations: Type 3R.
3. Booster Pump, Well House, and Vault locations: NEMA Type 4.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with NECA Standard of Installation.

B. Install fuses in fusible disconnect switches.

C. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.2 FIELD QUALITY CONTROL

A. Perform field inspection in accordance with Section 01400.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.5.

END OF SECTION

SECTION 05423

ENCLOSED MOTOR CONTROLLERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manual motor controllers.

B. Magnetic motor controllers.

C. Automatic Controllers

D. Combination magnetic motor controllers and disconnects.

E. Soft Start

F. SPD – Surge Protection Device

1.2 RELATED SECTIONS

A. Section 05070 - Hangers and Supports.

B. Section 05075 - Electrical Identification: Engraved nameplates.

C. Section 05425-Variable Frequency Controller

D. Section 05491 - Fuses.

1.3 REFERENCES

A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; National Electrical Manufacturers Association; latest edition.

B. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives; National Electrical Manufacturers Association; latest edition.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; latest edition.

D. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

E. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches; National Electrical Manufacturers Association; latest edition.

F. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC; National Electrical Manufacturers Association; latest edition.

G. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices; National Electrical Manufacturers Association; latest edition.

H. NEMA ICS 6 - Industrial Control and Systems: Enclosures; National Electrical Manufacturers Association; latest edition.

I. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; latest edition.

J. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; latest edition.

K. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching/overcurrent protective devices, short circuit ratings, dimensions, enclosure details.

C. Test Reports: Indicate field test and inspection procedures and test results.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Maintenance Data: Replacement parts list for controllers.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.

C. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Weg SSW07 series or equal

~~A.~~B. Substitutions: See Section 01600 - Product Requirements.

2.2 MANUAL CONTROLLERS

A. Manual Motor Controllers: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller with overload element, red pilot light, NO auxiliary contact, and push button operator.

B. Fractional Horsepower Manual Controllers: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light, and key operator.

C. Motor Starting Switches: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, with red pilot light and key operator.

D. Enclosures: NEMA ICS 6, NEMA Type4.

2.3 AUTOMATIC CONTROLLERS

A. Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower, with motor circuit protector.

B. Reversing Controllers: Include electrical interlock and integral time delay transition between FORWARD and REVERSE rotation.

C. Two-Speed Controllers: Include integral time delay transition between FAST and SLOW speeds.

D. Coil Operating Voltage: 120 volts, 60 Hertz.

E. Overload Relays: NEMA ICS 2; bimetal.

F. Motor Circuit Protector: NEMA AB 1, circuit breakers with integral instantaneous magnetic trip in each pole. All controllers shall include a three phase motor protector; Motor Saver Model 777.

G. Enclosures: NEMA ICS 6, NEMA Type 4.

H. SPD – An appropriate Surge Protection Device necessary to limit transient overvoltage's of atmospheric origin and divert current waves to ground.

2.4 ACCESSORIES

A. Auxiliary Contacts: NEMA ICS 2, 2 normally open contacts in addition to seal-in contact.

B. Cover Mounted Pilot Devices: NEMA ICS 5, standard duty oil-tight type.

C. Pilot Device Contacts: NEMA ICS 5, Form Z, rated A150.

D. Pushbuttons: Unguarded type.

E. Indicating Lights: LED.

F. Selector Switches: Rotary type.

G. Relays: NEMA ICS 2.

H. Control Power Transformers: 120 volt secondary, primary as required, in each motor starter. Provide fused primary, secondary, and bond unfused leg of secondary to enclosure.

I. Remote HMI: Furnish and install remote human machine interface panel for RVSS on panel door near pushbuttons and switches.

~~H.~~

2.5 COMBINATION CONTROLLERS

A. Combination Controllers: Combine motor controllers with disconnects in common enclosure. Obtain IEC Class 2 coordinated component protection.

B. Thermal Magnetic Circuit Breakers: NEMA AB 1, with integral thermal and instantaneous magnetic trip in each pole.

C. Motor Circuit Protector: NEMA AB 1, circuit breakers with integral instantaneous magnetic trip in each pole. All controllers shall include a three phase motor protector; Motor Saver Model 777.

D. Nonfusible Switch Assemblies: NEMA KS 1, enclosed knife switch with externally operable handle.

E. Fusible Switch Assemblies: NEMA KS 1, enclosed knife switch with externally operable handle. Fuse clips: Designed to accommodate Class R fuses.

F. SPD – An appropriate Surge Protection Device necessary to limit transient overvoltage's of atmospheric origin and divert current waves to ground.

2.6 SOFT START

A. All controllers for pump motors shall include soft start operation. The soft start shall provide adjustable ramp times for starting and stopping pumps to minimize system hammers. Soft starts shall be compatible with the controllers, and shall be inspected and accepted by the City Engineer.

B. SPD – An appropriate Surge Protection Device necessary to limit transient overvoltage's of atmospheric origin and divert current waves to ground.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install enclosed controllers where indicated, in accordance with NECA Standard of Installation, NFPA70.

B. Install enclosed controllers plumb. Provide supports in accordance with Section 05070.

C. Height: 5 feet to operating handle.

D. Provide fuses for fusible switches; refer to Section 05491 for product requirements.

E. Select and install overload heater elements in motor controllers to match installed motor characteristics.

F. Provide engraved plastic nameplates; refer to Section 05075 for product requirements and location.

G. Neatly type label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.

H. Provide clearances around enclosed controllers according to NECA Standards & NFPA70E.

3.2 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.16.2.

END OF SECTION

SECTION 05425

VARIABLE FREQUENCY CONTROLLERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Variable frequency controllers.

1.2 RELATED SECTIONS

A. Section 05075 - Electrical Identification: Engraved nameplates.

B. Section 05491 - Fuses.

1.3 REFERENCES

A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; National Electrical Manufacturers Association; latest edition.

B. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives; National Electrical Manufacturers Association; latest edition.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; latest edition.

D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; latest edition.

E. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

D. Test Reports: Indicate field test and inspection procedures and test results.

E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Manufacturer's Field Reports: Indicate start-up inspection findings.

G. Operation Data: NEMA ICS 7.1. Include instructions for starting and operating controllers, and describe operating limits that may result in hazardous or unsafe conditions.

H. Maintenance Data: NEMA ICS 7.1. Include routine preventive maintenance schedule.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.

C. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

D. Conform to requirements of IEEE 519-1992.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.7 MAINTENANCE SERVICE

A. Provide service and maintenance of controller during the warranty period.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Schneider Altivar 600 series or equal.

~~A.~~B. Substitutions: See Section 01600 - Product Requirements.

2.2 DESCRIPTION

A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.

1. Employ microprocessor-based inverter logic isolated from power circuits.
2. Design for ability to operate controller with motor disconnected from output.
3. Harmonies Filter to meet IEEE 519 Levels

B. Enclosures: NEMA 250, Type 4, suitable for equipment application in places regularly open to the public.

C. Finish: Manufacturer's standard enamel.

2.3 OPERATING REQUIREMENTS

A. Displacement Power Factor: Between 1.0 and 0.95, lagging, over entire range of operating speed and load.

B. Operating Ambient: 0 degrees C to 40 degrees C.

C. Minimum Efficiency at Full Load: as per manufacturer's standard design.

D. Time to Stop: as per manufacturer's recommendations.

E. Volts Per Hertz Adjustment: Plus or minus 10 percent.

F. Current Limit Adjustment: 60 to 110 percent of rated.

G. Acceleration Rate Adjustment: 0.5 to 30 seconds.

H. Deceleration Rate Adjustment: 1 to 30 seconds.

I. Input Signal: 4 to 20 mA.

2.4 COMPONENTS

A. Display: Provide integral digital display to indicate output voltage, output frequency, and output current.

B. Status Indicators: Separate indicators for over-current, over-voltage, ground fault, over-temperature, and input power ON.

C. Furnish HAND-OFF-AUTOMATIC selector switch and manual speed control.

D. Include under-voltage release.

E. Control Power Source: If separate circuit is used, a separate indicating pilot light shall be equipped on door front to indicate if control power is present. Light shall be labeled 'control power', and shall list circuit and panel of origin. ~~Control Power Source: Separate Circuit.~~

F. Door Interlocks: Furnish mechanical means to prevent opening of equipment with power connected, or to disconnect power if door is opened; include means for defeating interlock by qualified persons.

G. Safety Interlocks: Furnish terminals for remote contact to inhibit starting under both manual and automatic mode.

H. Control Interlocks: Furnish terminals for remote contact to allow starting in automatic mode.

I. Manual Bypass: Furnish contactor, motor running overload protection, and short circuit protection for full voltage, non-reversing operation of the motor. Include isolation switch to allow maintenance of inverter during bypass operation.

~~J. Emergency Stop: Use dynamic brakes for emergency stop function.~~

~~K. Disconnecting Means: Include integral fused disconnect switch on the line side of each controller.~~

~~L.~~J. Wiring Terminations: Match conductor materials and sizes indicated.

2.5 SOURCE QUALITY CONTROL

A. Shop inspect and perform standard productions tests for each controller.

B. Make completed controller available for inspection at manufacturer's factory prior to packaging for shipment. Notify Owner at least 7 days before inspection is allowed.

C. Allow witnessing of factory inspections and tests at manufacturer's test facility. Notify Owner at least 7 days before inspections and tests are scheduled.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surface is suitable for controller installation.

B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

C. Verify that field measurements are as indicated on shop drawings.

3.2 INSTALLATION

A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.

B. Tighten accessible connections and mechanical fasteners after placing controller.

C. Provide fuses in fusible switches; refer to Section 05491 for product requirements.

D. Select and install overload heater elements in motor controllers to match installed motor characteristics.

E. Provide engraved plastic nameplates; refer to Section 05075 for product requirements and location.

F. Neatly type label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place in clear plastic holder.

~~F.~~G. VFD shall be located in climate controlled conditions. If room heating and air conditioning are not present, cabinet heating (for humidity control) and air conditioning shall be provided.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.16.2.

3.4 MANUFACTURER'S FIELD SERVICES

A. Provide the service of the manufacturer's field representative to prepare and start controllers.

3.5 ADJUSTING

A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.6 DEMONSTRATION

A. Demonstrate operation of controllers in automatic and manual modes.

END OF SECTION

SECTION 05443

PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Distribution panel boards.

B. Branch circuit panel boards.

C. Load centers.

1.2 RELATED SECTIONS

A. Section 05075 - Electrical Identification.

1.3 REFERENCES

A. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; latest edition.

B. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches; National Electrical Manufacturers Association; latest edition.

C. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC; National Electrical Manufacturers Association; latest edition.

D. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association; latest edition.

E. NEMA PB 1 - Panel boards; National Electrical Manufacturers Association; latest edition.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panel boards Rated 600 Volts or Less; National Electrical Manufacturers Association; latest edition.

G. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; latest edition.

H. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations of panel boards and record actual circuiting arrangements.

E. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

1.6 MAINTENANCE MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Furnish two of each panel board key.

PART 2 PRODUCTS

2.1 DISTRIBUTION PANELBOARDS

A. Description: NEMA PB 1, circuit breaker type.

B. Panel board Bus: Copper, ratings as indicated. Provide copper ground bus in each panel board.

C. Minimum integrated short circuit rating: 65,000 AIC.

D. Fusible Switch Assemblies: NEMA KS 1, bolt on circuit breakers, quick-make, quick-break, load interrupter with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse clips.

E. Molded Case Circuit Breakers: NEMA AB 1, bolt on circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits and motors.

F. Current Limiting Molded Case Circuit Breakers: NEMA AB 1, bolt on circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size Class RK-5 fuse.

G. Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower, with bimetal overload relay.

1. Coil operating voltage: 120 volts, 60 Hz.
2. Size as shown on Drawings.
3. Provide unit mounted control power transformer, RED indicating light in front cover.

H. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.

I. Enclosure: NEMA PB 1 cabinet box; type and size as required.

J. Cabinet Front: Surface type, fastened with concealed trim clamps, hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

2.2 BRANCH CIRCUIT PANELBOARDS

A. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panel board.

B. Panel board Bus: Copper, ratings as indicated. Provide copper ground bus in each panel board; provide insulated ground bus where scheduled.

C. Minimum Integrated Short Circuit Rating: As indicated.

D. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles.

1. Type SWD for lighting circuits.
2. Class A ground fault circuit interrupter breakers where scheduled.

E. Current Limiting Molded Case Circuit Breakers: NEMA AB 1, bolt on circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size Class RK-5 fuse.

F. Enclosure: NEMA PB 1, Type 1; Indoor, Outdoor-3R, Booster, well and vault-type 4.

G. Cabinet Front: Flush cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

2.3 LOAD CENTERS

A. Description: Circuit breaker load center, with bus ratings as indicated.

B. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical.

C. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles.

1. Type SWD for lighting circuits.
2. Class A ground fault circuit interrupter breakers where indicated.

D. Enclosure: NEMA PB 1, Type 1. Indoor, Outdoor-3R, Booster, well and vault-type 4.

E. Box: Flush type with door, and pull ring and latch on door. Finish in manufacturer's standard gray enamel.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install panel boards in accordance with NEMA PB 1.1 and the NECA Standard of Installation.

B. Install panel boards plumb. Install recessed panel boards flush with wall finishes.

C. Height: 6 feet to top of panel board; install panel boards taller than 6 feet with bottom no more than 4 inches above floor.

D. Provide filler plates for unused spaces in panel boards.

E. Provide typed circuit directory for each branch circuit panel board. Revise directory to reflect circuiting changes required to balance phase loads. Circuit location shall describe area served in a uniquely identifiable manner such as “NE Hallway lighting” or “Mezzanine Receptacles” and shall not be ambiguous or repetitive descriptions such as “Lighting” or “Receptacle”.~~be uniquely and adequately descriptive.~~

F. Provide engraved plastic nameplates under the provisions of Section 05075.

G. Provide spare conduits out of each recessed panel board to an accessible location above ceiling. Identify each as SPARE.

H. Ground and bond panel board enclosure as required by NFPA70.

3.2 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01400.

B. Inspect and test in accordance with NETA STD ATS, except Section 4.

C. Perform inspections and tests listed in NETA STD ATS, Section 7.4 for switches, Section 7.5 for circuit breakers.

3.3 ADJUSTING

A. Measure steady state load currents at each panel board feeder; rearrange circuits in the panel board to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 05510

INTERIOR LUMINAIRES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior luminaries for buildings to include:

1. Interior luminaires and accessories.
2. Ballasts.
3. Lamps.
4. Luminaire accessories.

1.2 REFERENCES

A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; latest edition.

~~B. ANSI C82.1 - American National Standard Specifications for Fluorescent Lamp Ballasts; latest edition.~~

~~C.~~B. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; latest edition.

~~D.~~C. NFPA 70 - National Electrical Code; National Fire Protection Association.

~~E.~~D. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association.

1.3 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

C. Product Data: Provide dimensions, ratings, and performance data.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Operation and Maintenance Data: Instructions for each product.

1.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 and NFPA 101.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

1.5 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Furnish one replacement lamps for each lamp type.

C. Furnish one of each ballast type.

PART 2 PRODUCTS

2.1 LUMINAIRES

A. Furnish products as indicated in Schedule included on the Drawings.

B. Substitutions: See Section 01600 - Product Requirements.

~~2.2 BALLASTS AND CONTROL UNITS~~

~~A. Fluorescent Ballasts: ANSI C82.1, high power factor type electronic ballast, suitable for lamps specified.~~

~~1. Voltage: 120 volts.~~

~~2. Certify fluorescent ballast design and construction by Certified Ballast Manufacturers, Inc.~~

~~2.3~~2.2 LAMPS

A. Lamp Types: As specified for each luminaire.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install suspended luminaires using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.

B. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

C. Install wall mounted luminaires at height as indicated on Drawings.

D. Install accessories furnished with each luminaire.

E. Connect luminaires to branch circuit outlets provided under Section 05138 using flexible conduit.

F. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

H. Install specified lamps in each emergency lighting unit.

3.2 FIELD QUALITY CONTROL

A. Perform field inspection in accordance with Section 01400.

B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

A. Aim and adjust luminaires as indicated.

3.4 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosures.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finishes and repair damage.

3.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate luminaire operation for minimum of two hours.

3.6 PROTECTION

A. Re-lamp luminaires that have failed lamps at Substantial Completion.

END OF SECTION

SECTION 05520

EXTERIOR LUMINAIRES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Exterior luminaires for buildings, such as pump houses, to include:

1. Exterior luminaires and accessories.
2. Ballasts.
3. Lamps.
4. Luminaire accessories.

1.2 REFERENCES

A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; latest edition.

~~B. ANSI C82.1 - American National Standard Specifications for Fluorescent Lamp Ballasts; latest edition.~~

~~C.~~B. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type); latest edition.

~~D.~~C. NFPA 70 - National Electrical Code; National Fire Protection Association.

1.3 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate dimensions and components for each luminaire which is not a standard product of the manufacturer.

C. Product Data: Provide dimensions, ratings, and performance data.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Maintenance Data: For each luminaire.

1.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Electrical Components: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

1.5 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Furnish one of each type and wattage lamp installed.

PART 2 PRODUCTS

2.1 LUMINAIRES

A. Furnish products as indicated in Schedule included on the Drawings.

B. Substitutions: See Section 01600 - Product Requirements.

2.2 BALLASTS

~~A. Fluorescent Ballasts: ANSI C82.1, high power factor type electronic ballast, suitable for lamps specified.~~

~~1. Provide low-temperature ballast suitable for lamps specified.~~

~~2. Voltage: 120 volts.~~

~~3. Certify fluorescent ballast design and construction by Certified Ballast Manufacturers, Inc.~~

~~4. Substitutions: See Section 01600 - Product Requirements.~~

~~B. High Intensity Discharge (HID) Pulse Start Ballasts: ANSI C82.4, mercury vapor lamp ballast, suitable for lamp specified.~~

~~1. Voltage: 120 volts.~~

~~C.~~A. LED

1. Voltage: 120 volts.

2.3 LAMPS

A. Lamp Types: As specified for each luminaire.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install luminaires as indicated on the drawings.

B. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

C. Install accessories furnished with each luminaire.

D. Connect luminaires to branch circuit outlets provided under Section 05138.

E. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

F. Bond products and metal accessories to branch circuit equipment grounding conductor.

G. Install lamps in each luminaire.

3.2 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 01400.

B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.3 ADJUSTING

A. Aim and adjust luminaires to provide illumination levels and distribution as recommended by the manufacturer.

3.4 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosures.

C. Clean photometric control surfaces as recommended by the manufacturer.

D. Clean finishes and repair damage.

3.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate luminaire operation for minimum of two hours.

3.6 PROTECTION OF FINISHED WORK

A. Re-lamp luminaires which have failed lamps at Substantial Completion.

END OF SECTION

SECTION 05530

STREET LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Street lighting for City streets.

1.2 RELATED SECTIONS

A. Section 02112 - Trenching.

B. Section 05131 - Conduit.

C. Section 05123 - Building Wire and Cable.

D. Section 05138 - Boxes.

E. Section 05140 - Wiring Devices.

F. Section 05155 - Equipment Wiring.

1.3 REFERENCES

A. See appropriate sections of these specifications.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their standards for the purpose specified and indicated.

1.6 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's installation instructions for equipment furnished under this and other sections.

B. Determine connection locations and requirements. Lights shall be 120 v. nominal to ground.

C. Coordinate all work on lighting system with Rocky Mountain Power.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.1 MATERIALS

A. Street lights, including poles and luminaires, shall be as indicated on the drawings.

1. Manufacturer: HADCO Division of Genlyte Thomas Group L.L.C.

B. Disconnect Switches: As specified in applicable Sections and in individual equipment sections.

C. Wiring Devices: As specified in Section 05140.

D. Wire and Cable: As specified in Section 05123.

E. Boxes: As specified in Section 05138. Junction box lids to be marked “Saratoga Springs Electric”.

F. Concrete: As specified in Section 03300.

G. Conduit: As specified in Section 05131.

PART 3 EXECUTION

3.1 PREPARATION

A. Private Street Lights:

1. Must be master-metered and
2. Shall not contain any City identification, such as the City logo.

B. Verify location of street light with Project Engineer.

C. Verify location and type of power source with Rocky Mountain Power.

3.2 INSTALLATION - STREET LIGHTS

A. Construct concrete base for light pole; size and type to be according to manufacturer’s written instructions and recommendations. Anchor bolts shall be installed according to manufacturer’s template.

B. Install light poles and luminaires, with lamps, in accordance with manufacturer’s written instructions and recommendations. Poles shall be plumb and securely attached to the concrete base.

C. Install an electrical junction box near the base of each light pole.

D. Install an Electrical junction/fuse ground box four to ten feet from Rocky Mountain Power source, as indicated on drawings and according to the Rocky Mountain Power Streetlight Point of Disconnect Diagram.

E. Install underground electrical conductors in conduit from electrical junction/fuse ground box

(Rocky Mountain Power Street Light point of Disconnect Ground Box) to electrical junction ground box at streetlight pole, as indicated on the drawings. Conductors shall be #6, Copper, XHHW-2. Trenching shall be done as described in Section 02112. Conduit to be installed with sand bedding and 24-inches of cover. Trenches shall be backfilled and compacted to required densities.

F. The neutral conductor shall be bonded (as per NFPA 70, 250.4) at the Rocky Mountain Power Street Light Point of Disconnect Ground Box.

G. Connection to power source will be made by Rocky Mountain Power. The contractor shall leave a 5- foot pig-tail at the Power source to be used for the connection. The contractor shall provide a trench and run the conduit from the electrical junction/fuse ground box (Rocky Mountain Power Street Light point of Disconnect Ground Box) to the source, as required by Rocky Mountain Power.

H. Make electrical connection to light poles in accordance with equipment manufacturer's instructions and as indicated on the drawings.

I. All work shall be done in accordance with the National Electrical Code (NEC) and International Building Code (IBC) and, where applicable, with the requirements of Rocky Mountain Power.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 01400.

B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.4 ADJUSTING

A. Aim and adjust luminaires to provide illumination levels and distribution as recommended by the manufacturer.

3.5 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosures.

C. Clean finishes and repair damage.

3.6 OPERATIONAL DEMONSTRATION

A. Demonstrate luminaire operation by verifying with City Inspector it’s continuous operation for a minimum of 48 hours.

3.7 PROTECTION OF FINISHED WORK

A. Re-lamp luminaires which have failed lamps at Substantial Completion.

END OF SECTION

SECTION 05540

OUTDOOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outdoor lighting

1.2 RELATED SECTIONS

A. Section 02112 - Trenching.

B. Section 05131 - Conduit.

C. Section 05123 - Building Wire and Cable.

D. Section 05138 - Boxes.

E. Section 05140 - Wiring Devices.

F. Section 05155 - Equipment Wiring.

1.3 REFERENCES

A. Illuminating Engineering Society of North America (IESNA) Lighting Handbook.

B. See appropriate related sections of these specifications.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as meeting their requirements for the purpose specified and indicated.

1.6 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's installation instructions for equipment furnished under this and other sections.

B. Determine connection locations and requirements.

C. Coordinate all work on lighting systems with Rocky Mountain Power.

D. Sequence electrical connections to coordinate with start-up of equipment.

1.7 LIGHTING REQUIREMENTS AND DESIGN STANDARDS

A. The purpose of lighting requirements is to require and set minimum standards for outdoor lighting to:

1. Provide for and control lighting in outdoor public places where public health, safety and welfare are potential concerns.
2. Protect drivers and pedestrians from the glare of non-vehicular light sources.
3. Protect neighbors and the night sky from nuisance glare and light trespass from improperly selected or poorly placed, aimed, applied, maintained or shielded light sources.
4. Promote energy-efficient lighting design and operation.
5. Protect and retain the intended visual character of the various venues of the City.

B. Applicability.

1. Uses that are proposed to operate during hours of darkness where there is public assembly and traverse, including but not limited to the following: residential, commercial, industrial, parking lots, sales lots, recreational and institutional uses, and sign, billboard, architectural and landscape lighting applications.
2. The City may require lighting be incorporated for other uses, applications and locations.
3. The glare-control requirements herein contained apply to lighting in all uses, applications and locations.

C. Definitions.

1. Lighting definitions shall be as described in the IESNA Lighting Handbook. If there is a difference between what is provided for here and the most recent edition of the IESNA Lighting Handbook, the terms found in the most recent edition will prevail. If there is a standard herein that is not contained in the most recent edition of the IESNA Lighting Handbook, the standard herein shall be imposed unless inconsistent with the most recent edition of the IESNA Lighting Handbook
2. The following definitions are selected from the Handbook for ready reference.
    a. Full Cutoff - attribute of a lighting fixture from which no light is emitted at or above a horizontal plane drawn through the bottom of the fixture, and no more than 10% of the lamp's intensity is emitted at or above an angle 10 degrees below that horizontal plane, at all lateral angles around the fixture.
    b. Cutoff - attribute of a lighting fixture from which no more than 2.5% of the lamp's intensity is emitted at a horizontal plane drawn through the bottom of the fixture or above, and no more than 10% of the lamp's intensity is emitted at or above an angle 10 degrees below that horizontal plane, at all lateral angles around the fixture.
    c. Fully Shielded – attribute of a lighting fixture provided with internal and/or external shields and louvers to prevent brightness from lamps, reflectors, refractors and lenses from causing glare at normal viewing angles.
    d. Glare - excessive brightness in the field of view that causes loss in visual performance or annoyance, so as to jeopardize health, safety or welfare.

e. Light Trespass – light emitted by a lighting fixture or installation, which is cast beyond the boundaries of the property on which the lighting installation is sited.

D. Design Criteria.

1. Illumination Levels. Outdoor lighting, as allowed by the City, shall have intensities and uniformities and glare control in accordance with the current recommended practices of the IESNA a contained in the latest edition of the IESNA Lighting Handbook and applicable Recommended Practices, except as may otherwise be required by the City.
    a. The design calculations for outdoor lighting installations shall be in accordance with the Lighting Handbook. This is includes, but is not limited to, calculation methods and procedures, photometric classifications, and photometric testing procedures.
    b. Illuminance selection should be based on the usage of the area to be illuminated, the level of activity, and night-time security requirements.
    c. Parking Stalls and Sidewalks, footpaths, and grounds around open parking lots shall be illuminated to a minimum of 0.5 fc, with a uniformity ratio of 10:1, the maximum shall not exceed 20 fc.
    d. Primary ingress and egress trails and walkways in parks and public areas shall be illuminated to a minimum of 0.1 fc, with an average of 1 fc.
    e. Primary building entrances shall be lit to a minimum of 5 fc.
2. Lighting Fixture Design.
    a. Fixtures shall be of a type and design appropriate to the lighting application and shall conform to Chapter 19.11 of the City Code.
    b. For the lighting of predominantly horizontal surfaces, such as, but not limited to parking areas, roadways, vehicular and pedestrian passage areas, merchandising and storage areas, automotive-fuel dispensing facilities, automotive sales areas, loading docks, cul-de-sacs, active and passive recreation areas, building entrances, sidewalks, bicycle and pedestrian paths, and site entrances, fixtures shall be aimed straight down and shall meet IESNA full- cutoff criteria.
        i. Fixtures with an aggregate rated lamp lumen output per fixture that does not exceed the rated output of a standard 60-watt incandescent lamp, i.e., 1,000 lumens, are except from the requirements of this paragraph.
    c. For the lighting of predominantly non-horizontal surfaces, such as, but not limited to, facades, landscaping, signs, billboards, fountains, displays and statuary, fixtures shall be fully shielded and shall be installed and aimed so as to not project their output into the windows of neighboring residences, adjacent uses, past the object being illuminated, skyward or onto public roadways.
        i. Fixtures with an aggregate rated lamp lumen output per fixture that does not exceed the rated output of a standard 60-watt incandescent lamp, i.e., 1,000 lumens, are except from the requirements of this paragraph.
    d. “Barn lights”, aka “dusk-to-dawn lights”, where visible from other properties, shall not be permitted unless fully shielded.
3. Control of Nuisance and Disabling Glare.
    a. All lighting shall be aimed, located, designed, fitted and maintained so as not to present a hazard to drivers and pedestrians by impairing their ability to safely traverse and so as not to create a nuisance by projecting or reflecting objectionable light onto a neighboring use or property.
    b. Floodlights and spotlights shall be so shielded, installed and aimed that they do

not project their output into the windows of neighboring residences, adjacent uses, past the object being illuminated, skyward or onto a public roadway or pedestrian way.

c. Parking facility and vehicular and pedestrian way lighting (except for safety and security applications and all-night business operations), for commercial, industrial and institutional uses shall be automatically extinguished no later than one hour after the close of business or facility operation. When safety or security lighting is proposed for after-hours illumination, it shall not be in excess of thirty-three (33) percent of the number of fixtures required or permitted for illumination during regular business hours.

d. Illumination for signs, billboards, building facades and/or surrounding landscapes for decorative, advertising or aesthetic purposes is prohibited between 11:00 p.m. and dawn, except that such lighting situated on the premises for a commercial establishment may remain illuminated while the establishment is actually open for business, and until one hour after closing.

e. Vegetation screens shall not be employed to serve as the primary means for controlling glare.

   i. Glare control shall be achieved primarily through the use of such means as cutoff fixtures, shields and baffles, and appropriate application of fixture mounting height, wattage, aiming angle and fixture placement.

f. The illumination projected from any property to a residential use shall at no time exceed 0.1 footcandle, measured line-of-sight from any point on the receiving property.

g. The illumination projected from any property to a non-residential use shall at no time exceed 1.0 footcandle, measured line-of-sight from any point on the receiving property.

h. Externally illuminated billboards and signs shall be lighted by fixtures mounted at the top of the billboard or sign and aimed downward. The fixtures shall be designed, shielded and aimed to limit the light output onto and not beyond the sign or billboard.

   i. Except for certain recreational lighting, fixtures meeting IESNA full-cutoff criteria shall not be mounted in excess of twenty (20) feet above finished grade. Fixtures not meeting IESNA full- cutoff criteria shall not be mounted in excess of sixteen (16) feet above finished grade.

i. The United States flag and the state flag shall be permitted to be illuminated from dusk till dawn. All other flags shall not be illuminated past 11:00 p.m. Flag lighting sources shall not exceed 10,000 lumens per flagpole. The light source shall have a beam spread no greater than necessary to illuminate the flag.

j. Under-canopy lighting, for such applications as gas/service stations, hotel/theater marquees, fast- food/bank/drugstore drive-ups, shall be accomplished using flat-lens full-cutoff fixtures aimed straight down and shielded in such a manner that the lowest opaque edge of the fixture shall be below the light sources at all lateral angles.

   i. The average illumination intensity in the area directly below the canopy shall not exceed 20 maintained footcandles and the maximum intensity shall not exceed 40 maintained footcandles.

k. The use of white strobe lighting for tall structures, such as smokestacks, chimneys, and radio/ communications/television towers is prohibited during hours of darkness, except as specifically required by FAA.

1.8 OUTDOOR LIGHTING PLAN SUBMISSION

A. For land development applications where site lighting is required and is proposed, lighting plans shall be submitted to the City Engineer for review and acceptance, with the preliminary and final land development plan applications and conditional use applications; and shall contain the following:

1. A plan or plans of the site, complete, with all structures, parking spaces, building entrances, traffic areas(both vehicular and pedestrian), landscaping that might interfere with lighting, and adjacent uses that might be adversely impacted by the lighting.
    a. The lighting plan shall contain a layout of all proposed fixtures by location, orientation, aiming direction, mounting heights, and types.
    b. The submission shall include, in addition to proposed area lighting, all other exterior lighting, such as, architectural, building-entrance, landscape, flag, signs, etc.
2. A 10 ft x 10 ft illuminance grid (point-by-point) plot of maintained horizontal footcandles overlaid on the site plan, plotted out to 0.0 footcandles, which demonstrates compliance with the light trespass, intensity and uniformity requirements as set forth in the Lighting Handbook.
    a. When the scale of the plan makes a 10 ft x 10 ft grid plot illegible, a larger grid spacing may be used.
3. The lamp lumen ratings and types, maintenance (light-loss) factors and IES file nomenclature used in calculating the illuminance levels.
4. Description of the proposed equipment, including fixture catalog cuts, photometrics, glare reduction devices, lamps, on/off control devices, mounting heights, pole foundation details and mounting methods.
5. Landscaping plans shall contain lighting fixture locations and shall demonstrate that the site lighting and landscaping have been coordinated to minimize conflict between vegetation and intended light distribution, both initially and at vegetation maturity.
6. A visual-impact plan that demonstrates appropriate steps have been taken to mitigate the potential consequences of on-site and off-site glare and to retain the intended character of the City.
    a. This plan may require the inclusion of initial vertical footcandle values at specific off-site venues, such as, bedroom windows of adjacent residential uses.
7. Plan notes. The following notes shall appear on the Lighting Plan:
    a. Post-acceptance alterations to lighting plans or intended substitutions for accepted lighting equipment are not permitted.
    b. The City reserves the right to conduct post-installation inspections to verify compliance with the City's requirements and with the Lighting Plan provided in the accepted drawings. Remedial action due to non-conformance shall be provided at no expense to the City.
    c. All exterior lighting shall meet IESNA full-cutoff criteria.

PART 2 PRODUCTS

2.1 MATERIALS

A. Outdoor lighting, including poles, luminaries and appurtenant items, shall be as indicated on the construction drawings.

1. Outdoor lighting shall conform to all the Lighting Requirement and Design Standards described above.
2. Outdoor lighting shall be acceptable to the City Engineer.
3. Fixtures shall be of the cutoff type, in accordance with the candlepower distribution classification of the Lighting Handbook.
    a. The manufacturer of the fixtures shall provide certification of the cutoff classification based on photometric testing performed in accordance with the Lighting Handbook and the applicable testing procedures referenced therein.
    b. Fixtures which do not meet the strict definition for cutoff fixtures, yet employ advanced or alternative technology which causes the photometric performance to approach that of cutoff fixtures, may be accepted by the City Engineer, on a case-by-case basis.
        i. (1) Such fixtures include, but are not limited to, period-style fixtures with refractive globes and internal cutoff reflectors.

B. Conduit: See Section 05131

C. Wiring Devices: As specified in Section 05140.

D. Wire and Cable: As specified in Section 05123.

E. Boxes: As specified in Section 05138. Junction box lids to be marked “Street Lights” or “Lighting.”

F. Concrete: As specified in Section 03300.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify location of outdoor lighting items with the City Engineer.

B. Verify location and type of power source with Rocky Mountain Power.

3.2 INSTALLATION - OUTDOOR LIGHTING

A. Mounting heights of lighting fixtures shall be as described in Paragraph 1.07 above.

B. Poles supporting outdoor lighting fixtures shall be installed as indicated on the construction drawings that have been reviewed and accepted by the City Engineer.

1. Poles for outdoor lighting fixtures for the illumination of parking areas and located directly behind parking spaces, or where they could be hit by snow plows, shall be placed a minimum of five (5) feet outside paved areas or tire stops, or placed on concrete pedestals at least thirty (30) inches high above the pavement.
2. Construct concrete bases for light poles, as indicated on the construction drawings; size and type to be according to manufacturer’s written instructions and recommendations. Anchor bolts shall be installed according to manufacturer’s template.
3. Install light poles on bases, in accordance with manufacturer’s written instructions and commendations. Poles shall be plumb and securely attached to the concrete base.

C. Install pole mounted cutoff fixtures, with lamps, in accordance with manufacturer’s written

instructions and recommendations.

1. Fixtures for the illumination of horizontal areas shall be aimed straight down, as described in Paragraph 1.07 above.
2. Cutoff fixtures shall be mounted plumb and level in accordance with the intended application of their design.
    a. The photometric nadir or the fixture (zero degree vertical angle of the candlepower distribution) shall be oriented plumb and the vertical angle of 90 degrees above the nadir (horizontal) shall be oriented level.
    b. Cutoff fixtures shall not be installed in a canted or tilted position which permits candlepower distribution above the horizontal.

D. Install other types of lighting fixtures, with lamps, for other types of installations as indicated on the construction drawings, in accordance with manufacturer's written instructions and recommendations.

E. All electrical feeds for lighting poles shall be run underground. No overhead feeds will be permitted.

1. Electrical feeds shall be installed as indicated on the construction drawings.
2. Install an electrical junction box near the base of light poles, as required.
3. Install underground electrical supply line lighting control panel to junction box at base of light pole, as indicated on the drawings. Wire shall be in conduit. Trenching shall be done as described in Section 02112. Conduit to be installed with sand bedding and 24-inch cover. Trenches shall be backfilled and compacted to required densities.
4. Make electrical connection to light poles in accordance with equipment manufacturer's instructions and as indicated on the drawings.
5. All work shall be done in accordance with the National Electrical Code (NEC) and the International Building Code (IBC) and, where applicable, with the requirements of Rocky Mountain Power.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection, testing, and adjusting in accordance with Section 01400.

B. Operate each lighting fixture after installation and connection. Inspect for improper connections and operation.

3.4 ADJUSTING

A. Aim and adjust lighting fixtures to provide illumination levels and distribution as recommended by the manufacturer and as indicated on the construction plans.

3.5 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosures.

C. Clean finishes and repair damage.

3.6 PROTECTION OF FINISHED WORK

A. Re-lamp lighting fixtures which have failed lamps at Substantial Completion.

END OF SECTION

MINUTES – Planning Commission

Thursday, April 23, 2020
City of Saratoga Springs City Offices
1307 North Commerce Drive, Suite 200, Saratoga Springs, Utah 84045

PLANNING COMMISSION MEETING MINUTES - DRAFT

Call to Order - 6:00 p.m. by Chairman Troy Cunningham

Present: Via Video Conference

Commission Members: Bryce Anderson, Audrey Barton, Troy Cunningham, Ken Kilgore, Reed Ryan, Josh Wagstaff.

Staff: Dave Stroud, Planning Director; Gina Grandpre Planner II; Conrad Hafen, Assistant City Attorney; Gordon Miner, City Engineer; Jeff Pearson, Engineer II; Nicolette Fike, Deputy Recorder, David Johnson, Economic Development Director.

Others: Daniel Schmidt, Thomas Lehnardt, Lou Phung

1. **Pledge of Allegiance -** led by Commissioner Cunningham.

2. **Roll Call** – A quorum was present

3. **Business Item: Preliminary Plat for Saratoga Springs Commercial Plat E located west of 1303 N. Exchange Drive. Daniel Schmidt, WPI as applicant.**

Planner II Gina Grandpre presented the item. The proposed preliminary plat of Saratoga Springs Commercial Plat E contains one lot in the Regional Commercial zone. The lot size is 2.01 acres and .8 acres will be dedicated as a public right of way as Exchange Drive. Open space is not required in a commercial subdivision plat but the site plan is required to have a minimum of 20 percent landscaping. Daniel Schmidt was present as applicant. Planning Director Dave Stroud advised that it is up to the State DABC to determine compliance and so Planning Commission will not see the site plan.

Commissioner Kilgore

- Received confirmation from the applicant that they would comply with all conditions.

Commissioner Barton

- Inquired how street names are determined, more particularly regarding Exchange Drive. Planning Director Dave Stroud advised that Exchange Dr. was already an established street name which will continue.

Motion made by Commissioner Barton that the Planning Commission forward a recommendation of approval to the City Council regarding the preliminary plat of Saratoga Springs Commercial Plat E, located south of Crossroads Blvd, west of Exchange Drive based upon the Findings and Conditions in the Staff Report. Seconded by Commissioner Anderson.
Aye: Bryce Anderson, Audrey Barton, Troy Cunningham, Ken Kilgore, Reed Ryan, Josh Wagstaff. Motion passed 6 - 0.

4. **Business Item: Site Plan for Saratoga Springs Commercial Lot 402 & 403 located approximately 153 W. Crossroads Blvd., Daniel Schmidt, WPI as applicant.**

Planner II Gina Grandpre presented the item. The applicant is requesting approval of two Site Plans in the Saratoga Springs Commercial Plat D Subdivision. Daniel Schmidt was present as applicant. He noted that these are two lots within plat D, there will be more lots coming for this project; the road and these two lots should all be built together.

Commissioner Cunningham

- Asked about potential tenants. Daniel Schmidt responded that they have a number of tenants signing leases which he cannot name yet; they will promote themselves. They have seen a little bit of a slowdown

at this time but several tenants are willing to move forward, others may take longer. They anticipate at least these two buildings will be strong.

Commissioner Kilgore
- Received confirmation from the applicant that they would comply with all conditions.
- Received clarification on the compliance list from Planner II Gina Grandpre.

Commissioner Wagstaff
- Asked about the current General Plan, this area has not been updated on it yet. Economic Development Director David Johnson noted an update to the area had been made and the map may still need updated. Staff will follow up with this.

Motion made by Commissioner Ryan to approve the proposed site plan of the Saratoga Springs Commercial Lots 402 and 403 Retail Building at ~191 W. crossroads Blvd. in the Regional Commercial zone with the findings and conditions in the Staff Report. Seconded by Commissioner Kilgore.
Aye: Bryce Anderson, Audrey Barton, Troy Cunningham, Ken Kilgore, Reed Ryan, Josh Wagstaff. Motion passed 6 - 0.

5. **Approval of Minutes: March 26, 2020**

Commissioners Kilgore and Anderson noted typos in the minutes.

Motion made by Commissioner Anderson to approve the minutes of March 26, 2020. Seconded by Commissioner Barton. Aye: Bryce Anderson, Audrey Barton, Troy Cunningham, Ken Kilgore, Reed Ryan, Josh Wagstaff. Motion passed 6 - 0.

6. **Reports of Action.** – No Reports were needed.

7. **Commission Comments.**
Commissioner Barton inquired who named the streets. Planning Director Dave Stroud advised that for the most part it is the developer. Those are then approved along with the plats in Planning Commission and City Council.

8. **Director's Report.** – Planning Director Dave Stroud noted that most of the staff was working from home. Waiting to hear of any new Planning Commission applicants. In response to Commissioner Cunningham he advised next month's meeting should go forward as planned; continuing with the current video conference at least through May.
Commissioner Wagstaff asked for an updated General Plan map. Economic Development Director David Johnson advised it should be in the GIS map section and they will follow up with that.

9. **Possible motion to enter into closed session** – No closed session was held.

10. **Meeting Adjourned Without Objection at 6:24 p.m. by Chairman** Troy Cunningham.

_____ _____
Date of Approval Planning Commission Chair

_____
Deputy City Recorder