City of Orem

Supplemental Document
to the
2007 APWA
Construction Specifications, Standards, and Drawings

March, 2011

This document is a supplement to the 2007 APWA Manual of Standard Specifications, the 2007 APWA Manual of Standard Plans and the UDOT 2008 Standard Specification and Standard Drawing. The 2007 APWA Manual of Standard Specifications and Plans are fully enforced except for the specifications and plans outlined in this document.

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INTRODUCTION

The purpose of these Construction Standards and Specifications is to govern any Work done or improvements installed within the City of Orem's Public Rights-of-Way and public utility easements (hereinafter collectively referred to as the "ROW"). Construction Work in the ROW shall conform to the Orem City Code, Orem Public Works & Development Services Construction Drawings, these Construction Standards and Specifications, 2007 APWA Manual of Standard Specifications, 2007 APWA Manual of Standard Plans, UDOT 2008 Standard Specification and Standard Drawing, the current MUTCD and any State or Federal Regulations. The Contractor is responsible to know and conform to the appropriate Codes, Regulations, Drawings, Standards and Specifications. Contractors should thoroughly read and understand these associated documents before performing any Work in the City's ROW.

GENERAL CONDITIONS

0.1 DEFINITIONS The terms listed below can be referred to in their abbreviated form:

"City"	The term "City" refers to the City of Orem. The authorized representative of the City of Orem shall be the **City Engineer** and other City employees as designated by the City Engineer.
"Work"	Any Excavation, Construction, Maintenance, Repairs, or Improvements within the ROW including any restriction of or closure of the use or access to the City's ROW. The term "Work" also includes work on any street, curb, gutter, sidewalk, sewer line, water line or other public utility.
"CS&S"	The abbreviation CS&S means the City of Orem Construction Standards and Specifications and associated detail drawings. In addition, the provisions of the Orem City Code, as amended, are hereby incorporated into these CS&S as if fully set forth herein. The CS&S are meant to function as a single unit. No individual chapter, section or drawing can stand alone.
"Contractor"	The term Contractor means any individual or entity that performs Work within the ROW including but not limited to: Contractors, sub-Contractors, developers, owners, owners' agents, utility companies and City Crews.
"Engineer"	The term Engineer refers to the City Engineer or his designated representative.
"MUTCD"	Manual of Uniform Traffic Control Devices.
"ROW"	The City of Orem's Public Rights-of-Way and public utility easements. This includes but is not limited to public streets, curbs, gutters, sidewalks, easements, and other areas owned or maintained by the City of Orem. Records of ownership are kept at the County Recorder's office.
"SWPPP"	Storm Water Pollution Prevention Plan.
"TCP"	Traffic Control Plans shall be required for most "Work" in the City's "ROW". Refer to chapter 12 for detailed explanations.
"Drawings"	The term "drawings" means collectively the drawings which are attached hereto at the end of these CS&S.

The Contractor shall contact Development Services engineering at 56 North State for all matters dealing with construction Work within a ROW or with any Work connecting onto a City utility. SPECIAL PERMITS AND BONDING ARE REQUIRED FOR ALL SUCH Work.

0.2 PERMIT, FEES, AND BONDING REQUIRED

0.2.1 PERMITS No Contractor may do any Work in any ROW without a permit from the City Department of Development Services. A permit to do Work in the ROW may be obtained by filing a completed application with the Department of Development Services. The Contractor's signature must be on the application to be accepted. A fully executed contract between a Contractor and the City shall be considered a permit to do Work in the ROW. No Contractor shall start Work until a permit is secured. Refer to Section 01 55 25 for special conditions concerning traffic control issues. The City of Orem and all utility companies are also bound by these CS&S documents.

0.2.2 FEES Before a City permit is issued, a permit fee and an inspection fee shall be paid to the City. The amount of such fees will be set by resolution of the City

Council. Generally, all fees are paid at Development Services at the time of the issuance of a building permit or prior to recording a subdivision plat.

0.2.3 BONDS

0.2.3.1 As a prerequisite to the issuance of a permit, each Contractor who performs Work in the City shall post and maintain a $1,000.00 cash bond with the City that will be held by the City for a minimum of 1 year after the completion of Work performed by the Contractor. The bond shall be held by the City to ensure that:

A. Construction Work is completed, and as-builts are submitted and approved.

B. Final inspection is conducted and the Work is found to comply with the CS&S.

C. Repairs and/or replacement of public improvements are finished and accepted.

D. Contractor complies with all other requirements of these Construction Standards and Specifications.

0.2.3.2 Failure of the Contractor to maintain safe conditions, to restore the area to "better than or equal to" condition during the first year, or to comply with any other provision of these Construction Standards and Specifications shall entitle the City to execute on the bond and to use the proceeds to take whatever action may be necessary to bring the Work into compliance with the CS&S. The City retains the right to charge the Contractor for any additional amounts in excess of the bond which the City expends to bring the Work into compliance with the CS&S. Any such additional expenses not covered by the bond must be paid to the City before the Contractor is allowed to restore its bond and do any further Work in the City.

0.3 CONTRACTOR AND CONSTRUCTION PLAN APPROVAL Before a Contractor performs any Work within the City, the Contractor shall be approved by the City. The Contractor shall allow a reasonable time for processing applications prior to the start of any Work. Contractor "Approval" is granted for a period of 1 year upon verification of the following:

0.3.1 A current **UTAH STATE CONTRACTOR'S LICENSE**. Work will be restricted to that authorized by the license.

0.3.2 **INSURANCE**: The Contractor shall attach a Certificate of Insurance from the Contractor's insurance company. The minimum insurance requirements are as follows:

Commercial General Liability: $1,000,000.00 combined single limit per occurrence for bodily injury, personal injury and property damage. If the policy contains a general aggregate limit, either the general aggregate limit shall apply separately to the Work being performed by Contractor or the general aggregate limit shall be $2,000,000.00. Coverage shall be at least as

broad as the Insurance Services Office Commercial General Liability coverage ("occurrence" form). Business Auto: $1,000,000.00 combined single limit per accident for bodily injury and property damage. Commercial General Liability. Coverage shall be at least as broad as the Insurance Services Office Business Auto Coverage form.

Workers' Compensation and Employers Liability: Workers' compensation limits required by Utah State Law and Employer's Liability Limits of $1,000,000.00 per accident or as required by Section 21 of the General Conditions of the appropriate City Contract.

The City, its officers, officials, employees, agents and volunteers shall be listed as additional insured on Contractor's Commercial General Liability insurance as respects: liability arising out of activities performed by or on behalf of Contractor, including the Contractor's general supervision of any employees or subcontractors; products and completed operations of Contractor; premises owned, occupied or used by Contractor; or automobiles owned, leased, hired or borrowed by Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees or volunteers.

The applicant shall hold harmless, indemnify and defend the City from any liability claims, losses or damages arising or alleged to arise from the Work covered by any permit, but not including the sole negligence of the City of Orem.

0.4 CONSTRUCTION PLANS Contractor plans must be approved by the City before any Work begins.

0.4.1 PRECONSTRUCTION MEETINGS between the Contractor(s) involved in the permit for Work shall be held with the City prior to commencement of any Work. The City's project manager shall schedule the appropriate time.

0.5 TIMELY COMPLIANCE WITH THE ISSUED PERMIT The Contractor shall perform the Work in accordance with the terms of the permit and the CS&S in effect at the date of the permit. The Work shall be done in a timely manner. Time limits may be a condition of the permit and may be shortened because of safety and weather concerns. Permits may be suspended if compliance is not met. The Contractor's bond may be forfeited and the Contractor may incur liability to the City when the City repairs sub-standard restoration, see sections 0.2.3.2 and 2.1.2.

0.6 SAFETY No Contractor shall leave any Work in an unsafe condition. All persons working on any street, sidewalk, sewer line, water line, etc., shall comply with all applicable federal, state, and local safety regulations.

0.7 INSPECTIONS All Work covered by a permit shall be inspected by the City, prior to the following:

1) backfilling and compacting,
2) placing concrete and asphalt,
3) placing any underground piping,
4) making any connection into a city utility line,
5) any other Work done in a public ROW,
6) the release of the Contractor's bond following the annual final inspection of the restoration Work.

City Project Managers/Inspectors shall also be notified prior to starting any work.

0.7.1 TIMELY NOTIFICATION OF NEEDED INSPECTIONS

0.7.1.1 Inspections performed during regular Working hours require at least four (4) hours notification.

0.7.1.2 For late afternoon inspections needed after 4:00 p.m., notification must be given by 1:00 p.m. on the day of the inspection.

0.7.1.3 For weekend inspections, notification must be given by 1:00 p.m. on the preceding Friday.

0.7.1.4 A charge shall be assessed for inspection call backs.

0.8 AS-BUILTS An electronic file or a series of original 24" x 36" as-built drawings shall be completed and filed with the City for each separate site plan or subdivision development which adds any infrastructure to the City ROW. Each file or drawing shall show the dimensions of the various infrastructure systems on separate layers using separate colors (i.e. blue for water, green for sanitary sewer, yellow for storm drains, grey for sidewalks and black for asphalt). As-builts shall label each object and indicate the true location and grade and/or elevation to an accuracy of 0.1'. Refer to the City of Orem's drawing standards for proper labels and notations. These files or drawings are intended to modify and improve the original permitted plans. The electronic file or drawings shall be "Professionally Certified" and presented to the City in an "Initial Submittal" and a "Final Submittal."

0.8.1 ELECTRONIC FILES The as-built information should be submitted in a format which is CAD compatible. The Contractor shall provide the City with electronic, as-built information on all new infrastructure pertaining to the project. The data shall contain northings, eastings, and elevations in accordance with the NAD 27 datum. The most recent publicized control data from the office of the Utah County Surveyor shall be used with grid distances. This information shall be in an AutoCAD-compatible file format or a comma-delimited ASCII text file

in the following format: point number, northing, easting, elevation, and description. Any questions should be referred to the ENGINEER.

0.8.2 **CERTIFICATION** As-built files or drawings shall be certified by the seal of a professional engineer, land surveyor or architect either by a certified letter accompanying an electronic file or as a professional stamp applied in ink, directly on the original drawings.

0.8.3 **INITIAL SUBMITTAL** The "Initial Submittal" shall be completed prior to permitting any surface improvements such as concrete curb, gutter and sidewalk, concrete flat Work, road base or asphalt. The initial submittal shall include buried infrastructure and utilities such as sanitary sewer, storm sewer, water, irrigation, fiber optics, phone, cable T.V., electrical distribution, and traffic control wiring. Each manhole, valve, fire hydrant, pipe bend, water meter and lateral stub will have x, y and z coordinates established within 0.1'.

0.8.4 **FINAL SUBMITTAL** The "Final Submittal" shall be completed before the Work may be considered finished and shall be completed at least one year prior to release of the bond. The final submittal shall include all permanent surface improvements such as concrete curb, gutter and sidewalk, concrete flat Work, road base, asphalt, lighting, and above ground utilities. All surface improvements shall be located and verified. Each road segment will have a width and length dimensioned. The type and thickness of sub-base, base asphalt pavement and concrete Work shall be indicated.

0.9 **MATERIALS TESTING** The City may require the Contractor to provide material or soil tests when in the judgment of the City there is sufficient basis to require such tests. The City will specify in writing to the Contractor the reasons for the required testing and the extent of the required testing. The Contractor must pay for all tests on materials or Workmanship found to be sub-standard or not in compliance with the CS&S.

0.10 **TRAFFIC CONTROL** Work site traffic control is a great concern to the City. The Contractor should fully understand the requirements of Chapter 12 - Traffic Control. The Contractor shall comply with the strict time requirements for Work within busy streets.

0.11 **CONFLICTS** These Construction Standards and Specifications are the minimum requirements of the City of Orem. In the event that any provisions herein conflict with general industrial standards, or with other requirements specified by the City, State, or Federal Regulations, the more stringent of the standards will apply.

DIVISION 01

GENERAL REQUIREMENTS

SECTION 01 55 26
TRAFFIC CONTROL

This specification changes a portion of APWA Standard Specification Section 01 55 26. All other provisions of the section remain in full force and effect.

Section 01 55 26 Page 125

PART 1 GENERAL

1.2 REFERENCES

D. **STREET DESIGNATION AND GOVERNING AGENCY**

1. **MAJOR STREETS within the City of Orem**

Center Street (Provo to Geneva Rd) ..... City
800 East (1400 South to 1600 North) ..... City
1600 North (800 East to Geneva Rd) ..... City
Orem Blvd. (All) . . . . City
1200 West (1600 North to 800 South) ..... City
800 South (State Street to Provo) ..... City
Sandhill Road (1200 South to 2000 South) ..... City
Sandhill Road (800 South to 1200 South) ..... UVU
State Street (All) ..... UDOT
800 North (All) ..... UDOT
University Parkway (All) ..... UDOT
Geneva Road (All) . . . . UDOT
I-15, and the On and Off Ramps of I-15 ..... UDOT

2. **SECONDARY STREETS within the City of Orem**

East / West		North / South	
2000 North	City	800 West	City
1200 North	City	Skyline Dr	City
400 North	City	Palisades Dr	City
400 South	City	400 East	City
800 South	City	Main Street	City
1200 South	City	400 West	City
1600 South	City	Columbia Ln	City
2000 South	City	1600 West	City

1430 South, 400 W - Sandhill ..... City
Orem Center Bus. Park Dr.(1250 South) ..... City
200 East, 1200 S - 1400 S ..... City
1400 South, 200 East - State St ..... City

3. **MINOR STREETS within the City of Orem.** All other public streets within the City, not listed above, shall be considered minor or local streets.

1.3 SUBMITTALS

A. **Traffic Control Plan Required.** The required TCP may range in complexity from a simple plan to a detailed site plan displaying signing, barricading,

material delivery areas, construction office, utility poles, staging areas, and construction phasing. In all cases, the TCP must address satisfactorily all of the requirements of the MUTCD for the project. Exceptions to the requirements of the MUTCD must be requested in writing by the applicant, and be approved by the City and shall be added to the TCP. All permits and TCPs must be kept on the job site.

B. **PERMISSION TO RESTRICT CITY STREETS**. All Contractors must obtain a permit from the City for a partial or complete closure of any public right-of-way, street, or sidewalk within the City of Orem. All requests to restrict right-of-way will be directed to the City. Requests that require partial or complete closure of any city street or sidewalk, detouring or rerouting of pedestrian traffic, or other similar public impacts shall include a Traffic Control Plan (TCP) that must be reviewed by the City. The City may require a TCP for any project that impacts a city street, right-of-way, or sidewalk.

C. **Advance approval**. Advance approval is required by the City for all projects on City ROW as set forth below. Closures, of any type, will not be permitted without the required advanced notice, except during emergency conditions.

1. 5 work days for complete closure of major traffic carrying streets (streets are listed at the end of this section).
2. 48 hours for partial closures of major streets and 48 hours for partial or complete closures of secondary traffic carrying streets
3. 48 hours for complete closure of local streets.

1.7 NOTIFICATION

A. When the Contractor encounters an unforeseeable emergency the Contractor shall immediately notify all organizations that may be affected by the partial or complete closure. The Contractor shall notify each of the following organizations 48 hours in advance for partial or complete street closures (all numbers may be obtained from the Department of Development Services):

Orem Department of Public Safety
Alpine School District Bus Transportation
The principal at the school or schools affected.
Utah Transit Authority (UTA) Dispatch
Waste Management
Post Office

1.5 DENIAL OF PERMIT

A. The City reserves the right to deny any street closure permits during any time, when in the City's judgment, the traffic restriction could result in unacceptable traffic congestion or unnecessary accident potential.

1.6 GENERAL TRAFFIC REGULATIONS

A. **PEAK HOUR LANE CLOSURE.** During the peak traffic hours of 7 a.m. to 9 a.m., and 4 p.m. to 6 p.m. on weekdays and 11 a.m. to 3.p.m. on Saturdays, TRAFFIC LANE CLOSURES ARE NOT PERMITTED at signalized intersections of major or secondary streets. In rare situations the Contractor can apply to the City for an exception.

B. **OFF PEAK HOUR LANE CLOSURE.** During OFF PEAK HOURS when one or more traffic lanes are restricted along major and secondary traffic carrying streets, or one traffic lane is restricted at a signalized intersection with left-turn channels, channelization shall be used to provide through lanes. Lane restrictions that do not allow enough room for channelization shall require flaggers and/or other traffic control devices.

C. **FULL STREET CLOSURES.** The full closure of major streets, secondary streets, and minor streets that are single access to a neighborhood area is NOT PERMITTED within the City. In rare situations the Contractor can apply to the City for an exception. The City may require the Contractor to do the Work during limited hours or on Sundays.

D. **TRAFFIC LANES.** A traffic lane shall not be considered as satisfactorily open to traffic unless it is at least 11' wide and is paved.

1. Resurfacing of Major streets shall be done the same day as the Work.
2. Resurfacing of Secondary streets shall be done within 48 hours.
3. Resurfacing of Minor streets shall be done within 7 days.

E. **UNIFORMED OFF-DUTY LAW ENFORCEMENT OFFICER.** Whenever a Contractor interferes with the function of a signalized intersection, the Contractor shall provide a uniformed off-duty law enforcement officer at all times during the period of interference to assist with traffic control. The Contractor shall coordinate with the City to determine the time and duration of the interference with the signalized intersection.

F. **LOCAL ACCESS.** Local access shall be maintained to all properties on all streets whenever possible. When local access cannot be maintained, the Contractor shall notify and work with the affected property owners, residents or tenants a minimum of 24 hours in advance. The Contractor shall be responsible to restore access as soon as possible.

G. **ACCESS.** Access to fire stations, police stations, hospitals and schools shall be maintained at all times. When access restrictions are necessary, the Contractor shall coordinate such access restrictions with the responsible person in charge of the affected fire station, police station, hospital, or school.

H. **NON-ESSENTIAL VEHICLES.** Non-essential vehicles not used to do the Work shall not park in the Work area that is barricaded or coned. Vehicles required in the Work area shall park downstream from the immediate Work area. Parking of private vehicles shall be out of the Work area and in conformance with parking regulations in the surrounding area. At no time shall the traffic lane adjacent to the Work site be impeded by Contractor vehicles or equipment.

PART 3 EXECUTION

3.2 TRAFFIC CONTROL DEVICES

D. **EXISTING TRAFFIC CONTROL DEVICES.** Throughout construction and maintenance operations it is important that all existing traffic control devices be kept concurrent with the TCP. In some cases the traffic control devices will

remain applicable to traffic and shall be maintained. In others the devices must be covered, relocated or removed.

1. **Traffic Control Signs.** The Contractor shall maintain all devices erect, clean, and in full view of intended traffic. The Contractor shall not relocate or remove any traffic control sign without approval from the City's Sign Specialist (229-7519). Existing signs which are not applicable, shall be removed or covered by the Contractor without damage. Any removed sign shall be salvaged in a secured area within the Work site or returned to the City (Traffic Section) at 955 North 900 West.

   a. The Contractor is responsible for final installation of signs. Signs shall be located according to the MUTCD and the City. Before the project is completed the job site will be inspected for damaged or missing signs. The Contractor shall be given 7 calendar days to replace missing City signs. After 7 days the City shall replace the missing signs at the expense of the Contractor.

2. **Traffic Signals.** The Contractor shall not interfere with or disrupt the operation of existing traffic signal equipment. The Contractor shall notify the City's Signal Specialist (229-7502) 72 hours prior to the start of construction within 300' of any signalized intersection. Most traffic signals within the City of Orem have been connected with a fiber optic communication line. The City shall, upon a blue stake request, provide the approximate location of all underground traffic signal equipment under City jurisdiction. The exact location of underground equipment shall be determined by the Contractor during excavation.

   a. The Contractor shall report any damage immediately as follows:

Weekdays	7:00 am to 5:00 pm	contact the City Signal Specialist at 229-7502.
Weekdays	5:00 pm to 7:00 am	contact Orem Public Safety 229-7070.
Weekends	All hours	contact Orem Public Safety 229-7070.

   b. The City will determine the necessary repairs to immediately restore traffic signal operation. The damaging Contractor will be billed for the cost of the inspection and repair
   c. When the existing traffic signal equipment cannot be maintained as provided for in the CS&S, the project permit, or approved traffic control plan, the Contractor shall at it's expense have a qualified Signal Contractor relocate the equipment to a temporary location such that all functions and displays on the existing signal equipment are maintained and in full view of the intended traffic at all times. The location and type of all temporary signal equipment shall be approved by the City.
   d. All signal equipment relocation and/or installation shall be coordinated with the City's Signal Specialist at 229-7502. All Work shall be inspected and approved by the City.
   e. The Contractor shall provide for an off-duty Law Enforcement Officer to be present at the site at any time the City deems it necessary for public protection. When temporary equipment or new equipment is installed to

replace existing equipment, the signal shall be fully operational prior to removal of the old equipment.

3. **Pavement Markings.** Existing pavement markings that conflict with the vehicle path indicated by barricades and channelization devices and cause driver confusion shall be removed or obliterated by the Contractor as directed by the City.
   a. The Contractor shall properly perform any necessary pavement marking removal or obliteration to leave only a minimal amount of pavement scars and to completely remove or cover existing markings. Sandblasting, grinding, or slurry seal may be used to remove existing markings. When used, slurry seal shall be applied in strips at least 24 inches wide over existing markings. Markings that become exposed shall be recovered. Painting over existing markings with black paint or asphalt material is not acceptable. In emergency conditions, temporary painting over of markings is to be immediately followed by permanent removal.
   b. The Contractor shall be responsible to pay for restoration of all pavement markings which are removed or become illegible due to construction Work. City crews or their representatives will do the repainting and the Contractor will be billed for the Work.
4. **Street Lighting.** Construction that involves the removal of street lighting shall require the installation of temporary lights to maintain the lighting levels. The Contractor shall coordinate the location and type of lighting with the City. All costs associated with the removal of existing lighting and the installation of temporary lighting are the responsibility of the Contractor.

SECTION 01 66 00

PRODUCT STORAGE AND PROTECTION

This specification changes a portion of APWA Standard Specification Section 01 66 00. All other provisions of the section remain in full force and effect.

Section 01 66 00 Page 135

1.8 PROTECTION OF LAWNS AND LANDSCAPING

B. Protect trees and tree roots of existing trees that are to remain.

1. To protect existing trees and roots, a Tree Protection Zone (TPZ) must be established.
   a. The method of establishing a TPZ is to calculate a circular area above and below ground with a radius equivalent to the greater of 10 feet or 1.5 feet for every inch in trunk diameter measured 4.5 feet above the ground (for example, the TPZ of a tree twelve inches in diameter has an eighteen foot radius). The area within the radius is the TPZ.
2. Tree fencing shall be made of wood or wire and erected before demolition, grading or construction begins and remain in place until final inspection of the project.
3. No excavation, trenching, grading, root pruning, dumping, or storage of material, topsoil, vehicles, and equipment, or any other activity, shall be permitted within the TPZ.
4. The TPZ shall remain free of chemically injurious materials and liquids such as paints, thinners, cleaning solutions, petroleum products, and concrete or dry wall excess, construction debris, or run-off.
5. If an underground line must go near a tree, tunneling or augering must begin and end outside of the TPZ and be a minimum of 24" deep.
6. No soil disturbance is permitted within the TPZ. Trees to be retained shall be irrigated.

C. Any damage to existing trees will be evaluated by the ENGINEER or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative.

DIVISION 03

CONCRETE

SECTION 03 30 04

CONCRETE

This specification changes a portion of APWA Standard Specification Section 03 30 04. All other provisions of the section remain in full force and effect.

Section 03 30 04 Page 193

2.4 ADMIXTURES

A. Calcium Chloride: Calcium chloride may be used only upon approval by the ENGINEER. No more than 2% (by weight) of calcium chloride can be used. No calcium chloride shall be used when metal is to be embedded into or in constant contact with the concrete, including but not limited to the following situations:

1. cross gutters
2. sidewalks reinforced with rebar
3. light post footings with embedded anchor bolts
4. slabs with mesh
5. openings in walls with angle iron headers
6. steel base plates mounted or embedded in the concrete surface
7. or any other concrete improvement with non-coated reinforcing steel

SECTION 03 30 10

CONCRETE PLACEMENT

This specification changes a portion of APWA Standard Specification Section 03 30 10. All other provisions of the section remain in full force and effect.

Section 03 30 10 Page 210

3.9 PROTECTION AND REPAIR

B. Repair

1. Modify or replace concrete not conforming to required levels, lines, details, and elevations
   a. Any section of curb, gutter or walk, improperly installed or damaged prior to its official acceptance, shall be repaired or replaced by the CONTRACTOR at the CONTRACTOR'S sole expense. When specified tolerances are not met or any damage to adjoining walk occurs, it shall be cause for rejection. The City will determine the required extent of removal, replacement or repair. No less than a 5' section of concrete sidewalk shall be replaced.

SECTION 03 35 00

CONCRETE FINISHING

This specification changes a portion of APWA Standard Specification Section 03 35 00. All other provisions of the section remain in full force and effect.

Section 03 30 04 Page 212

3.2 FINISHING HORIZONTAL SLABS

E. Trowel Finish:

1. Do not use a trowel finish on exterior concrete

F. Broom or Belt Finish

1. Concrete shall be accurately screed, levelled and bullfloated
2. After water sheen has disappeared, edging, striking, floating and minimal troweling (if required), are performed.
3. Horsehair or concrete broom is used to sweep surface before the final set.

DIVISION 26

ELECTRICAL

SECTION 25 56 19
ROADWAY LIGHTING

PART 1 PROCEDURES

A. The City Street Lighting Engineer will design the street lighting system. This will be at a time when the Developer is ready to go to construction and Utah Power has designed the location of power services for the project. The Developer will bond for their street lighting based upon bids from responsible contractors or use the City's estimate.

B. The Developer has an option by written agreement to have the City install the street lights. The City will share with the Developer what their costs would be to install the street light. The Developer can review the costs and decide whether to have its own contractor or the City to install all or part of the improvements. The Developer and the City will put their verbal agreements into a written agreement.

C. **NUMBERING AND MAPPING**. The developer and installation contractor shall coordinate with the City in preparing shop drawings showing the location of poles, numbering of poles and date installed. The City will survey the location of poles, conduit and buried cable and prepare a GIS map.

PART 2 INSTALLATION

A. **RESIDENTIAL**. The residential acorn style post top lighting fixture, 150 watt high pressure sodium lamp, 120 volts, on 16 foot fluted aluminum direct buried poles shall be installed on the property line on approximately 200 feet staggered spacing, 400 feet on one side of the street, 200 feet on alternate side of the street as laid out by the design engineer in advance of construction.

1. The street light shall be set back 2 feet from the back of sidewalk/curb.
2. The cable installation:

<u>Option A</u>. Underground power access at rear property line.

Areas with back lot line pad mounted transformers and secondary pedestals. The cable in conduit, 3 #10 RHW-2 in 3/4" conduit, shall be installed from the transformer or secondary service pedestal at the rear property line by trenching, plowing or directional boring to the pole location on the front lot line, the depth should be 24" below ground level. Direct bury power runs with 3 #10 RHW to additional light poles may be run along the street either along the back of the sidewalk, curb or in the asphalt about 2 feet off the lip of gutter.

<u>Option B.</u> Underground power at available at the along the street.

Areas with overhead distribution in the back lot lines or where there is a fence or built up areas on the property line, Install 3 #2 RHW-2, connected to UP&L Co. Secondary conductors, in a 2" conduit on a terminal pole to a street light pull box at the base of the pole, ground the neutral and ground conductor to a 3/4" x 10' copper clad ground rod in the pull box. Extend direct bury cable 3 #2 RHW-2 behind the sidewalk/curb or in the asphalt about 2 feet off the lip of gutter on a line parallel to the front property line to the street lights. The cable shall be buried 24" below the surface.

Option C. Underground power at available at the along the street.

Areas with front lot line pad mounted transformers and secondary pedestals. The cable 3 #10 RHW-2 shall be installed from the transformer or secondary service pedestal to the street light. The depth should be 24" below finish grade level.

B. **CABLE INSTALLATION AT THE SOURCE**

1. The phase leg of the 120 volt service to the street light should be fused at the transformer or service pedestal, in "3-A" above, with an in line watertight fuse holder fused at 10 amps. This fuse holder should be a Homac catalog number SLK-M single fuse holder, or approved equal. The neutral conductor shall be connected to the neutral bus and in the transformer or service pedestal and also connected to the ground rod in the transformer or service pedestal using a Homac catalog number DYU-M non fused, Wye connector, or approved equal. The green ground will be connected to the ground bus or ground rod in the transformer or pedestal.

2. The phase leg of the 120 volt service to the street lights should be fused in the pull box of the terminal pole, in "3-B" above, with an in line watertight fuse holder fused at the amperage as outlined by the street light designer on the drawings. This fuse holder should be Homac catalog number SLK-M single fuse holder, or approved. The neutral conductor shall be connected to the neutral bus in the pull box using a Homac catalog number DYU-M, non fused Wye connector, or approved equal. The green ground will be connected to the ground rod in the pull box.

C. **POLE GROUNDING AND FUSING**

1. The aluminum pole, as in "3-A" above, will be direct buried as per detail and grounded with the ground and neutral conductors. The phase leg of the 120 volt service should be fused at 8 amps with an in line watertight fuse holder, Homac catalog number SLK-M single fuse holder, or approved equal. The neutral conductor shall be connected to the neutral conductor at the pole and grounded to the pole with a watertight Wye connector with a Homac catalog number DYU-M, or approved equal. The ground conductor shall be connected directly to the pole.

2. The aluminum pole, as in "3-B" above, will be direct buried as per detail and grounded with the ground and neutral conductors. The phase leg of the 120 volt service fused at 8 amps with a watertight Wye fused connector, Homac catalog number FYU-M (and the end fixture fused with

a single fuse holder SLK-M), or approved equal. The neutral conductor will be connected to the neutral at the pole and grounded to the pole with a Homac four wire watertight connector catalog number FSS-1010-4 (and the end fixture connected with a Wye non fused connector DYU-M), or approved equal. The green ground conductor will be connected to the ground lug on the pole.

D. **INDUSTRIAL AREAS**. The Industrial Street Lights fixture, 250 watt metal halide lamp, 240 volts shall be directly mounted to a 25 foot straight, 5" square steel anchor base pole or directly mounted to existing wood distribution poles.

1. The steel poles shall be set back 2 feet from the back of the sidewalk/curb and installed on a screw foundation, preferred method, or a concrete pole base depending upon the existing soil conditions, see detail attached. There will be a street light pull box located adjacent to the pole base for the fuse connections and grounding with a 3/4" x 10' copper clad ground rod in the pull box.

2. The poles shall be spaced on the street by the street light design engineer so that the street lights will have an average maintained horizontal illuminance of 1.2 foot candles with a uniformity ratio of 3:1 (Avg./Min).

3. The underground feed to these steel poles will be direct bury cable behind the back of the sidewalk/curb or in the asphalt about 2 feet off the lip of gutter, buried 24" below the surface with three conductors, two phase conductors for 240 volt service and a green ground sized by the street light engineer to maintain less than a 3% voltage drop. The underground feeder will come from an underground terminal pole with three conductors up the pole, sized by the street light engineer, in a 2" rigid galvanized conduit with a 2" weather-head at the top. The conductors will be connected to the UP&L Co. service conductors at the top of the pole and terminate in a pull box at the base of pole with a 3/4" x 10' copper clad ground rod, and the phase conductors will be fused, sized by the street light engineer, with a Homac watertight twin-fused connector kit, catalog number SLT-M, or approved equal. The green ground will be connected to the ground rod in the pull box.

4. The underground feeders to these street light poles will be fused, in the pull box at the base of the pole, at 8 amps with two Homac watertight Wye fused connector kits, number FYU-M, (the end fixture will use a Homac twin-fused connector kit, number SLT-M), or approved equal. The green ground conductor will ground the base of the pole and will be connected to the ground rod in the pull box.

5. The industrial fixtures mounted on the existing wood poles will use existing overhead secondary conductors and will have an in-line fused connector kit fused at 8 amps, Homac catalog number SLT-M, or approved equal. Ground fixture with the existing neutral conductor.

D. **STREET CORRIDOR LIGHTS (800 North, State Street, Center Street, University Parkway)**

1. The commercial fixture, 400 watt metal halide teardrop style fixture at 240 volts and will be mounted at 25 feet on a steel fluted anchor based pole.

2. The steel poles shall be set back 2 feet from the back of the sidewalk/curb and installed on a screw foundation, preferred method, or a concrete pole base depending upon the existing soil conditions, see detail attached. There will be a street light pull box located adjacent to the pole base for the fuse connections and grounding with a 3/4" x 10" copper clad ground rod in the pull box.

3. The poles hall be spaced on the street by the street light design engineer so that the street lights will have an average maintained horizontal illuminance of 1.6 foot candles with a uniformity ratio of 3:1, (Avg/Min.).

4. The underground feed to these steel poles will be in 2" PVC conduit, behind the back of the sidewalk/curb. Utah State right-of-ways do not allow any streeting conduit in the asphalt portion of roadway areas. Center Street road right-of-way is owned by Orem and has 2" conduit with pull boxes being installed on both sides of the street from 100 East to 1200 West by Staker Paving. The conduit shall be buried 24" below the surface with three conductors, two phase conductors for 240 volt service and a green ground sized by the street light engineer to maintain less than a 3% voltage drop. The underground feeder will come from an underground terminal pole with three conductors up the pole, sized by the street light engineer, in a 2" rigid galvanized conduit with a 2" weather-head at the top. The conductors will be connected to the UP&L Co. Service conductors at the top of the pole and terminate in a pull box at the base of hte pole with a 3/4" x 10' ground rod, and the phase conductors will be fused, sized by the street light engineer, with a Homac watertight twin-fused connector kit, catalog number SLT-M, or approved equal. Connect the green ground to the ground rod in the pull box.

5. The underground feeders to these street light poles will be fused, in the pull box at the base of the pole, at 15 amps with two Homac watertight fused connector kit, number FYU-M, (the end fixture will use a Homac twin-fused connector kit, number SLT-M), or approved equal. The green ground will ground the base of the pole and be connected to the ground rod.

DIVISION 31

EARTHWORK

SECTION 31 11 00

SITE CLEARING

This specification changes a portion of APWA Standard Specification Section 31 11 00. All other provisions of the section remain in full force and effect.

Section 31 11 00 Page 409

1.2 REFERENCES

A. ANSI A300 Tree Pruning Standards.

1.3 QUALITY ASSURANCE

A. The ENGINEER, City Forester, or an appointed representative shall be present during tree pruning operations.

1.4 SITE CONDITIONS

B. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative.

1.5 PROTECTION

A. Protect roots and branches of trees to remain.

1. See Section 01 66 00 for PROTECTION OF LAWNS AND LANDSCAPING, SECTION 1.8.

B. When setting posts, avoid damaging tree roots.

C. Do not permit heavy equipment or stockpiling of materials or debris within the barricaded area, or permit earth surface to be changed.

D. Provide water to maintain existing trees.

PART 3 EXECUTION

3.1 EXAMINATION

C. Tree root inspection:

3. The ENGINEER, City Forester, or an appointed representative will be present to inspect tree roots when existing surface is altered.

3.4 TREE REMOVAL

C. For stumps larger than 6 inches caliper remove and treat as follow:

1. Grind stumps 12" below final grade if they cannot be removed.

SECTION 31 23 16

EXCAVATION

This specification changes a portion of APWA Standard Specification Secion 31 23 16. All other provisions of the section remain in full force and effect.

Section 31 23 16 Page 414

Add the following to Article 3.10 Trench Excavation

3.2 PROTECTION

G. Protect trees and tree roots of existing trees that are to remain.
   1. See Section 01 66 00 for PROTECTION OF LAWNS AND LANDSCAPING, SECTION 1.8

3.10 TRENCH EXCAVATION

C. Limit width of Trench excavations to the dimensions suitable for worker access per pipe manufacturer's recommendation.
   1. The shape of the trench shall be a simple rectangle. The minimum width shall be 24", unless otherwise approved by the City.
   2. Provide enough space for compaction equipment.
   3. Notify the City if excavation operations exceed any indicated line and grade limits.

D. In public thoroughfares and regardless of Trench depth, limit length of open Trenches to 200 lineal feet, day or night. Provide barricading, Section 01 55 26. Protect Trenches over night.
   1. When trenching comes within 24" of a gutter, sidewalk or other roadway structure, the removal of the surface layers must be extended all the way to that structure.
   2. The Contractor shall be responsible for maintaining a road surface suitable for travel by the public from the time of excavation until the surface has been restored.
   3. The Contractor shall be responsible for all dust control and all claims and damages resulting from failure to maintain a suitable surface

E. Cutting of the asphalt shall be made by sawing a full depth vertical joint on each side of the trench, see section 02 41 14 PAVEMENT REMOVAL.
   1. The saw cut is required just prior to placing asphalt to trim off deteriorated asphalt edges and areas of side slope undermining. The cut shall be a simple rectangular shape that removes enough asphalt to reveal a minimum 12" bearing shelf of undisturbed soil around all sides of the excavation.

F. Rotomilling off the asphalt layer of a trench shall only be done with the approval of the City.
   1. The Contractor shall be responsible for repairing the damage and deterioration of the asphalt adjacent to the trench.

2. Cuts shall be vertical and smooth, areas of crumbling asphalt will have to be milled or cut back to structurally sound asphalt.

SECTION 31 23 17

ROCK REMOVAL

This specification changes a portion of APWA Standard Specification Section 31 23 17. All other provisions of the section remain in full force and effect.

Section 31 23 16 Page 415

Add the following to Article 3.4 Rock Removal – Explosive Method

3.4

G. If substantial rock is impeding the progress of the project, work with the Engineer to mitigate the issue. Disintegration Blasting will be the last resort.

H. Continue section.

SECTION 31 23 23

BACKFILLING FOR STRUCTURES

This specification changes a portion of APWA Standard Specification Section 31 23 23. All other provisions of the section remain in full force and effect.

Section 31 23 23 Page 417

PART 3 EXECUTION

3.2 PROTECTION

A. Protect existing trees, shrubs, lawns, existing structures, fences, reads, sidewalks, paving, curb and gutter and other features.

1. Protect trees and tree roots of existing trees that are to remain, See Section 01 66 00 for PROTECTION OF LAWNS AND LANDSCAPING, SECTION 1.8.

SECTION 31 25 00

EROSION AND SEDIMENTATION CONTROL

DEFINITIONS

Best management practices (BMPs) - Schedules of activities, prohibitions of practice, maintenance procedures, and other management practices to prevent or reduce the pollution of Waters of the State. BMP's also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, waste disposal, or drainage from material storage.

Erosion - The wearing away of the land surface by water, wind, ice or other geological agents, including the detachment and movement of soil or rock fragments by water, wind, ice, gravity, or any combination thereof.

Municipal Separate Storm Sewer System - A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), designed or used for collection or conveying stormwater.

Orem City Stormwater Inspector - Assigned City representative responsible for inspecting grading/construction activities for compliance with Erosion and Sedimentation Control Plan.

Sedimentation - A process by which solid materials, inorganic (mineral) and organic, come to rest on the earth's surface either above or below sea level.

Sediment - Particulate solid material, either inorganic or organic, that will settle or be deposited in a liquid under the force of gravity.

SWPPPCAP. Storm Water Pollution Prevention Plan Construction activity Permit will need to be acquired if the area of disturbance is over 500ft2.

SWPPP Template. A Storm Water Pollution Prevention Plan (SWPPP) template must be submitted to Orem City on or before pre-construction. SWPPP templates can be found at http://www.waterquality.utah.gov/UPDES/stormwater.htm. If area of disturbance is over ONE acre, then a Utah Pollution Discharge Elimination System (UPDES) Permit number will need to be acquired with a Notice of Intent submittal that can be obtained at the web link.

Waters of the State - Any and all surface and subsurface waters which are contained in or flow through the State of Utah; does not include waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed.

PART 1 GENERAL

Erosion and sediment control for construction activity.

This specifications govern the Storm Water pollution Prevention Plan this is required for all construction actives that will disturb 500 f2t of soil or larger. All earth disturbance activities in the City of Orem are regulated by the requirements of Utah Pollutants Discharge Elimination System (UPDES) regulations.

All earth disturbance activities, including those that disturb more than 1 acre, must implement and maintain Best Management Practices (BMPs) to control erosion and sediment pollution. Stormwater Pollution Prevention Plan (SWPPP) is a principal requirement of the stormwater UPDES permit. A SWPPP: Identifies all potential sources of pollution, which may reasonably be expected to affect the quality of stormwater discharges from the construction site; describes practices to be used to reduce pollutants in stormwater discharges from the construction site; and assures compliance with the terms and conditions of the issued permit.

State and Federal law requires a Storm Water Pollution Prevention Plan for all construction activity exceeding one acre. Orem City requires the Storm Water Pollution Prevention Plan be formatted on standard 24”x36” sheets so that it can be integrated into the construction plan set. Construction activities of less than one acre will still be required to take appropriate measures to prevent sediment from entering the storm water utility system and to prevent the tracking of mud and debris onto city streets. If the area of disturbance is less the one acre then a SWPPPCAP will be required.

EROSION CONTROL

Erosion controls are surface treatments that stabilize soil exposed by excavation or grading. Erosion control measures, or Best Management Practices (BMP’s), provide the best means of managing sediment from disturbed lands by preventing soil movement. These BMP’s are variously referred to as source controls, vegetative controls, or nonstructural controls. Some typical BMP’s used to control erosion are as follows:

• **Surface Roughening** – Provides temporary stabilization of disturbed areas by creating depressions in the soil surface. The depressions reduce the quantity of stormwater runoff by increasing infiltration. Surface roughening also reduces runoff velocity and provides for sediment trapping.

• **Mulching** – Temporarily stabilizes soils by securely applying materials such as grass, hay, woodchips or wood fibers to the soil’s surface. Mulching protects the soil from raindrop impact and reduces the velocity of overland runoff. Mulch also aids in the growth of temporary seeding by holding seeds and topsoil in place, retaining moisture, and insulating against extreme temperatures.

• **Temporary Revegetation** – The use of quickly germinating vegetative cover on disturbed areas to stabilize soils and control erosion in the short term.

• **Permanent Revegetation** – The use of perennial vegetation on disturbed areas to provide long term stabilization of soils and erosion control

.

• **Erosion Control Blankets** – Installation of geotextiles that are used to stabilize soils, steep slopes, and drainage channels. The geotextiles effectively shield the soil from the effects of wind and rain and enhance the growth of vegetation through the geotextile.

• **Construction Phasing** – Consists of properly planning and scheduling land disturbing activities for the purpose of minimizing the total amount of disturbed area at any one time during the construction process.

SEDIMENT CONTROL

Sediment controls capture soil that has been eroded. Soil particles suspended in runoff can be filtered through a porous media or deposited by slowing the flow and allowing the natural process of sedimentation to occur. Sediment controls (or BMP's) are facilities built to perform this function, and are also referred to as structural controls. Some typical BMP's used for sediment control include:

- **Vehicle Tracking -** Refers to the stabilization of construction site access locations and staging areas to prevent the tracking of sediment from the construction site.

- **Slope Protection -** Used to capture and divert runoff from the faces of cut and fill slopes. Temporary diversion dikes and temporary slope drains are common BMP's used for this purpose.

- **Rough Cut Street Control -** Temporary sediment barriers that are placed on alternate sides of a rough cut street to divert runoff from the rough cut street and to slow the runoff velocity.

- **Silt Fence -** A temporary sediment barrier constructed of filter fabric stretched between supporting posts and entrenched into the ground. Runoff is filtered through the filter fabric while sediment is deposited on the upstream side of the barrier.

- **Sediment Basin -** A temporary sediment entrapment facility that captures and detains sediment-laden runoff long enough to allow sediment to settle out. Sediment basins are formed by excavation or construction of an embankment of compacted soil. Other BMP's may be considered, provided that sufficient documentation, to include field installation performance evaluation, is submitted to Orem City Public Works for review and approval.

- **Hydrant and water line Flushing -** Before flushing of water lines or fire hydrants, the street and gutters must be inspected for any sediment /debris from washing into the storm water utility. If no curb or gutter is in stalled and there is a potential that flushing will erode the shoulder of the street then the contractor will be required to flush with the appropriate BMP (i.e. piping, hydrant hoes ect…) to insure that no pollutants will enter the storm water utility or waters of the State.

- **Trench Dewatering -** Trench dewatering (BMP) shall be staged on site if an incidental discharges of water into a trench/pit occurs. Water is removed using well points and power driven pumps, which discharge in to a system of filter bags or tubes consisting of the proper sized. Dewatering must be done so that the velocity of the

discharged water doesn't cause scouring of the receiving area. If the receiving area is a structural BMP (i.e. basin or sump), the design of the BMP should be based on the anticipated flow from the dewatered area.

- **Inlet Protection** - Sediment control barrier formed around a storm drain inlet. Runoff is filtered through the barrier while sediment is deposited on the upstream side of the barrier. Several options exist for the construction of the barrier ranging from straw bales and gravel bags to a multitude of commercially available geotextile products.

- **Outlet Protection -** Structurally lined aprons or other acceptable energy dissipating devices placed at the outlets of pipes or paved channel sections. This BMP prevents scour at stormwater outlets and reduces the velocity of concentrated stormwater flows to protect downstream channels from erosion.

1.1 **SECTION INCLUDES**

A. Erosion control and slope protection facilities including blankets or mulches.
B. Construction of drainage facilities to protect work area.

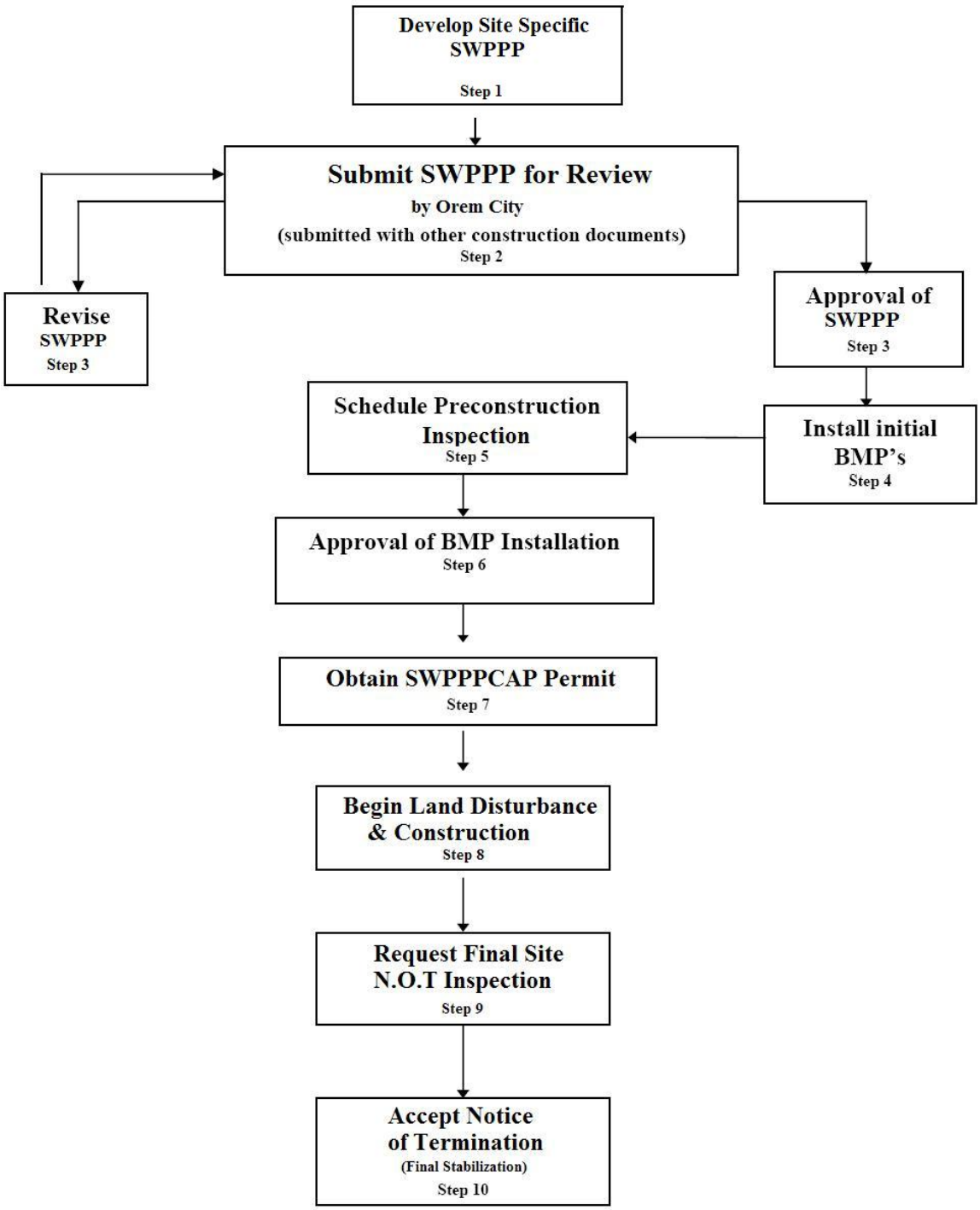
1.2 **SUBMITTALS**

SWPPPCAP, EROSION AND SEDIMENT CONTROL PLAN

Under the Utah Pollutants Discharge Elimination System (UPDES) regulations. The recipient of a Storm Water Pollution Prevention Plan for construction Activity Permit (the Permittee) shall install the erosion and sediment control measures required by the approved Storm Water Pollution Prevention Plan before commencing any construction activity on the site which the Plan applies or at such times indicated in the Plan. The erosion and sediment control measures shall be properly installed and maintained in accordance with the Permit, the manufacturers' specifications, and good engineering practices. The Permittee shall maintain such measures on the site until the City accepts the termination of the Permit.

GENERAL SUBMITTAL REQUIREMENTS AND PROCEDURES

This section outlines the general submittal requirements and procedures to obtain and comply with the Orem City SWPPPCAP Permit.


Develop Site Specific SWPPP
Step 1
Submit SWPPP for Review
by Orem City
(submitted with other construction documents)
Step 2
Revise SWPPP
Step 3
Approval of SWPPP
Step 3
Install initial BMP's
Step 4
Schedule Preconstruction Inspection
Step 5
Approval of BMP Installation
Step 6
Obtain SWPPPCAP Permit
Step 7
Begin Land Disturbance & Construction
Step 8
Request Final Site N.O.T Inspection
Step 9
Accept Notice of Termination
(Final Stabilization)
Step 10

ESC SUBMITTAL REQUIREMENTS

The following items are required for all ESC Submittals.

ESC Drawing Cover Sheet

Since the ESC drawings are normally part of a comprehensive set of construction drawings for development, one cover sheet may suffice for the entire set of drawings. It shall include the following information related to the ESC portion of the plan set. Additional requirements shall be required for the other portions of the construction drawings. Contact the Public Works Department for a complete list of cover sheet requirements.

1. Project name

2. Project address (if applicable)

3. Owner address

4. Design firm's name and address

5. Plan sheet index

6. Design Engineer's signature block with name, date and Professional Engineer registration number. Signature block shall include the following note:
   - THE **EROSION AND SEDIMENT CONTROL PLAN** INCLUDED HEREIN HAS BEEN PREPARED UNDER MY DIRECT SUPERVISION IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY OF OREM CITY CONSTRUCTION STANDARDS AND SPECIFICATIONS MANUAL.
7. General Location Map at a Scale of 1-inch to 2000 – feet indicating:
   - General vicinity of the site location
   - Major roadway names
   - North arrow and scale

ESC Drawing Index Sheet

For projects that require multiple plan-view sheets to adequately show the project area (based on the specified scale ranges), a single plan-view sheet shall be provided at a scale appropriate to show the entire site on one sheet. Areas of coverage of the multiple blow-up sheets are to be indicated as rectangles on the index sheet.

ESC Drawing

This plan sheet shall provide erosion and sediment controls for the initial clearing, grubbing and grading of a project. At a minimum, it shall contain:

1. Title Block – Include name and address of proposed project/development, submittal date, title of drawing, and sheet number.

2. Project Site Plan – Existing and proposed right-of-way and easements.

3. Professional Engineer's Seal – Include signature and date.

4. Drawing Information:
   - North arrow indicator
   - Section-Township-Range
   - Drawing Scale
   - Symbol Legend

5. Limits of construction encompassing all areas of work, access points, storage and staging areas etc. All other areas outside the limits of construction shall be lightly shaded to clearly show area not to be disturbed.

6. Existing topography at 1' - 2' maximum contour intervals, extending a minimum of 100 feet beyond the property line (insufficient extension of contours will be cause for non-compliance).

7. Water Features – Include locations of springs, streams, wetlands and other surface waters and the boundaries of 100-year flood plains (if determined).

8. Storm Drainage Structures – Include locations of all existing and proposed channels, swales or drainage pipes which either convey off-site stormwater through or route stormwater around the construction area.

9. Erosion and Sediment Control Structures – Include locations of all proposed erosion and sediment control facilities. In addition, develop typical or specific details of all proposed facilities.

10. Material Storage Areas – Include all areas used for storage of building materials, soils, or wastes.

11. Batch Plants – Identify the location of any dedicated asphalt or concrete batch plants.

12. Construction Site – Provide construction site boundaries and limits of soil disturbance (include area). Stockpile areas shall be presented as well as areas of cut and fill.

Installation of Initial BMP's. The Initial BMP's shown on the ESC Drawings shall be installed prior to the on-site Preconstruction inspection. The Initial BMP's include, but are not limited to, silt fence, construction fence, and vehicle tracking control.

Scheduling the Preconstruction Inspection. The Permittee(s) shall contact Public Works to schedule the on-site Preconstruction inspection. Three day notice (business days, not including Saturday, Sundays and holidays) shall be provided to schedule the meeting.
Attendees at the Preconstruction inspection. The on-site Preconstruction inspection is required prior to the start of construction. The following should be present:

1. **Owner or Owner's Representative**

2. **General Contractor**.

3. **SWPPP Responsible Person and** or **Alternative** (one or both may be the same as the Owner and/or General Contractor Representatives).

4. **Grading Sub-Contractor**, if different than the General Contractor.

CONSTRUCTION SITE INSPECTIONS

The overall effectiveness of the ESC Plan depends upon the correct installation and maintenance of BMP's. All construction activities that are required to submit an SWPPP. SWPPP must be inspected as necessary to ensure compliance with the approved SWPPP. The focus of the inspections is to verify that structural BMP's are installed and maintained properly and that temporary control BMP's are being implemented appropriately. Once the site has completed all necessary final stabilization measures, the responsible person will notify the Orem City Department of Public Works and schedule an inspection. The Orem City Department of Public Works will provide guidance to the owner and the owner's representatives in complying with the requirements of the SWPPPCAP Permit.

FINAL STABILIZATION

Final Stabilization means that all soil disturbing activities at the site have been completed, and that a uniform (e.g. evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geo-textiles) have been employed. In some parts of the country, background native vegetation will cover less than 100% of the ground (e.g. arid areas). Establishing at least 70% of the natural cover of native vegetation meets the vegetative cover criteria for final stabilization. For example, if the native vegetation covers 50% of the ground, 70% of 50% would require 35% total cover for final stabilization. For individual lots in residential construction, final stabilization means that either the homebuilder has completed final stabilization as specified above, or the homebuilder has established temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and has obligated the homeowner, by contract, to complete the requirements for final stabilization within two years.

NOTICE OF TERMINATION (N.O.T)

Stormwater Pollution Prevention Plan Construction Activity Permit will not be considered terminated until the Permittee submits a Notice of Termination of Construction Activity Permit ("Notice") to the City and the Notice is accepted by the City. The City shall accept the Notice if the Permittee has met the requirements of the Permit and its ordinance. The Permittee shall keep and maintain all Permit-required improvements on the site until the City accepts the Notice. SWPPP bonds will not be released until the Notice of Termination has been accepted by the City.

A. Submit prior to using:

1. Sample of blanket or geotextile materials.
2. Mulch formula.
3. Grass mixture listing.
4. Plant list.
5. Geotextile manufacturer's certification.

B. Application rate of fiber mulches recommended by tackifier manufacturer.

1.3 **DELIVERY, STORAGE AND HANDLING**

A. Deliver seed in original containers with certified germination test results showing analysis of seed mixture, percentage of pure seed, year of production, and date of packaging. Damaged packages are not acceptable. Store seed free of moisture.

B. Deliver fertilizer in waterproof bags showing weight, chemical composition and name of manufacturer.

C. Deliver blanket in original wrapping showing name of manufacturer and product weight.

D. Deliver plant materials immediately prior to placement.

E. Replace plant when original root protection system (burlap bag wrap of earth ball, plastic container with special plant bedder, etc.) has been broken or displaced prior to planting.

PART 2 PRODUCTS

2.1 **MATERIALS**

A. Riprap: Rock, Section 31 37 00.

B. Blankets: Uniform open weave jute, wood fiber, biodegradable or photodegradable synthetic fiber matting.

C. Geotextiles: Refer to fabric in Section 31 05 19.

D. Erosion Control Vegetation Mats: Permanent three dimensional mats which allow for revegetation where high water flows are expected.

E. Fiber Mulches: Straw, hay, wood or paper free from weeds or foreign matter detrimental to plant life.

F. Mulch Binder: Vegetable based gel tackifier with growth stimulant.

G. Topsoil and Fertilizer: Refer to Section 31 05 13 and Section 32 92 00.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Remove foreign materials, roots, rocks, and debris.

B. Grade to eliminate rough spots, and ponding areas.
C. Grade soil to drain perimeter water away from protected areas.
D. As applicable.
1. Temporary controls, Section 01 57 00.
2. Grass, Section 32 92 00.

3.2 **SLOPE PROTECTION BLANKET**

A. Cover seeded slopes where grade is greater than 3 horizontal to 1 vertical with blanket. Roll down over slopes carefully and loosely without stretching or pulling.
B. Lay blanket smoothly on prepared soil surface. Bury top end of each section in a narrow Trench. Leave 24 inches overlap from top roll over bottom roll. Leave 12 inches overlap over adjacent section.
C. Toe-in top end of each section in narrow Trench at least 12 inches deep. Toe-wrap fabric at bottom of slope.
D. Staple loosely the outside edges and overlaps.
E. In ditches, lay matting in upstream direction. Overlap and staple ends 6 inches with upstream section on top.
F. If natural drainage water traverses protected or controlled area; construct a channel or riprap according to Drawings and Section 31 37 00.
G. Lightly dress slopes with topsoil to ensure close contact between cover and soil.
H. Present alternative methods of protection for approval prior to starting any work.

3.3 **GEOTEXTILE**

A. Placement, Section 31 05 19.

3.4 **MULCHES**

A. Apply mulches at the rate indicated.
B. When installed with a tackifier, apply at the rate recommended by the tackifier Supplier.

3.5 **SURFACE COVER**

A. Grass, Section 32 92 00.
B. Ground cover, Section 32 93 13.

3.6 **MAINTENANCE**

A. Maintain surfaces and supply additional topsoil where necessary, including areas affected by erosion.
B. Protect and repair geotextiles, Section 31 05 19.
C. Keep surface of soil damp only as necessary for seed germination.
D. Apply water slowly so surface of soil will not puddle and crust.
E. Replant damaged grass areas showing root growth Failure, deterioration, bare or thin spots, and eroded areas.
F. Re-fertilize 60 days after planting.
G. Remove weeds that are over 3 inches high.

END OF SECTION

NON-STORM WATER DISCHARGE CONTROLS

BMP Dewatering Operations

DESCRIPTION: Water is removed using well points and power driven pumps, which discharge in to a system of filter bags or tubes consisting of the proper sized. Dewatering must be done so that the velocity of the discharged water doesn't cause scouring of the receiving area. If the receiving area is a structural BMP (i.e. basin or sump), the design of the BMP should be based on the anticipated flow from the dewatered area.

- This BMP is applicable to trench or excavation dewatering.

- Discharges of non-storm water from a trench or excavation that contain sediments or other pollutants to the sanitary sewer, storm drain systems, creek bed (even if dry), or receiving waters is prohibited.

Water generated by dewatering activities may be managed in accordance with the following procedures:

- Use water where possible for construction activities such as compaction and dust control. If used for these applications, ensure that the water will infiltrate and not run-off the land to storm drain systems, to creek beds (even if dry) or to receiving waters.

- If allowed, infiltrate to an appropriate landscaped, vegetated or soil area.

Non-contaminated storm water may be discharged to land for infiltration when:

- The water does not run-off from the land to storm drain systems, to creek beds (even if dry) or other surface waters.

Maintenance and Inspection

- Inspect pumps, hoses and all equipment before use. Monitor dewatering operations to ensure it does not cause offsite discharge or erosion.

- Inspect routinely, when applicable activities are under way.

Outlet Protection

BMP: Outlet Protection

DESCRIPTION:
A rock outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble which is placed at the outlet of a pipe to prevent scour of the soil caused by high pipe flow velocities, and to absorb flow energy to produce non-erosive velocities.

APPLICATIONS:
- Wherever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach.
- Rock outlet protection is best suited for temporary use during construction becasue it is usually less expensive and easier to install than concrete aprons or energy dissipators.
- A sediment trap below the pipe outlet is recommended if runoff is sediment laden.
- Permanent rock riprap protection should be designed and sized by the engineer as part of the culvert, conduit or channel design.
- Grouted riprap should be avoided in areas of freeze and thaw because the grout will break up.

INSTALLATION/APPLICATION CRITERIA:
Rock outlet protection is effective when the rock is sized and placed properly. When this is accomplished, rock outlets do much to limit erosion at pipe outlets. Rock size should be increased for high velocity flows. Best results are obtained when sound, durable, angular rock is used.

LIMITATIONS:
- Large storms often wash away the rock outlet protection and leave the area susceptible to erosion.
- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat.

MAINTENANCE:
- Inspect after each significant rain for erosion and/or disruption of the rock, and repair immediately.
- Grouted or wire-tied rock riprap can minimize maintenance requirements.

OBJECTIVES

- ☐ Housekeeping Practices
- ☐ Contain Waste
- ☐ Minimize Disturbed Areas
- ☐ Stabilize Disturbed Areas
- ☒ Protect Slopes/Channels
- ☐ Control Site Perimeter
- ☒ Control Internal Erosion

TARGETED POLLUTANTS

- ■ Sediment
- ☐ Nutrients
- ☐ Toxic Materials
- ☐ Oil & Grease
- ☐ Floatable Materials
- ☐ Other Waste

- ■ High Impact
- ☒ Medium Impact
- ☐ Low or Unknown Impact

IMPLEMENTATION REQUIREMENTS

- ☒ Capital Costs
- ☐ O&M Costs
- ☒ Maintenance
- ☐ Training

■ High ☒ Medium ☐ Low

DIVISION 32

EXTERIOR IMPROVEMENTS

SECTION 32 01 13

SLURRY SEAL

This specification changes a portion of APWA Standard Specification Section 32 01 13. All other provisions of the section remain in full force and effect.

Section 32 01 13 Page 455

3.2 PREPARATION

B. PROTECTION

1. Protect trees, plants and other ground cover from damage.
2. Prune trees; Section 32 01 93. Allow equipment passage underneath. Repair tree damage at no additional cost to owner. Repair of tree damage to be performed by an ISA certified arborist.
3. Install invert covers.
4. Mask Street Fixtures.
5. Protect curb, gutter, and sidewalk from spatter, mar or overcoat.
6. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative.
7. Pruning of trees to be performed by an ISA certified arborist.

SECTION 32 01 14

CHIP SEAL

This specification changes a portion of APWA Standard Specification Section 32 01 14. All other provisions of the section remain in full force and effect.

Section 32 01 14 Page 462

3.2 PREPARATION

B. Protection

1. Protect trees, plants and other ground cover from damage.
2. Prune trees; Section 32 01 93. Allow equipment passage underneath. Repair tree damage at no additional cost to owner. Repair of tree damage to be performed by an ISA certified arborist.
3. Install invert covers.
4. Mask Street Fixtures.
5. Protect curb, gutter, and sidewalk from spatter, mar or overcoat.
6. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative.
7. Pruning of trees to be performed by an ISA certified arborist.

SECTION 32 01 15

MICRO-SURFACE SEAL

This specification changes a portion of APWA Standard Specification Section 32 01 15. All other provisions of the section remain in full force and effect.

Section 32 01 15 Page 470

3.2 PREPARATION

B. Protection

1. Protect trees, plants and other ground cover from damage.
2. Prune trees; Section 32 01 93. Allow equipment passage underneath. Repair tree damage at no additional cost to owner. Repair of tree damage to be performed by an ISA certified arborist.
3. Install invert covers.
4. Mask Street Fixtures.
5. Protect curb, gutter, and sidewalk from spatter, mar or overcoat.
6. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative.
7. Pruning of trees to be performed by an ISA certified arborist.

SECTION 32 01 16

RECYCLED ASPHALT PAVING

This specification changes a portion of APWA Standard Specification Section 32 01 16. All other provisions of the section remain in full force and effect.

Section 32 01 16 Page 476

3.2 PREPARATION

B. Protection

1. Protect trees, plants and other ground cover from damage.
2. Prune trees; Section 32 01 93. Allow equipment passage underneath. Repair tree damage at no additional cost to owner. Repair of tree damage to be performed by an ISA certified arborist.
3. Install invert covers.
4. Mask Street Fixtures.
5. Protect curb, gutter, and sidewalk from spatter, mar or overcoat.
6. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative.
7. Pruning of trees to be performed by an ISA certified arborist.

SECTION 32 01 90

PLANT MAINTENANCE

This specification changes a portion of APWA Standard Specification Section 32 01 90. All other provisions of the section remain in full force and effect.

Section 32 01 90 Page 489

1.2 GRASS MAINTENANCE

A. General: Maintain surfaces until Work is accepted, but in any event for a period of not less than 60 days after planting. If growth of the grass is poor, not growing an inch in height each week.
   1. Top dress with Fertimulch soil builder compost from the Miller Company LC, or equivalent
   2. Top dressing will be at a rate of 1/4" in depth or 3/4 cubic yards per1000 square feet.
   3. All top dressing materials will have a smooth and level finished grade eliminating any piles of material by dragging or raking of material into the turf area.

E. Mowing: Cut grass first time when it reaches a height of 2-1/2 inches and maintain to minimum height of 2 inches. New turf should be mowed before reaching a height of 4 (four) inches tall to prevent matting. Do not cut more than 1/3 of blade at any one mowing. Remove clippings. After first mowing, water to moisten soil from 3-5 inches deep. Allow a minimum of 5 days between mowing.

F. Weed Control: Control weeds after 6 (six) weeks or after 3 (three) mowings.

1.3 **TREES, PLANTS, AND GROUND COVER MAINTENANCE**

A. General: Care for planted areas. Maintain water, weed, repair, and protect until Work is accepted, but in any event for a period of not less than 60 days after planting. Supply additional topsoil where necessary, including areas affected by erosion or settlement.

B. Watering: After planting, keep ground moist until healthy growth is established. Thereafter, thoroughly water as needed when dry until Work is accepted. Prevent erosion.

C. Weeding: Uproot and remove weeds completely. Do not allow growth and germination of weed seeds. Fill in large holes caused by weeding with topsoil and rake smooth.

D. Protection: Protect planted areas against traffic by erecting barricades and warning signs. Replant damaged planted areas.

E. Maintain stakes, straps, and wire to keep tree trunk vertical. Repair or replace accessories when required.

1.4 **REPLACEMENTS**

A. When any portion of surface becomes gullied or otherwise damaged and planting has failed to grow, repair and replant.

B. At conclusion of maintenance period, replant areas showing root growth Failure, bare or thin spots, and eroded or settled areas with materials of

like kind and size as specified for original planting.

C. Throughout the maintenance period, replace any unsatisfactory or dead plants, as determined by the ENGINEER, City Forester, or an appointed representative, within 10 days of written notice.

1.6 **GUARANTEE**

A. Guarantee covers plant material establishment 1 year from date of acceptance.

B. Replace plant materials found dead or not in a healthy growing condition, as determined by the ENGINEER, City Forester, or an appointed representative, with plant materials of same size and species with a new guarantee commencing on date of replacement.

C. At end of guarantee period if landscaped surfaces have settled causing poor drainage conditions, correct grade deficiencies. Make corrections after receiving approval of corrective methods and schedules.

D. Perform corrective work at no additional cost to OWNER.

SECTION 32 01 91

TREE ROOT CUTTING

This specification changes a portion of APWA Standard Specification Section 32 01 91. All other provisions of the section remain in full force and effect

Section 32 01 91 Page 491

PART 1 GENERAL

1.3 PROJECT CONDITIONS

B. Provide written notification to neighbors in property abutting the tree root cuts to disclose where the cuts were made.

1.4 QUALITY ASSURANCE

A. Notify ENGINEER, City Forester, or an appointed representative prior to cutting any tree roots to allow for inspection and consultation.

PART 3 EXECUTION

3.2 CUTTING TREE ROOTS

A. Never cut buttress roots [i.e. roots at the broadened base of the tree trunk] or roots greater than 2” diameter without written authorization of ENGINEER, City Forester, or an appointed representative. Avoid injury to trunk and bark.

B. Keep root cutting at least 4 feet away from tree trunk. Limit cutting to one side of tree unless authorized otherwise in writing by ENGINEER, City Forester, or an appointed representative.

C. Cut roots clean and straight (no ragged or torn edges). Use appropriate equipment that properly cuts roots. Do not make partial root cuts.

D. Do not injure roots to remain.

E. Cut roots back to root laterals if possible. Keep root removal to a minimum.

3.3 BACKFILLING

C. Disregard

SECTION 32 01 93

PRUNING TREES

This specification changes a portion of APWA Standard Specification Section 32 01 93. All other provisions of the section remain in full force and effect

Section 32 01 93 Page 493

PART 1 GENERAL

1.4 QUALITY ASSURANCE

A. Notify ENGINEER, City Forester, or an appointed representative prior to cutting any tree branches to allow for inspection and consultation.

PART 2 PRODUCTS

2.1 PRUNING PAINT

A. Do not use pruning paint or wound dressing of any kind on pruning cuts.

PART 3 EXECUTION

3.1 PREPARATION

A. Pruning work in any publicly owned right of way requires CONTRACTOR notifying the adjacent property owner and giving them a brief description of why and how the work will be done. Notification needs to be given at least 2 weeks before any work is done so the property owner has a chance to respond if they choose to do so. The arborist selected to provide pruning service shall be ISA certified and provide the notices. A written record of delivery dates of notices by address is required for the arborist.

B. Pruning trees on private property require tree owner approval. ENGINEER, City Forester, or an appointed representative, and CONTRACTOR shall jointly contact the owners for approval prior to performing any work.

3.2 TREE PRUNING

D. Remove tree branches extending over the roadway to provide a clear height of

1. 16 feet over the travel lane.*
2. 14 feet over the Driveway.
3. 12 feet over finished grade.
4. 6 feet away from street light.
5. 12 feet over signal light.
6. 8 feet over sidewalk.
7. 14' over parking lane*

***** The travel lane means the lane vehicles typically use for travel which is different than the parking lane which is the lane adjacent to the street along the curb normally used for parking.

G. Prune trees to make them safe, healthy, shapely, symmetrical, and typical of the natural form of the species being pruned. Remove no more than 25 percent of the live canopy per year. Do not remove branches that would deform the appearance of the tree.

I. Reduce length of limbs as ordered by ENGINEER, City Forester, or an appointed representative using the drop crotch pruning method.

J. Do not remove any live branch larger than 4 inches in diameter unless authorized by ENGINEER, City Forester, or an appointed representative.

K. Pre-cut branches to reduce weight of final cut using the natural target pruning 3 step cut method. The first cut is made away from the trunk on the underside of the branch; the second cut is outside of the bottom cut and removes the limb. The final cut removes the stub just outside of the branch bark ridge and branch collar.

L. No internodal final cuts permitted.

R. Do not leave branch stubs outside of the branch collar or the branch bark ridge.

SECTION 32 12 14

TACK COAT

This specification changes a portion of APWA Standard Specification Section 32 12 14. All other provisions of the section remain in full force and effect.

Section 32 12 14 Page 533

Add the following to Article 2.1 Asphalt Material

A. Select from the following
    1. Emulsified Asphalt: Grade MS-1, SS-1 or SS-1h, Section 32 12 03.
    2. Cationic Emulsified Asphalt: Grade CSS-1 or CSS-1h, Section 32 12 03.
    3. Rapid Cure Cutback Asphalt: Grade RC-70, Section 32 12 03.
    4. Medium Cure Cutback Asphalt: Grade MC-70, Section 32 12 03.

SECTION 32 12 16

PLANT MIX ASPHALT PAVING

This specification changes a portion of APWA Standard Specification Section 32 12 16. All other provisions of the section remain in full force and effect

Section 32 12 16 Page 535

PART 3 EXECUTION

3.2 PREPARATION

B. Protection:

1. Protect trees, plants and other ground cover from damage.
2. Prune trees; Section 32 01 93. Allow equipment passage underneath. Repair tree damage at no additional cost to owner. Repair of tree damage to be performed by an ISA certified arborist.
3. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the City Forester or an appointed representative.
4. Pruning of trees to be performed by an ISA certified arborist.

SECTION 32 12 17

COLD MIX ASPHALT PAVING

This specification changes a portion of APWA Standard Specification Section 32 12 17. All other provisions of the section remain in full force and effect

Section 32 12 17 Page 543

PART 3 EXECUTION

3.2 PREPARATION

B. Protection:

1. Protect trees, plants and other ground cover from damage.
2. Prune trees; Section 32 01 93. Allow equipment passage underneath. Repair tree damage at no additional cost to owner. Repair of tree damage to be performed by an ISA certified arborist.
3. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative.
4. Pruning of trees to be performed by an ISA certified arborist.

SECTION 32 13 13

CONCRETE PAVING

This specification changes a portion of APWA Standard Specification Section 32 13 13. All other provisions of the section remain in full force and effect

Section 32 13 13 Page 547

PART 3 EXECUTION

3.2 PREPARATION

B. Protection:

1. Protect trees, plants and other ground cover from damage.
2. Prune trees; Section 32 01 93. Allow equipment passage underneath. Repair tree damage at no additional cost to owner. Repair of tree damage to be performed by an ISA certified arborist.
3. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative. Pruning of trees to be performed by an ISA certified arborist.

SECTION 32 16 13

DRIVEWAY, SIDEWALK, CURB, GUTTER

This specification changes a portion of APWA Standard Specification Section 32 16 13. All other provisions of the section remain in full force and effect.

Section 32 16 13 Page 576

3.2 PREPARATION

E. Minimum grade for curb and gutter is 0.5% unless approved by the ENGINEER.

3.5 CONTRACTION JOINTS

A. Tooled Joints (Score Lines)
   1. Depth = T/4. T is the depth of the concrete slab in inches
   2. Top Radius = ½ to ¾ inch

B. Sidewalks
   1. Every 10 feet
   2. Remains the same
   3. Place longitudinal and transverse joints no greater than 2.5 times the concrete thickness. (e.g. maximum length and width, without contraction joints, of 4 inch thick concrete is 2.5 x 4 or 10 feet.)

3.6 EXPANSION JOINTS

B. Sidewalks, Sidewalk Ramps
   5. Install expansion every 100’ of sidewalk

3.7 FINISH

B. Round edges exposed to public view to a ½” to ¾” radius.

SECTION 32 31 13

CHAIN LINK FENCES AND GATES

This specification changes a portion of APWA Standard Specification Section 32 31 13. All other provisions of the section remain in full force and effect

Section 32 31 13 Page 595

PART 3 EXECUTION

3.1 PREPARATION

A. Identify utility location, Section 01 31 13.
B. Excavation, Section 31 23 16.
C. Refer to ASTM F 567 and CLFMI products manual for chain link fence installation.
D. Protect roots and branches of trees and plants to remain. If any tree roots are to be disturbed, refer to section 32 01 91. If any tree branches are to be pruned, refer to section 32 01 93.
E. Limit the amount of clearing and grading along the fence line to permit proper installation.

SECTION 32 84 23

UNDERGROUND IRRIGATION SYSTEMS

This specification changes a portion of APWA Standard Specification Section 32 84 23. All other provisions of the section remain in full force and effect

Section 32 84 23 Page 605

Add the following

1.3 DEFINITIONS

B. Irrigation System : The arrangement of the irrigation system, including the main water supply valve/s, back flow preventor, water metering device, main water supply piping, lateral control valves, lateral piping, sprinkler head swing joints and the sprinkler heads and or water emmitors. The irrigation system will also include the connection of the main electrical power supply to the control clock/s, control clock/lateral control valve/s wiring, lightning protection and any and all accessories specified by the OWNER related to the project.

D. OWNER : City of Orem Staff directly involved in project.

E. Main Irrigation Shut Off Valve: The valve which controls the water to the irrigation system from the city water supply system.

F. Back flow Preventer: City approved device to prevent water in the irrigation system from moving up stream to the city water supply system.

G. Water Meter: City approved meter for measuring the amount of water used in the irrigation system.

H. Main Line Supply Piping: Piping between the main shut off valve and all of the lateral irrigation control valves.

I. Lateral Control Valves: Electrically controlled water valves that control the flow of water to the lateral piping and sprinkler heads.

J. Lateral Line piping: That system of pipes downstream from the lateral control valve. The lateral line pipe feeds water to sprinklers and/or emitters.

K. Sprinkler Head Swing Joints: The arrangement of pipes and fitting connecting each sprinkler head to the lateral sprinkler line piping.

L. Sprinkler Heads and Emmiters: The specified device for distributing the irrigation water to the vegetation.

M. Main Electrical Power Supply: The electrical power supply and connections from the public electrical power source to the sprinkler control clock/s conforming to the NFPA 70: National Electric Code.

N. Controller/s, Control Clock/s: Automatic, electronic lateral valve control device/s.

O. Control Clock/Lateral Control Valve/s Wiring: The wire connecting the controller/s to the lateral control valves.

P. Lightning Protection: As per the manufactures specifications and system that protects the entire irrigation system from lightning storm damage.

Q. Accessories: Any and all addition items or components associated with the sprinkler system specified by the city staff following the city specifications for installing an irrigation system.

1.4 PERFORMANCE REQUIREMENTS Page 605

C. Water Coverage will be at 100-percent for all planting and turf areas. Modify layout to obtain coverage and rate of application and to suit manufacturer's standard heads. Do not decrease the number of heads indicated unless acceptable to ENGINEER, City Forester, or an appointed representative.

1.5 SUBMITTALS

B. Layout Drawings will include:

1. Plan layout and details illustrating piping layout to the water supply location.
2. Layout drawings will also include; the system control clock/s, main and lateral piping and fittings, circuit control valves, sprinkler heads and accessories.
3. All layout drawings will include the manufacturer and model names/numbers of all system components and accessories.

PART 2 PRODUCTS

2.1 PIPE, FITTINGS, OTHER

C. Lateral pipe: Solvent welded schedule 80 PVC.

D. Fittings: Solvent welded schedule 80 PVC.

E. Risers, swing joints: Threaded Schedule 80 PVC.

F. Flow sensor, Rain Bird or Netafim Hydrometer brand, compatible to the Maxicom system.

2.2 VALVES

B. Automatic Valve: All electronic remote-control sprinkler valves will be Rain Bird, # EFB-CP-PRS-D. All electronic control valves will have

schedule 80 PVC unions installed just prior (upstream) to the control valve and just after (downstream) the control valve.

C. Stop and Waste: All stop and waste valves will be King Bridge Brass and sized properly for the irrigation system design and operation. All pipe and fittings within four feet of the stop and waste valve will be brass.

2.4 BACKFLOW PREVENTER

A. As specified by the city water section personnel. Manufacturer's standard, to suit the irrigation system.

B. For a reduced pressure backflow prevention device. The drain to daylight must be a minimum of 12-inches below the bottom of the release valve for devices 4-inches in diameter and smaller, or 12-inches plus the nominal diameter of the devices over 4-inches in diameter.

2.5 SPRINKLER HEADS

B. All turf sprinkler heads will be Rain Bird # 7005, # 5000-Sam, 6504's, 800's, and/or # 1804-1812 Sam-PRS, designed for full, head-to-head coverage and installed as per manufacturers recommendations and specifications.

C. All sprinklers will be the RainBird brand unless approved by the city prior to design.

D. All # 1804-1812 Sam-PRS heads will have marlex swing joints and insert L's at both ends of connections. Rain Bird #7005, #5000-Sam, 6504, 800 heads will have swing joints with two marlex L's at each end of connections.

E. All heads will be identified with a non-potable cover as part of a non-potable water system.

2.6 VALVE BOX

A. Valve boxes must be at least, jumbo size, Carson manufacture or city acceptable equivalent, with a vandal-proof lock-down lid.

B. Each valve box will have a minimum of twelve (12) inches of clean drain rock placed under the valve box.

C. All drain rock will be four (4) inches below the control valve body and piping.

D. Electronic valves will have a minimum of ten (10) inches of clearance below the valve box lid and be a maximum depth of eighteen (18) inches below finished grade.

E. One (1) control and isolation ball valve per valve box.

F. All valve boxes will have room to remove the control valve bonnet within the valve box.

G. All control valve boxes will be to established finished grade.

1. All raising, lowering, leveling will be included in the original contract at no additional cost the city.

2.7 AUTOMATIC CONTROL SYSTEM

A. Controllers will be Rain Bird, # ESP-SAT with a with a cluster control unit, model # CCU 28 W/S. A # RTC-ESP-MC card will be included in the system bid and installation price, as determined by the ENGINEER, City Forester, or an appointed representative.

B. A CAT 3 phone line, fiber optic, two wire, or radio link, as determined by the ENGINEER, City Forester, or an appointed representative, to the Cluster

Control Unit (CCU)and surge protection, a phone base connection or a MDS TransNet OEM radio or MDS TransNet 900 radio with a properly matched antenna for our central control system.

1. A six (6) pair communication wire, PaigeSpec P7315D-Rev1, or Maxicom radio link, connecting the controller/s to the CCU to facilitate communication from the central control unit system to the controller/s conjuction with the Maxicom system.
2. RainBird, RAINGAUGE, installed to RainBird specifictions in conjuction with the Maxicom system.

C. In park areas all controllers will be located inside storage building.

D. Outside controllers will be installed within a Rain Bird, # ESP-SAT-SS pedestal, i.e., parkways or where storage buildings are not accessible.

E. Provide unit of capacity to suit number of lateral control valves plus two open stations for Maxicom program. One lateral control valve, per control unit valve station.

F. Each control will be wired and equipped to operate with a remote control system allowing in field operation as determined by the ENGINEER, City Forester, or an appointed representative.

1. If required by the ENGINEER, City Forester, or an appointed representative, Remote Technology model # 01025 commander with carry case and proper installation of antenna/s and correct style/s to have proper coverage and operation of the remote communication system.

G. Wire

1. Provide wire for connecting remote control valves to the automatic controllers that is Type "UF", 600 volt, stranded or solid copper, single conductor, multicolored with PVC insulation and bearing the UL approval for direct underground burial feeder cable.
2. All connections/splices will be with waterproof connectors, i.e. King one step connectors or city approved equivalent.
3. Two (2) additional valve control wires will be run through all valve boxes. The common wire will not be accepted as a control wire.
4. Provide sixteen (16) inches of expansion loop slack wire at all connections inside valve box.
5. No wire splicing outside of valve boxes.
6. Bury all wires in the same trench as the pipe, directly under the piping.
   a. If wires cannot be buried in the piping trench all wires will be installed in at least double the total wire size grey PVC electrical conduit.

2.8 WATER MAIN SUPPLY VALVE

A. As specified by the city water section personnel. Manufacturer's standard, to suit the irrigation system.

2.9 WATER METER

A. As specified by the city water section personnel. Manufacturer's standard, to suit the irrigation system.

PART 3 EXECUTION

3.2 INSTALLATION

A. General

1. Install a new irrigation system/s to provide full, head-to-head coverage while following all specifications as listed.
2. Submit five copies of an irrigation system drawing with proposal for the City of Orem, (the City), to review, show costs and a list of parts to be used. All plans are diagrammatic. 3. Verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturers' recommendations.
3. All materials and installations are subject to the approval of the ENGINEER, City Forester, or an appointed representative.
4. The manufacturer's recommended methods of installation, which when approved by the City, will become the basis for inspecting and accepting or rejecting the final system.
5. Proposals will include all labor and all materials for the completion of the job.
6. Materials for the job will be available for the project to start two weeks after the contract is awarded.
7. The remaining landscape will be returned to its preconstruction condition
8. All trenching will be outside of the drip line of all trees and shrubs.
9. Before excavating, establish the location of all underground utilities and obstructions.
10. Trench for sprinkler system to ensure proper grades and slopes.
11. Within planting areas avoid conflict with trees. Where irrigation lines are required in proximity to trees and/or shrubs which are to remain, boring will be required to lessen the damage to roots.
12. Install stop and waste valves, isolation valves, vacuum breakers, pressure reduction valves, and other equipment required by local authorities according to Laws and Regulations in order to make system complete.
13. Inspect all pipes and fittings before installation, remove all dirt, scale and burrs and reaming as required, install all pipe with all markings up for visual inspection and verification.
14. Flush lateral lines thoroughly. Remove all foreign materials prior to the installation of sprinkler heads.
15. Damaged, dented and broken pipe will not be accepted under any circumstances. Replacement of damaged, dented and broken pipe will be required upon inspection at the contractor cost
16. Provide, install and maintain from the beginning to completion of the work, construction barricades, fences, guards, railings, lights and warning signs necessary and/or required by State, County and/or City laws or policies to avoid injury or damage to any persons and/or property.
17. The City has all salvage rights.

B. Control Valves
   1. Brass isolation ball valves at each valve station, installed upstream of the control valve.
   2. There will be only one electronic control valve and one ball valve in each valve box.
   3. All control valves will have the capability of being operated with a remote control system allowing remote field operation.

C. Quick-Coupling Valve
   1. Rain Bird**, #** 44LRC will be installed prior to (upstream) of each control valve or group of control valves and/or at least every 150 feet along the constant pressure main line.
      a. All quick-coupling valves will be in a separate regular size valve box, Carson manufacture valve box, or city accepted equivalent.
      b. The male valve insert must be fully controllable without altering the valve box or the male/female valve assemblies.

D. Backflow Preventers

E. Sprinkler Heads, Emitters, Bubblers, Small Rotators (less than 10 gallons per minute)

H. Backflow Preventers - 2" and smaller Backflow Preventers shall be installed with a flange fitting upstream and downstream of the preventer to allow for removal from the pipe riser system. To minimize breakage to the preventer pipe riser system, no PVC pipe will be allowed upstream or downstream of the backflow preventer until proper thrust restraint is achieved. Backflow Preventers shall be installed in a properly sized protective cage approved by the City. The initial test of the Backflow Preventer within 10 days of first water use is the responsibility of the installer. All testing data shall be submitted to Water Section personnel.

3.3 BACKFILLING OPERATION

A. Backfill to 6 inches above pipe with soil fee of rocks over 1 inch diameter, debris, or organic matter. Backfill final 4 inches with soil of like quality to adjacent areas.

B. Center load all lines with a small amount of backfill to prevent arching and whipping under pressure.

C. **Do not allow any work to be covered until it has been inspected by the ENGINEER, City Forester, or an appointed representative.** Should any of the work be enclosed or covered before it has been approved, the contractor will uncover all such work at no additional cost to the City as required for testing and inspections. After repairs, testing, inspection and approval the area will be returned to the conditions before such repairs, testing, inspection and approval were needed at no addition cost to the City.

SECTION 32 91 19

LANDSCAPE GRADING

This specification changes a portion of APWA Standard Specification Section 32 91 19. All other provisions of the section remain in full force and effect

Section 32 12 17 Page 543

PART 3 EXECUTION

3.2 PROTECTION

A. Protect existing trees, shrubs, lawns, existing structures, fences, roads, sidewalks, paving, curb and gutter and other features.

1. To protect existing trees and roots, a Tree Protection Zone (TPZ) must be established.
   a. The method of establishing a TPZ is to calculate a circular area above and below ground with a radius equivalent to the greater of 10 feet or 1.5 feet for every inch in trunk diameter measured 4.5 feet above the ground (for example, the TPZ of a tree twelve inches in diameter has an eighteen foot radius).
   b. The area within the radius is the TPZ.
   c. Tree fencing shall be made of wood or wire and erected before demolition; grading or construction begins and remain in place until final inspection of the project.
   d. No excavation, trenching, grading, root pruning, dumping, or storage of material, topsoil, vehicles, and equipment, or any other activity, shall be permitted within the TPZ.
   e. The TPZ shall remain free of chemically injurious materials and liquids such as paints, thinners, cleaning solutions, petroleum products, and concrete or dry wall excess, construction debris, or run-off.
   f. If an underground line must go near a tree, tunneling or augering must begin and end outside of the TPZ and be a minimum of 24" deep. No soil disturbance is permitted within the TPZ.
   g. Trees to be retained shall be irrigated.

B. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the ENGINEER, City Forester, or an appointed representative.

C. Protect above or below grade utilities. Contact utility companies to repair damage to utilities. Pay all cost of repairs.

D. Protect Subgrade from desiccation, flooding and freezing.

E. Do not fill adjacent to structures until Excavation is checked by ENGINEER, City Forester, or an appointed representative.

F. Do not use compaction equipment adjacent to walls or retaining walls that may cause wall to become over-stresses or moved from alignment.

G. Do not disturb or damage foundation perimeter drainage, foundation,

damp-proofing, foundation waterproofing and protective cover, or utilities in Trenches.

H. Restore any damaged structure to its original strength and condition.

SECTION 32 92 00

TURF AND GRASSES

This specification changes a portion of APWA Standard Specification Section 32 92 00. All other provisions of the section remain in full force and effect

Section 32 92 00 Page 615

Add the following

2.3 TOP SOIL

A. Soil test required prior to construction. The ENGINEER, City Forester, or an appointed representative and Contractor will agree on the testing source.
B. All soil amendments to bring the soils to USU standards will be included as part of the contractors original bid agreement.
C. Minimum top soil depth at finished grade will be ten (10) inches.
D. If off site soils are needed to achieve the ten (10) inch finish grade depth on the site, soil will be of similar type to the native top soil on site as determined by a soil test. All off site soils will be approved for use by the City before use.

PART 3 EXECUTION

3.1 PREPARATION

A. Protect existing underground improvements from damage
B. Do not place turf and grasses until existing weeds have been removed and soil has been prepared.
C. Do not sow immediately following rain, when ground is too dry, too hard or during windy periods without first loosening the surface.
D. Protect trees and tree roots of existing trees that are to remain. To protect existing trees and roots, a Tree Protection Zone (TPZ) must be established.
   1. The method of establishing a TPZ is to calculate a circular area above and below ground with a radius equivalent to the greater of 10 feet or 1.5 feet for every inch in trunk diameter measured 4.5 feet above the ground (for example, the TPZ of a tree twelve inches in diameter has an eighteen foot radius).
   2. The area within the radius is the TPZ.
   3. Tree fencing shall be made of wood or wire and erected before demolition, grading, or construction begins and remain in place until final inspection of the project.
   4. No excavation, trenching, grading, root pruning, dumping, or storage of material, topsoil, vehicles, and equipment, or any other activity, shall be permitted within the TPZ.
   5. The TPZ shall remain free of chemically injurious materials and liquids such as paints, thinners, cleaning solutions, petroleum products, and concrete or dry wall excess, construction debris, or run-off.
   6. If an underground line must go near a tree, tunneling or augering must begin and end outside of the TPZ and be a minimum of 24" deep. No soil

disturbance is permitted within the TPZ.

7. Trees to be retained shall be irrigated.

E. Any damage to existing trees will be evaluated by the ENGINEER, City Forester, or an appointed representative. Dollar value of damage will be determined using the most current edition of *Guide for Plant Appraisal*. Remediation for value lost and appropriate compensation will be determined by the City Forester or an appointed representative.

3.2 GRADING

A. Establish finished grades after settling to provide adequate drainage so no water pockets so ridges will be created.

B. All finish grade soils will be blended and worked to a depth of ten (10) inches and surface scarified before planting or sodding turf areas. Remove rock and debris over 2 inches diameter, any vegetation, and weeds.

1. Do not till within the Tree Protection Zone.

C. Site tolerances

1. Total topsoil depth for lawns and grasses: 10 inches

D. After all excavation and grading of the site and before any plants or turf are planted a complete soil test will again be completed on all turf, shrub and/or flower areas. All nutrient levels will meet standards set by Utah State University.

E. If the existing native top soil is fifteen (15) inches in depth, it is to be disturbed as part of the grading plan, this top soil it will be stock piled and reused for finish grades.

F. If soil brought in is not of the same structure then both soils will need to be tiled and mixed together so a soil interface will not occur.

3.3 FERTILIZING

E. When seed or hydro seed is planted a 16-16-16 plus Fe at 1 (one) pound Nitrogen/1000 square feet will be applied at the time of planting or hydro seeding.

F. Fertilizer, 25-5-10 with slow release with polymer coated sulfur coated urea, will be applied to the new turf at a rate of 1 (one) pound Nitrogen /1000 square feet every 30 days after sodding or seed germination.

3.4 SEEDING

C. Seeding mix should be a blue ribbon seed mix from Granite seed Company or an equivalent seed source.

D. Uniformity of turf grass is required when seeding.

1. Over seed to obtain uniformity filling in any low areas with a planters mix and soil using a blue ribbon mix of seed at 7 (seven) pounds per 1000 square feet**.**

3.5 ONE-STEP HYDROSEEDING

C. Seeding mix should be a blue ribbon seed mix from Granite seed Company or an equivalent seed source.

3.6 TWO-STEP HYDROSEEDING

C. Seeding mix should be a blue ribbon seed mix from Granite seed Company or an equivalent seed source.

SECTION 32 93 43

TREE

This specification changes a portion of APWA Standard Specification Section 32 93 43. All other provisions of the section remain in full force and effect

Section 32 93 43 Page 623

PART 1 GENERAL

1.2 REFERENCES

B. American National Standards Institute.
1. A300: Tree, Shrub and Other Woody Plant Maintenance Practices
2. Z60.1-1996: American Standard for Nursery Stock.

1.3 SUBMITTALS

A. Copy of CONTRACTOR'S notice to property owner. Format to be substantially as follows:

NOTICE TO PROPERTY OWNER

Your new tree is a: _____ *(Name of tree)*

How to take care of your new tree.

Water when soil near the trunk is dry to the touch for the first year after planting. Use 5 gallons of water per inch of trunk caliper.

*Prune only dead or damaged branches the first year.

- Do not fertilize until second year and only then if needed.
- Do not use week killer near new trees.
- Protect new tree from damage by cars, lawn mowers, grass trimmers, bikes, vandals, etc.
- Maintain a mulch cover at the base of the new tree.

1.4 QUALITY ASSURANCE

A. All plants to be purchased must meet ANSI Z60.1-1996, the American Standard for Nursery Stock, and be in a healthy condition as determined by the ENGINEER, City Forester, or an appointed representative.

B. Nursery: Use a company specializing in growing and cultivating trees with minimum 3 years experience.

C. Installer: Use a company specializing in installing and planting trees.

D. Planting Plan: Correlate planting time with specified maintenance periods and guarantee.

E. Notice will be given to the ENGINEER, City Forester, or an appointed representative, when plants are available for inspection to assure conformity to specification requirements as to quality, size, and variety. All plants will be properly identified with a label.

F. The ENGINEER, City Forester, or an appointed representative has the right to inspect all plant material and reject any plant material deemed unfit before it is planted, during the progress of the work, or within one

year after the work is completed.

1. Rejected plants will be marked and will be removed from the site and replaced with suitable plants at the contractors cost.
2. Plants must be healthy, true to form, free from disfiguring knots, sun scald, frost cracks, abrasions of the bark, plant diseases, insects, and all forms of damage, infestation, and disease.
3. Plants must be typical first class representatives of their species of growth.
4. Plants shall be sound, healthy, vigorous, well-branched and densely foliated when in leaf and have healthy, well-developed root systems.
5. Balled and burlapped (B&B) shrubs or trees will have a firm rootball which does not allow the trunk to move independent of the ball.
6. Tree branches will not be tipped. Tipping is described as removing tips of branches at internodes. Plants shall be capable of standing upright without the support of stakes or guys after planting.
7. Deciduous trees shall be at least two (2) inches in caliper measured six (6) inches above ground level. Evergreen trees shall be at least five (5) feet in height above ground level.
8. Plants larger than the size specified may be accepted at no increase to the contract unit price, provided the plants meet the requirements listed above.
9. Substitute plants will not be accepted without prior approval of the ENGINEER, City Forester, or an appointed representative.

G. Rejection: Reject any tree upon the following basis.

1. Tree has cracked or broken ball of earth surrounding roots preparatory to or during process of planting.
2. Tree was cut back from a larger plant to meet Specifications.
3. Tree is not the specified size.
4. Tree has been pruned improperly.
5. Tree has disease or insect infestations.
6. Tree was damaged during transplant.
7. Tree has bark damage to the trunk.
8. Tree has co-dominant stems.
9. Tree has underdeveloped root system.
10. Tree has multiple branch attachments in close proximity on the trunk.
11. Any other reason as defined by the ENGINEER, City Forester, or an appointed representative.

1.6 WARRANTY

A. Warrant tree planting through one year plus one continuous growing season. Include coverage of trees from death, unhealthy conditions, if tree dies from poor planting practice, or any other reason as determined by the ENGINEER, City Forester, or an appointed representative. Replace any unsatisfactory or dead tree within 10 days or written notice.

1.7 MAINTENANCE

D. Correctly prune dead or broken branches. Refer to Section 32 01 93.

2.1 TREE MATERIALS

A. Species and size specified, grown in climatic conditions similar to those in locality of the Work with branching configuration and cane requirements indicated in ANSI Z60.1-1996.

E. Before site delivery, containerized plants will be grown for a minimum of sixty (60) calendar days under full exposure to climatic conditions in the container they will be delivered in. All plants may be examined by the ENGINEER, City Forester, or an appointed representative for condition and compliance with specifications.

F. Deciduous trees shall be at least two inches in caliper measured six inches above ground level. Evergreen trees shall be at least five feet in height above ground level. Plants larger than the size specified may be accepted at no increase to the contract unit price provided the plants meet the requirements listed above. Substitute plants will not be accepted without prior approval.

2.2 SOILS

A. Backfill of Root Ball Pit: Native soil, if not excessively rocky, compactable or clayey; otherwise amend at a rate of 2 parts native soil to 1 part composted organic material. Mix together thoroughly.

3.2 EXCAVATION

A. Dig only as deep as the root ball. The hole should be just deep enough so the bottom of the root ball can be placed on undisturbed soil and the root collar will be at or slightly above the level of the final soil grade.
   1. The root collar is a flared or swollen area on the trunk where the root system and trunk meet.
   2. If the shrub or tree is a grafted variety, the graft union must be kept above the final grade.

3.3 INSTALLATION

F. Place the plant or tree in the bottom of the hole onto undisturbed soil with its stem vertical. Make sure the root collar is at or slightly above the final soil grade. Trees and shrubs planted deep shall be replanted or replaced, at the discretion of the ENGINEER, City Forester, or an appointed representative.

G. All packing materials should be removed from potted plant material. If potted material is root bound, one (1) inch deep cuts should be made on both sides of the root ball and on the bottom to sever circling roots.

H. Backfill: Fill the hole with the original native soil
   1. Remove any large rocks and break up large clods.
   2. Pack the soil lightly to remove air pockets but do not over compact.
   3. Straighten the shrub or tree and keep its root collar at the correct level as you backfill.
   4. Add and firm the soil until it is even with the surrounding soil level. If the shrub or tree was planted too shallow, mound the soil up to the root collar or root ball. It is better to plant shallow than to plant too deep. No roots should be exposed when backfilling is complete.

I. Trees shall be surrounded with a circle of mulch three to four (3-4) inches deep extending at least three (3) feet from the trunk.
   1. The mulch shall consist of wood chips or other coarse organic material approved by the Forester.

2. Mulch will be kept a few inches away from the trunk to avoid trunk decay.
3. Plastic sheeting, rocks, porous weed barriers, or other materials are not to be placed over the planting hole.

3.4 PRUNING

B. Prune only damaged or dead wood.

3.5 PROTECTION

F. Stake all newly planted trees unless otherwise specified by the ENGINEER, City Forester, or an appointed representative.
   1. All balled and burlap trees shall be staked with a minimum of two (2) stakes. Stakes should be driven at least two (2) feet into the ground, just outside the planting hole, in undisturbed soil.
   2. Guy loosely near the soil level to allow some trunk movement, using soft strapping at least one (1) inch wide looped around the trunk.
   3. Do not wrap any wire around the trunk. The guy wires should be connected to the end of the strapping.
   4. Hose-covered wire is unacceptable
   5. Use at least 16 gauge galvanized wire to secure the strapping around the trunk to the metal posts.
   6. Trees planted in park settings and/or by building or schools should have three (3) tall stakes surrounding the tree to help physically protect the tree even if no guying materials are used.

G. Once staked and mulched, water should be applied to settle the soil and remove air pockets. Use five (5) gallons of water per inch caliper of tree.

DIVISION 33

UTILITIES

SECTION 33 05 05

DUCTILE IRON PIPE

This specification changes a portion of APWA Standard Specification Section 33 05 05. All other provisions of the section remain in full force and effect.

Section 33 05 05 Page 642

Add the following to Article 2.1 Pipe and Fittings

A. Buried Applications:
   6. Does not apply

SECTION 33 05 20

BACKFILLING TRENCHES

This specification changes a portion of APWA Standard Specification Section 33 05 20. All other provisions of the section remain in full force and effect.

Section 33 05 20 Page 670

1.8 BACKFILL TRENCHES

A. Trench Backfilling: One test per Lot

1. Engineer may either Delete or Increase these testing requirements based on observed compaction effort and/or confidence in material used for Backfill.

2.1 BACKFILL MATERIALS

D Asphalt bearing material allowed only in bottom half of base course and must be mixed 50% with road base. Asphalt bearing material not allowed in trench backfill.

E Slag may be allowed to replace road base by the Engineer. Slag shall not be allowed in trench backfill

2.2 ACCESSORIES

D Tracer Wire. Any culinary water line, regardless of size, type, or installation, shall have a 14 gauge insulated copper tracer wire installed within 6" directly above the top of pipe. Tracer wire is to be installed with any non-metallic pipe, wire or conduit that is designed for utility use of any type.

1. Wire is to be spliced in at all connections to other mains, and connections must be covered or coated with corrosion protection using gel caps or mastic pad.
2. Where a new main ends, such as at a dead end or where it connects to an old main that does not have a tracer wire, the locating wire shall be properly grounded either by connecting directly onto the ductile iron pipe or by connecting onto a grounding rod. This connection shall also be covered or coated with corrosion protection as previously stated.
3. Fire lines shall have tracer wire installed to the valve inside the building. Refer to drawings for further clarifications.

3.4 PIPE ZONE

B Pipe zone backfill shall be SAND around ALL culinary water piping. ENGINEER may allow manufacturers recommendations for concrete or plastic sewer/storm sewer installations.

3.8 SURFACE RESTORATION

A. Provide smooth, stable, temporary surfaces where Trenches pass through roadways, driveways or sidewalks

SECTION 33 05 25

PAVEMENT RESTORATION

This specification changes a portion of APWA Standard Specification Section 33 05 25. All other provisions of the section remain in full force and effect.

Section 33 05 25 Page 682

3.4 ASPHALT CONCRETE PATCH

C. Place asphalt concrete in lifts no greater than 3 inches, or less than 2 inches.

F. T-patch required for all final asphalt pavement restoration.

1. Asphalt thickness will match the existing asphalt thickness plus 1 inch, with a minimum of 4 inches.
2. If existing asphalt thickness is 6 inches or greater, then the asphalt patch will match the existing thickness.
3. An additional one foot of asphalt will be removed around the entire perimeter of the excavated trench to create a one foot bearing shelf for the asphalt patch.

SECTION 33 08 00

COMMISSIONING OF WATER UTILITIES

This specification changes a portion of APWA Standard Specification Section 33 08 00. All other provisions of the section remain in full force and effect.

Section 33 08 00 Page 685

PART 2 PRODUCTS

2.1 TESTING MATERIALS

A. Medium:
1. Above 10 psi working pressure - Water
2. Below 10 psi working pressure - Air or Water

PART 3 EXECUTION

3.2 ALIGNMENT AND GRADE TEST FOR GRADE SPECIFIC INSTALLATIONS.

3.3 PRESSURE TEST

A. Air Test: Per manufactures recommendation - Gravity lines
B. Hydrostatic Test - Pressure lines

3.6 PIPE TESTING SCHEDULE

C. Sanitary Sewers
4. Pressure Test for pressure pipeline and gravity pipeline systems

E. Storm Drains
4. Pressure Test for pressure pipeline and gravity pipeline systems

SECTION 33 11 00

WATER DISTRIBUTION AND TRANSMISSION

This specification changes a portion of APWA Standard Specification Section 33 11 00. All other provisions of the section remain in full force and effect.

PART 1 GENERAL

1.3 PERFORMANCE REQUIREMENTS

A. Depth of Cover
   1. Due to Trench Safety requirements and the increased costs that go with trenches 5' and over for shoring, sloping, or shielding, the City requires a standardized trench depth of 4'6" for culinary water main lines.
   2. All culinary piping must have a minimum of 3 ft (36") of cover. (This also applies to service lines.) Actual design cover is required, unless approved on a case by case basis by the Engineer due to competing utilities found in the field.
   3. No piping should have more than 66 inches of cover unless approved by the Engineer, on a case by case basis. In approved cases, recommendations for how grade adjustment and return to design grade, will be accomplished, must be approved by the Engineer before proceeding.
   4. The construction drawings should represent the best information available as to the location and size of the existing lines. The location, depth, and size of the lines shall be verified prior to making the connection. The City must approve any change from the details shown on the drawing prior to installation.

1.4 SUBMITTALS

C. Record Documents: Submit documents, See Section 01 78 39 Include details of underground structures, connections, thrust blocks and anchors. Show interface and spatial relationship between piping and adjacent structures. Make certain that GPS shots have been taken before backfilling.

1.5 SITE CONDITIONS

E. Notification. The City and all affected water users must be notified at least 24 hours in advance of water shut-off. Door flyers (hangers) shall be left with all affected water users who <u>are not at home</u>. Water shall not be turned off before 9:00 a.m. or after 4:00 p.m. in residential areas. Affected businesses shall be contacted and the timing of being without service will be coordinated to minimize the impact upon their normal business functions.

F. Maintain Clean Pipe During Installation. The pipe shall be installed in accordance with the best current practices. All openings in the pipelines shall be closed with water-tight or rodent- proof plugs when pipe installation has stopped at the close of the day's work or when work has stopped for other reasons, such as

breaks or meal periods. If water accumulates in the trench, water-proof plugs shall remain in place until the trench is dry.

PART 2 PRODUCTS

2.6 TAPPING SADDLES (For taps 3/4 to 2")

A. Provide appropriate saddle for type of pipe to be tapped.
B. Provide saddles with designed corrosion protection that is in accordance with the soils surrounding the installation.
C. All Tapping Saddles to have iron pipe threads to receive a MIP threaded corporation stop. No CC threaded saddles or corps allowed!
D. All saddles to be designed to withstand the forces exerted during the tapping process and to the design pressure of the piping it is being attached to.

2.7 SERVICE CONNECTION

A. Corporation Stop to be of brass or bronze material with a Male Iron Pipe threaded end to be connected at the main by use of a Direct Tap or a Tapping Saddle, other end to be either compression or flare type fitting to connect service line to water main.
B. Service line to be of Type K Copper for the majority of 3/4" and 1" water services in Orem. Highly corrosive soil areas have been identified and an exception to use polyethylene tubing may be required. SEE MAP (If there is any question about your job being in one of these areas please contact the Water Section at Public Works.) Inserts must be used in poly tubing.
C. 1 ½" and 2" service lines to be of polyethylene tubing.
D. Inserts must be used in poly tubing
E. Whether Copper or poly tubing is used; one continuous section is required with no connections from the corporation stop to the meter assembly

PART 3 EXECUTION

3.2 PREPARATION

D. Clearly identify and promptly set aside defective or damaged pipe.
   1. Pipe Condition. All pipe shall be carefully inspected by the Contractor prior to installation. Any defective pipe shall not be used.
   2. Care and Handling of Pipe. Special care shall be taken to prevent damage to pipe and protective coatings. Proper equipment, tools and facilities shall be provided and used for safe and controlled construction procedures. Pipe placed in trenches shall be lowered in place by means of ropes, booms or any type of power equipment sufficient to handle each piece separately. In no case shall pipe be allowed to fall freely. Pipe may not be allowed to lie in the flow line of the curb and gutter.
   3. Pipe Cleanliness. All foreign matter or dirt shall be removed from the inside of the pipe before it is placed and it shall be kept clean during and after installation. Should the pipe become dirty, contaminated or flooded with trench water, it shall be cleaned in

accordance with methods specified in the latest edition of ANSI/AWWA C651 prior to disinfection.

3.3 LOCATING POTABLE WATER PIPE

A. Comply with Utah Drinking Water Act. As a minimum, locate potable water pipe at least 18 inches vertical and 10 feet horizontal edge to edge between water and sewer lines. Place water lines above sewer line.

1. Where potable water piping crosses <u>under</u> sewer mainlines or over mainlines without at least 18" of clearance the following applies:
    a. The new utility that is invading the "Safe Zone" shall be in a protective casing of one full stick of Ductile Iron class 350 pipe that is centered at the existing utility crossing and sealed at each end to keep out (or in) any contaminants from a resulting breach of the sewage piping.
    b. Care shall be taken to minimize the disturbance around the existing utility. If the existing utility is damaged in the installation process it shall be repaired in such a manner that no repair joints will be in the trench line of the new line being laid.
    c. Inspection of crossing, casing, repairs etc. shall be done by a representative of the City Engineer. Any further precautions and or requirements deemed advisable or necessary by the Engineer shall be fully complied with. This may include but not limited to: replacement of existing utility piping for up to 10 ft on either side of crossing, installing a casing over the existing utility, or encasing the existing utility in concrete for a specified distance.

B. There shall be a 3 ft minimum horizontal clearance maintained between water lines and any paralleling utility.

C. Do not put potable water lines in the same Trench with sewer lines, storm drains, electric wire, electric conduit, fiber conduit, or gas.

D. Any water line 2" or larger shall not be installed under or within 20 ft of any structure.

3.4 INSTALLATION –PIPE AND FITTINGS

H. Disregard

3.5 INSTALLATION-CONCRETE THRUST BLOCKS

A. If hydrostatic tests are performed before concrete thrust blocks have cured, alternative temporary thrust restraints must be installed along with restraining glands (mega-lug type) at all potentially affected fittings. This also applies to final connections where System pressure will be energized against fittings before concrete thrust has had a chance to cure. See Chart in drawings.

B. Provide thrust blocks on all plugs, caps, tees, hydrants, tapping tees, and vertical or horizontal bends.

F. See chart in Standard Drawings for Thrust Block sizing

3.6 INSTALLATION-VALVES AND VALVE BOXES

B. Valve Boxes

4. Cast Iron Valve Box. The diameter of the valve box shall not be less than 5". The length of the valve box shall be such that it will permit adjustment from the depth of the valve operator nut to finished grade. In cases where the top of the valve nut is deeper than 5' below finished grade, an extension shall be used to bring access to within 4' of finished Grade. The extension shall be approved by the Engineer before it is installed.

3.7 INSTALLATION - TAPS

E. Service line taps to be made by Water Section personnel if tapping into a mainline already in service. All taps, of any size may be made by authorized "commercial tappers". Excavation Contractors are responsible for taps made to new water mains that they have recently installed. <u>ONLY CITY WATER EMPLOYEES OR "COMMERCIAL TAPPERS" UNDER DIRECTION OF THE WATER SECTION ARE ALLOWED TO TAP EXISTING WATER MAINS.</u>

3.8 INSTALLATION - SERVICE LINES

A. Replacing Existing Water Service Line / Installing New Service Lines
   1. Replace Galvanized services with Copper Type K copper, Section 33 05 03, or Polyethylene Pipe, Section 33 05 06, as required based upon the corrosiveness of soil and geographic location in the Orem city limits.
   2. Soldered joints are not allowed.
   3. Verify depth of new installation, 42" of cover in roadway is required.
   4. Tracer wire is required where new trench is dug. In the case of pulling a service line, Type K Copper is required without tracer wire on the service.
   5. Sand bedding is required on all copper and poly service lines.
   6. Coordinate with PROJECT MANAGER for GPS data collection and inspection prior to backfilling TRENCH.
   7. Maximum service line length in a planned residential development is 30 ft. Maximum service line length in public streets shall be 40 ft.
   8. See Standard Drawings

B. Service Line Repair / Relocation
   1. Replace galvanized services with Type K Copper, Section 33 05 03, or Polyethylene Pipe, Section 33 05 06 as stated above.
   2. Match existing tubing size and type if replacing a piece of the original service for the repair or moving a portion of the service for installation of competing utilities.
   3. Use approved compression type or flare type couplings. Soldered joints are not allowed.
   4. Maintain appropriate depth.
   5. Provide Sand bedding on all excavated tubing.
   6. Coordinate with PROJECT MANAGER for GPS data collection and inspection prior to backfilling TRENCH.
   7. See Standard Drawings for details

C. Meter Box
   1. Install meter boxes behind curb in planter/ landscaped area if possible. Install behind side walk in landscaped area if curb- gutter- sidewalk are contiguous.
   2. Keep meters as close to mainline as is practical. Meters must be at least 10 ft from building. Meters or the lines feeding them are not allowed under

covered parking or any other structure. Meters are not allowed in Sidewalks, driveways, roadways or parking lots unless no alternative exists as per the Engineer. Any exception to the above will require mitigating actions to protect the meter and the public. (Traffic rated lids, concrete manholes for meter box, etc.)

3. Meter lids must be set to final grade. Plumbing inside of meter box must be 16 to 20 inches below meter lid.
4. Using Manifold System for Service Line and Meter Installation. Water meter manifold systems shall be used when installing multiple meters for residential and non-residential buildings as required in Article 21-1 of the Orem City Code (Water Services). Refer to Standard drawings.
    a. When using 2", 4", 6" or 8" water mains to supply meter manifold, please refer to 6.13.1.2 Chart A and 6.13.1.3 Chart B to calculate the number of service lines that can be tapped to the main line.
    b. Chart A. The number of services that can be tapped to a main line are shown in the following chart. These figures are based on the circular area (diameter) of pipe only. Formula: D_2 x .785 = circular area/feet. Friction losses are not calculated in to determine the amount of services that can be used. Please refer to the following chart.

Example: You can tap seven 3/4" services to a 2" main line.

	Chart "A" - Size of Service Tap							
Size of Main Line	3/4"	1"	1 ½"	2"	3"	4"	6"	8"
2"	7	4	1	1				
4"	29	17	6	3	1	1		
6"	65	39	15	8	4	2	1	
8"	116	70	26	15	7	4	1	1
> 8"	Requires Special Review and Approval by the City							

Note: To determine a combination for various sizes of services that can be used for a particular main line size refer to Chart B shown on the next page.

    c. Chart B. To use this chart calculate the total circular area of service lines to be used and compare that figure to the total circular area of the main line supplying the services.

Example: If you would like to tap four 3/4" services and two 1" services to a 2" main line calculate it as follows. Multiply .003 x 4 = .012, then multiply .005 x 2 = .01, add .012 + .01 = .022 this would be the total circular area of the services. The total circular area of the 2" main line is .023 so this combination of services would not exceed that of the main line. Any combination of services and service sizes will need to be calculated accordingly.

Size of Pipe	Circular Area of Pipe Opening (D_2 x .785)
3/4"	.003
1"	.005
1 1/2"	.013
2"	.023
3"	.049
4"	.087
6"	.196
8"	.35
> 8"	Requires Special City Review and Approval

SECTION 33 12 16

WATER VALVES

This specification changes a portion of APWA Standard Specification Section 33 12 16. All other provisions of the section remain in full force and effect.

Section 33 12 16 Page 697

PART 2 PRODUCTS

2.1 VALVES – GENERAL

A. Underground

2. Three inches (3) and larger: Flanged or Mechanical Joint ends as specified. Non-rising stem - stainless steel where deemed high corrosive soils. Two inch square operating nut. Stainless steel body bolts. AWWA C111

B. Submerged or Above Sewage or Water

1. Valve body bolts to be Stainless Steel

2.3 BUTTERFLY VALVES

A. GENERAL

1. Non-tapping valves 10" or larger shall be butterfly valves. The butterfly valves shall conform to the specification C504 of the American Water Works Association and shall have heavy duty cast iron body. The bearing shall be the nylon non-lubricating type. The valve shall have a leak-tight closure at 150 psi. The valve shall be for buried service with a sealed gear operator.

SECTION 33 12 19

HYDRANT

This specification changes a portion of APWA Standard Specification Section 33 12 19. All other provisions of the section remain in full force and effect.

Section 33 12 19 Page 702

PART 2 PRODUCTS

2.1 DRY BARREL HYDRANTS

A. To be Waterous, Kennedy, Mueller, or pre-approved hydrant manufacturer meeting the following specifications:

11. To be repairable without requiring excavation.
12. Able to be raised without excavation
13. Auxiliary valves to be located at mainline tee or 25 ft from hydrant in "end of line" installations.

PART 3 EXECUTION

3.2 INSTALLATION

A. …As per International Fire Code, a 3 ft radial clear area is required around a HYDRANT. This includes fences, walls, mailboxes, vegetation, or any above ground obstacle that would hinder the operation or maintenance of the HYDRANT. See Standard Drawing

3.4 PAINT

C. Paint color shall be red.

SECTION 33 12 33

WATER METER

This specification changes a portion of APWA Standard Specification Section 33 12 33. All other provisions of the section remain in full force and effect.

Section 33 12 33 Page 705

PART 2 PRODUCTS

2.0 WATER METER SIZING

A. To be done by city staff, based upon fixture count.
B. If Irrigation use only, to be determined by owners architect or engineer.
C. Service line to be sized according to meter. Service line may need to be upgraded if a larger meter is required than the service line size that was stubbed in.
D. Service line cannot be greater than 1 pipe size larger than the actual meter from the mainline to the meter.

2.1 METER

A. Meter will be supplied by the CITY

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation of WATER METER valving and piping (meter setter) and the WATER METER box or vault is the responsibility of the property owner.
B. Meter Setters. Meter setters shall be Ford or Mueller or an approved equivalent with state approved Dual Check valves. Dual check valves must conform to ASSE standard 1024 and be "in-line" serviceable. No setters having a meter bypass shall be allowed
C. Meter Can. In driveway areas, meter cans and lids will require traffic rated lids and special City approval. Electrical grounding shall not be permitted inside meter cans or on street side of services. Meter box/can shall be of white PVC and conform to the sizes listed below.
D. Water Meter Lids. Water meter lids shall be cast iron raised meter lid with approved lock down nut.
E. Final Grade. The top of water meter lid final grade shall be within 1/4" of final sidewalk grade or within 1" when located in surrounding sloped grade of grass and landscaped areas.
F. Riser Materials. Riser materials shall be of approved pre-cast concrete riser materials.
G. Service line piping from the Water Main to the Meter must be Type K copper. (Poly tubing if in corrosive soils area.) All service line piping on the customer's side of the meter shall conform to International Plumbing Code.
H. Thermal Expansion Tank and Intermittent T&P Valve. "Dual Check" valves are required on all water service lines to new buildings to prevent water from back-flowing into the City's water lines. This creates a closed water system. Current plumbing codes call for the installation of expansion tanks and/or

intermittent relief valves to be installed on "closed" systems, please refer to the most current International Plumbing Code.

I. Stop and Waste sprinkler valves and tees must be placed at least 2ft from the meter box. Sufficient gravel drain rock shall be installed at stop and waste valve to contain all of the drain water.

J. METER BOX SIZING

1. 3/4" meter 20" diameter
2. 1" Meter 20" diameter
3. 1 ½" and 2" meters 30" diameter
4. 3/4 or 1"(two in a can) 30" diameter
5. 3" and larger meters require vaults - Contact Water Section Personnel for dimensions.

SECTION 33 13 00

DISINFECTION

This specification changes a portion of APWA Standard Specification Section 33 13 00. All other provisions of the section remain in full force and effect.

PART 1 GENERAL

1.7 REGULATORY REQUIREMENTS

B. Orem wants to insure and maintain the highest quality water service possible. All new water lines need to be disinfected so as not to jeopardize the integrity of the existing water system. Because of the diversity and complexity of each installation, a disinfection plan shall be required. The Contractor shall propose and coordinate the development of a disinfection plan with the City's Project Manager that will conform to the latest edition of AWWA C651. The fees and costs of re-tested failed sections of pipe shall be the responsibility of the Contractor.

PART 3 EXECUTION

3.2 DISINFECTION OF WATER LINES

A. Before pressure testing, fill waterline with water and chlorine to obtain a 50 ppm initial dosage. Let chlorinated water set in line for 16 to 24 hours. Make sure air has been expelled from line.

B. Obtain a Free Chlorine sample of at least 25 ppm for 16 hours or 10 ppm for 24 hours, repeat chlorination process until this requirement has been met.
Flush chlorinated water out of pipe until a residual of less than 1 ppm is obtained. Make sure measures are taken to mitigate any environmental issues.

C. Perform pressure test as per Section 33 08 00. Upon passing the pressure test, flush at 2.5 ft per second until chlorine residual tests are at Water System residual for that location.

D. Work with Water Section personnel to collect the first Bacteriological Tests from predetermined points in the new line. Repeat the above steps until a sample has passed.

E. Work with Water Section personnel to collect the second Sample set.

F. Upon passing two consecutive samples the new line can be connected to the culinary system.

G. Quick kill Disinfection
   1. All water pipes shall be clean prior to disinfection. If in the opinion of the City, contamination is such that it cannot be removed by flushing, a preliminary measure of cleaning by mechanical means and then swabbing with 1% hypochlorite disinfecting solution (i.e. Quick Kill Method) shall be required prior to standard disinfection.

H. Refer to AWWA C651

3.5 FIELD QUALITY CONTROL

A. All piping and fittings not covered by the above stated disinfection and testing processes shall be disinfected with a 1% chlorine solution, prior to being connected into the Water System. This applies to all connections after testing has been completed and all spot repairs made to active sections of the Water System.

SECTION 33 31 00

SANITARY SEWERAGE SYSTEMS

This specification changes a portion of APWA Standard Specification Section 33 31 00. All other provisions of the section remain in full force and effect.

Section 33 31 00 Page 712

2.1 PIPING AND FITTINGS

D. Saddles shall be one of the following: Backman Transit sewer saddles, Insert-a-T compression fitting, or B101 models.
   1. In areas where the City has determined that water is a problem, the B101 saddle with bowl wax shall be used and strapped to the pipe.

3.2 INSTALLATION – PIPE AND FITTINGS

F. Type of pipe allowed to have ¼" per foot grade for sewer lateral connections
   1. Concrete, see section 33 05 02
   2. Ductile Iron, see section 33 05 05
   3. Acrylonitrile-Butadiene-Styrene (ABS), see section 33 05 01
   4. Polyvinyl Chloride (PVC) SDR 35, see section 33 05 07
   5. Vitrified Clay, see section 33 05 10

G. Type of pipe allowed to have 1/8" per foot grade for sewer lateral connections
   1. Ductile Iron, see section 33 05 05
   2. ABS, cut into 10' lengths and glued together with coupling, see Section 33 05 01
   3. PVC, 6" diameter and larger

H. Cast Iron or ABS wyes required for clean out.
   1. Clean out to be located behind walk, back of curb, or within 2' of the property line, whichever is closest to the street right-of-way**.**
   2. A second cleanout will be installed a maximum distance of 5' from the foundation wall.
   3. Fernco or Calder coupling may be used to connect PVC pipe to the cast iron wye or to other dissimilar type and sizes of pipe.
   4. Max distance between cleanouts is 75'
   5. Clean out required at any bend or combination of bends in excess of 45°.
   6. Clean out standpipe can be cast iron or ABS with cast iron or brass cap.

I. The sewer line(s) shall be located a minimum of 3'6" deep at the property line.

3.5 TAP CONNECTIONS – 6 INCHES AND SMALLER

E. Lateral connections are not allowed to public sewer manholes. If the sewer system is considered private, then lateral connections to the manhole are allowed.

3.6 TAP CONNECTIONS – LARGER THAN 6 INCHES

SECTION 33 41 00

STORM DRAINAGE SYSTEMS

This specification changes a portion of APWA Standard Specification Section 33 41 00. All other provisions of the section remain in full force and effect.

Section 33 41 00 Page 715

2.1 PIPING AND FITTINGS

A. Provide piping materials and factory fabricated piping products of sizes, types and classes indicated.

1. Pipe used for Storm Drain or Irrigation transmission lines and having a diameter of 15" or larger shall be reinforced concrete pipe meeting requirements of ASTM C76.

2.5 CLEANOUTS AND MANHOLES

G. All storm drain manhole covers shall be a standard 24-3/4" size and labeled "Storm Drain." Manhole covers not conforming to the standard size and markings shall be converted to the standard size and marking, (i.e. 24" or 25" lids must be converted to 24-3/4") as part of the work.

2.9 SUMPS AND PRETREATMENT MANHOLES

A. Sump: 5' diameter precast concrete or 12 gauge galvanized metal

1. Precast concrete to meet ASTM C 478 precast requirements. See also section 03 40 00.
2. See City of Orem Standard Drawing SD-4 for details.

B. Pretreatment Manhole: 4' diameter precast concrete manhole

1. Precast concrete to meet ASTM C 478 precast requirements. See also section 03 40 00.
2. See City of Orem Standard Drawing SD-4 for details.

3.3 INSTALLATION – CLEANOUTS, MANHOLES, SUMPS AND PRETREATMENT MANHOLES

E. (Section applies, except disregard concrete collar. Asphalt collar preferred)

F. Sumps are not allowed in soil sensitive areas having poor percolation as shown on City of Orem Standard Drawing SD-1.

G. Sumps are not allowed within the 3 year delineation (travel) zone of culinary wells. The 3 year delineation zone for drinking water source protection has been established by professional studies and has been approved by the Drinking Water Division of the Utah Department of Environmental Quality. The City of Orem has the responsibility to update and maintain the delineation zone maps. Refer to City of Orem Standard Drawing SD-2, Well Head Protection.

H. Sumps shall be constructed in conformance with the City of Orem Standard Drawing SD-4.

1. They shall be staked in the field and indicated on the approved plans.
2. In the area surrounding sumps, the original material shall be removed and the entire backfill done with imported drain rock.

3. Slag shall not be used as drain rock.
4. After backfilling is completed, the entire excavation shall be thoroughly flooded to insure that settlement is complete.
5. Grates shall be set in place and adjusted for final elevation and alignment.
6. The City of Orem may require a fabric barrier between drain rock and road base (or other material) when there is the possibility of silt and aggregate fines moving into the void space of the drain rock.

I. Pretreatment Manholes shall be constructed in conformance with the City of Orem Standard Drawing SD-4.

SECTION 33 47 00

PONDS

This specification changes a portion of APWA Standard Specification Section 33 47 00. All other provisions of the section remain in full force and effect.

Section 33 47 00 Page 719

3.1 CONSTRUCTION

F. Pond embankments shall have a slope no greater than 33% (3' horizontal to 1' vertical), unless otherwise approved in writing by the City Engineer.

G. Pond bottoms shall have a minimum slope of 2%.

H. Pond embankments that are to be established with turf grass shall have a slope no greater than 25% (4'horizontal to 1' vertical).

DIVISION 34

TRANSPORTATION

SECTION 34 41 13

TRAFFIC SIGNALS

The City of Orem adopts sections 02892 TRAFFIC SIGNAL, 13553 ATMS CONDUIT (Orem City revisions included), 13554 POLYMER CONCRETE JUNCTION BOX, 13594 FIBER OPTIC COMMUNICATION, and 16525 HIGHWAY LIGHTING from the 2008 UDOT Standard Specifications.

FIBER OPTICS SYSTEMS

FIBER OPTIC SYSTEMS

The City of Orem adopts sections 13553 ATMS CONDUIT, 13554 POLYMER CONCRETE JUNCTION BOX, and 13594 FIBER OPTIC COMMUNICATION from the 2008 UDOT Standard Specifications.

SECTION 13553

ATMS CONDUIT

This specification changes a portion of 2008 UDOT Standard Specification Section 13553. All other provisions of the section remain in full force and effect

PART 3 EXECUTION

B. Do not place conduit directly above parallel utilities.

1. Conduit shall not be placed a minimum of 5' on either side of any City owned utility that has a maximum depth of 5'. These utilities include but are not limited to: water lines, sanitary sewer lines, storm sewer lines, and other fiber optic cables.
2. If the CITY owned utility is deeper than 5', but less than 10', then the conduit shall be place a distance of 6' plus the width of the pipe from CITY owned pipe.
3. If the CITY owned utility is deeper than 10', then the conduit shall be placed a distance of 10' plus the width of the pipe from the CITY owned pipe.
4. The fiber shall also be a minimum of six feet from the lip of gutter out into the street.

I. Minimum Cover of Conduit:

1. Minimum cover in sidewalks or paved surfaces: 18" min
2. Minimum cover in highway right-of-way, greater than 20 ft from the edge of the pavement: 3 ft.
3. Minimum cover in highway right-of-way, within 20 ft of the edge of the pavement: 5 ft.
4. Minimum cover in City of Orem right-of-way, paved surfaces: 18"

L. **AS-BUILTS.** The City requires that an electronic file or a series of original 24" x 36" as-built drawings be completed for each separate site or development which adds any infrastructure to the City ROW.

1. The electronic file or drawings shall be "Professionally Certified" and presented to the City in an "Initial and Final Submittal."
2. The Contractor is responsible to see that as-builts are completed in a timely manner.
3. Refer to Introduction Section 0.8 (As-Builts) for requirements concerning certification, initial and final submittals.