

SPECIAL PROVISIONS
City of Flagstaff, Arizona
West Flag Improvements:
Canyon Terrace Dr.

City of Flagstaff Project Number:
03-20007



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Special Provisions

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MAG UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION 2019 EDITION, CITY OF FLAGSTAFF GENERAL PROVISIONS, AND CITY OF FLAGSTAFF ENGINEERING STANDARDS ARE HEREBY AMENDED TO INCLUDE THE FOLLOWING:

PART 100 GENERAL CONDITIONS

SECTION 102 – BIDDING REQUIREMENTS AND CONDITIONS

102.6 SUBCONTRACTORS' LIST

(Revise to include)

The Contractor shall submit a subcontractor list to the City with the proposal pamphlet. It shall include the list of anticipated subcontractors and the dollar amount and percentage of contract work that each subcontractor will perform.

SECTION 104 – SCOPE OF WORK

104.1.1 GENERAL

(Revise to include the following)

The project generally includes new roadway construction of Canyon Terrace Dr. from Switzer Canyon Dr. to Switzer Canyon Dr., new waterline, new sewer line, and water and sewer services along the same. The scope of work presented in these Special Provisions and the accompanying construction plans more specifically include the following:

- Surface improvements (asphalt pavement section, sidewalks, and curb and gutter)
- Drainage improvements (valley gutters)
- Removal and relocation of existing improvements (signs, etc.)
- Water Main Replacements (including new connections to existing water mains, fire hydrants and water services)
- Sewer Main Replacements (including new connections to existing sewer mains and sewer services)
- Street signage
- Miscellaneous improvements (appurtenance & manhole adjustments)

104.1.2 MAINTENANCE OF TRAFFIC

(Revise to include the following)

Any full street closures will require the approval of the City and involve adequate re-routing (as approved by the City Traffic Engineer), notification of media, notification of residents and businesses in the project area and along the proposed route, and adequate temporary signage/signals. All street restrictions or closures must be coordinated with emergency responders.

The Contractor shall be required to provide no less than one (1) week advance written notice of all street closures and traffic restrictions to all affected property owners, business owners, and residents, including those properties on a detour route. The notice shall be submitted to the City for review and shall include

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the projected date and duration of the closure and alternate detour routes. Each notice shall include the Contractor's name, contact person and local 24-hour telephone number as well as the City Project Manager's name and telephone number.

Construction Phasing Plan:

A detailed Construction Phasing Plan must accompany the Traffic Control Plan submitted to the Owner. This Construction Phasing Plan must show the schedule, duration, and location of all construction items and activities throughout completion of the Project. The Construction Phasing Plan must coordinate with the Traffic Control Plan. The Contractor will be required to present the plans to the Owner within seven (7) days of Notification of Award. The Owner shall promptly review the plans and either approve them or provide a written list of the items that will require revision. The Contractor shall submit the corrected plans within five (5) calendar days of receiving the Owner's list of required revisions. The corrected plans submittal shall address all comments from the Owner's list of required revisions.

Bidding and Construction Phasing Plans must conform to these requirements.**Traffic Safety:**

At the time of the pre-construction conference, the Contractor shall designate an employee who is qualified and experienced in construction traffic control and safety, to be available on the project site during all periods of construction to coordinate and maintain safe barricading whenever construction restricts traffic. This person shall be available during non-construction hours in case of any traffic control and/or safety items that need to be handled in an urgent manner. Traffic control shall include pedestrian, bicycle and vehicular traffic.

Sanitation Pickup:

Regular residential sanitation pickup in the Switzer Ridge/mesa neighborhood every Wednesday (Trash) and Thursday (Recycle). Bulk trash pickup occurs approximately every 5 weeks with the specific schedule found on the City of Flagstaff website at: <http://www.flagstaff.az.gov/DocumentCenter/View/50309>.

Dumpster pick up varies from location to location; coordinate with the City's Environmental Division and the property owner for pick-up days. When construction activity interferes with sanitation pickup, the Contractor shall provide for sanitation vehicle access to the affected properties or relocate the trash containers where access is acceptable. The Solid Waste Division of the Public Works Department contact is (928) 213-2110. The contact number for Waste Management is (928) 779-6050. If trash or recycle pickup is obstructed by the construction activity, the Contractor will be responsible for proper disposal.

Emergency Access:

All roadway closures shall be coordinated by the Contractor with Traffic Engineering and the City's Project Manager at least 1 week in advance of the closures. The Contractor shall submit the closure for approval to the Traffic Engineer, copy the information to the City's Project Manager, and forward the street closure information to the Fire Department, Police Department, and Emergency Medical Services after approval.

US Postal Service and Other Delivery Services Access:

The Contractor shall be responsible for maintaining access for postal service and other delivery services, within the project area at all times. The Contractor shall coordinate this work to avoid interruption of mail service and other delivery services. Should an existing mailbox be damaged by construction activity,

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the Contractor shall promptly remove and replace the damaged mailbox in kind, including post and foundation, at no cost to the resident or the City.

The Contractor shall maintain mailboxes, and/or provide temporary mailboxes, so that no disruption of mail service and other delivery services shall occur. If mail and or other delivery service disruptions are anticipated, the Contractor shall notify the City's Project Manager, Inspector, affected property owner and/or resident(s), the United States Post Office, and/or other delivery services at least 48 hours in advance.

104.2 ALTERATION OF THE WORK**104.2.3 DUE TO EXTRA WORK**

See the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction Section 104.2.3.

(Revise to include the following)

At the pre-construction meeting, the contractor will submit for review and approval, equipment and personnel rates that may be used to assist in determining compensation for extra work performed. These rates may be used when determining the cost of extra work if bid unit line items do not exist in the original proposal. Profit, taxes and markup for all extra work will be in accordance with the appropriate MAG sections if bid unit line item prices are not used.

The following contract allowances are included and hereby incorporated into the contract documents as follows:

Trench Rock Excavation. See City of Flagstaff Amendments to MAG Standard Specifications Section 601.2.1.

Unsuitable Material. See City of Flagstaff Amendments to MAG Standard Specifications Section 205.2.

Subgrade Stabilization shall include all equipment, labor and materials necessary to stabilize the subgrade after unsuitable material has been removed and replaced with materials that conform to the project specifications. The Contractor is responsible for coordinating proposed solutions that may be acceptable to the City of Flagstaff. Proposed solutions (including the use of geogrid) will be paid out of the Subgrade Stabilization Allowance bid item.

SECTION 105 – CONTROL OF WORK**105.2 PLANS AND SHOP DRAWINGS**

(Revise as follows)

The Contractor shall submit electronic copies of each shop drawing, product data, or mix design to the City for review. Only materials to be used on this specific construction project shall be submitted.

The General Contractor shall review and stamp all shop drawings and product data for conformance with the construction documents prior to submission. Any shop drawings or product data not reviewed and stamped by the General Contractor will be returned without review. Items not in accordance with the contract drawings shall be so noted upon the Contractor's review.

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Any shop drawing not checked and initialed by the supplier/detailer prior to submitting for engineering review will be returned without review. Any changes from the original drawings shall be noted by the submitting party. Any changes not called out shall be considered not in accordance with the contract documents unless specifically noted otherwise.

Shop drawings shall not replace the contract drawings. Items omitted or shown incorrectly and not noted by the reviewer are not to be considered changes to the contract drawings. Reviewing is intended as an aid to the Contractor in obtaining correct shop drawings. It is the Contractor's responsibility to assure that items are constructed in accordance with the contract drawings.

Any engineering design performed by others and submitted for review shall bear a seal of an engineer registered in the appropriate jurisdiction and discipline. The adequacy of designs and layouts performed by others rests with the designing or submitting party.

The construction documents may not be reproduced for use as shop drawings.

105.2.1 RECORD DRAWING PREPARATION AND COORDINATION

See the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction Section 105.2.1 & 105.2.2

105.2.2 RECORD DRAWING (AS-BUILT PLANS)

(Revise to include the following)

ADEQ Certificates of Approval to Construct Water Facilities:

- #20190285 – Water Facilities (Canyon Terrace Drive)

and Construction Authorizations for Sewage Collection Systems:

- #20190285 – Construction Authorization for a Sewage Collection System (Canyon Terrace Drive)

City and ADEQ approved as-built record drawings shall be provided to the City in PDF/A format from the original source.

105.5 COOPERATION OF CONTRACTOR:

(revise to include the following)

The Contractor's Project Manager and Project Superintendent shall attend weekly construction progress meetings. The Contractor shall be prepared to discuss construction schedule, construction activities planned for the upcoming two (2) weeks (submit proposed two (2) week schedule), problems, issues, any information required by the City's Project Representative, construction staking, business/residence/citizen complaints, safety, traffic control and pedestrian access requirements, weather delays experienced during the previous week, disposal of materials, access/construction coordination with businesses/residences, inspection/testing, overtime worked during the previous week, payments, water/sewer service disruption, submittals, field orders/field changes and any other business as necessary. The Contractor shall prepare meeting agendas and meeting minutes. Minutes shall be distributed within four (4) working days after the meeting.

Public Involvement: At the time of the Pre-construction Conference, the Contractor shall designate an employee that is fully responsible for coordination with the public, including but not limited to; the property

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owners, renters, leasers, Public media, the City of Flagstaff Public Information Officer and Mayor/Council. This person shall be qualified and experienced in public coordination and shall be available during all periods of construction to coordinate any issues.

Protection of Work: The Contractor is required to protect work during inclement weather. The Contractor shall grade areas to drain and utilize pumps to remove ponding water immediately during all stages of construction during both working and non-working hours.

105.8 CONSTRUCTION STAKES, LINES AND GRADES:

See the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction Section 105.8.

(revise to include the following)

Unless noted otherwise in the contract documents, the Contractor shall lay out the work from the lines, grades and dimensions shown on the drawings. The Contractor shall be responsible for all such work for the duration of the project. Any dimension or grade errors shall be immediately transmitted in writing to the City's Project Manager for clarification, before proceeding with the work.

SECTION 107 – LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

See the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction.

(revise to include the following)

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107.2 PERMITS:

The City of Flagstaff Capital Improvements Department will prepare Temporary Entry Permits for the work to be done on private property as needed. A copy of these permits will be provided to the Contractor and shall be kept on site during construction.

Erosion Protection and Site Restoration

Erosion control shall be in accordance with Section 431 of the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction. BMP's are shown on the construction documents for the Contractor's use, however the contractor shall modify BMP's as needed to control erosion. The SWPPP shall be kept and maintained on site during construction.

Measurement and Payment

Measurement shall include all items required to comply with the requirements of the AZPDES permit program and City of Flagstaff requirements. The cost for obtaining and complying with the AZPDES permit, inspection documentation, erosion control devices and all work associated with stormwater protection shall be included in the pay item for SWPPP.

107.5.4 HANDLING, REMOVAL AND DISPOSAL OF SURPLUS MATERIAL AND ASBESTOS CONTAINING MATERIALS (ACM)

See the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction.

(revise as follows)

The West Flag Improvements: Canyon Terrace Dr. improvement project includes work associated with disconnecting, removing, disposing, and abandoning existing AC waterlines in-place. The Contractor is responsible for all work associated with these activities to complete the project as shown on the construction documents.

The Contractor shall strictly follow City of Flagstaff requirements regarding the handling, removal and disposal of asbestos containing materials. Detailed instructions are shown on the construction plans.

All work relating to the removal and disposal of materials as described above shall be incidental to the project and no separate payment shall be made for this work.

107.6 PUBLIC CONVENIENCES AND SAFETY**REMOVAL OF PARKED VEHICLES**

(revise to include the following)

Whereas on-street parking currently exists within the project limits, the Contractor shall give written notice, describing the proposed work and parking restrictions, to each adjacent business or residence. Written notice (with specific dates of anticipated construction work) shall be given at least one week in advance of the work. In the event that the work requires removal of parked vehicles, the Contractor shall coordinate removal to the nearest convenient side street at the Contractor's expense. No separate payment will be made for this work.

107.9 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE:

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See the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction and Section 430 of these special provisions.

(revise to include the following)

The Contractor shall take special care to control construction-related dust and noise and to keep the project site cleaned up to the greatest extent possible.

Prior to construction commencing, the Contractor shall prepare a video recording of the project area that adequately shows each private property within the project corridor to document existing conditions. A copy of this video shall be provided to the City in a viewable format.

As part of the work, the Contractor is responsible for replacing and/or restoring landscaping (including but not limited to fences, gates, brick pavers, retaining walls, landscape rock walls or rock barriers, parking bumpers, driveway materials, private signage, etc.), and any other owner improvements impacted by construction of the project (e.g. water meter and PRV installation, removal of the existing water meter and box, sewer service/clean outs, storm drain/catch basins, fire hydrants, driveway match backs, slope match backs, and gate adjustments) not otherwise called out on the construction plans.

Protection of Existing Trees and Vegetation:

Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

1. Provide protection for roots over 1-1/2 inch in diameter that are cut during construction operations. Coat cut faces with an acceptable coating formulated to use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out, cover with earth as soon as possible.
2. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations in manner acceptable to the City's Project Manager. Employ a licensed arborist to repair damage to trees.
3. Replace trees that cannot be replaced and restored to full-growth status, as determined by the City Project Manager.

The Contractor is responsible for trimming trees/landscaping to provide sight clearance for signage, driveways, and other construction improvements. Trimming and protection of trees/landscaping is addressed further in Section 201 Clearing and Grubbing.

107.11 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICES:

(revise to include the following)

The Contractor is responsible for providing written notification to each affected resident at least 48 hours prior to any disruption to water or sewer service in the construction area. The notice must include the exact time of the disruption of service and the expected duration of the loss of service. The Contractor shall schedule shut offs as to minimize disruption to the public. Any night or weekend work request shall be submitted to the Owner in writing 48 hours prior and approved before the construction activity is performed. Protection of existing utilities during the Contractor's operation is considered incidental to

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the line item that is being performed in the area of the existing utility. On Hutcheson the concrete slurry bank for electrical lines is shallow, the contractor shall take care not to damage electrical lines.

Locations of underground utilities shown on the plans are to be regarded as approximate only. Limited potholing was conducted along Canyon Terrace Dr. The information from the potholing, performed by Adams Trenching in Spring 2019, was incorporated into the plans. Not all underground utilities were potholed, and potholing was based on utility map information furnished by the City of Flagstaff and franchise utilities. If an existing utility is not shown on the utility map information provided, it was not potholed. The intent of potholing was to determine if conflicts exist between the proposed water line, sewer line, and existing utilities. Conflicts may still exist that are not noted on the plans. The Contractor is required to locate all utility conflicts before work is started in the area. Sewer services are shown horizontally based on City of Flagstaff sewer logs, depths are approximate based on typical minimum slopes for shallow sewers and maximum slopes for deeper sewers. Water services are shown horizontally based on surveyed water meters; depths are assumed relative to existing waterline depth.

The Contractor shall protect existing water, sewer, electrical, communications, and gas service lines where the proposed work crosses individual service lines. Not all service lines are shown on the plans and it is the Contractor's responsibility to determine their location in the field. Protection or repair of existing service lines is considered incidental. In the event that there is a physical conflict between an existing service line and the proposed work, the Contractor shall immediately notify the City of the conflict. The City's Project Manager will decide as to how the conflict will be resolved. Any extra work required as a result of an unforeseen service conflict will be ordered and paid for in accordance with City of Flagstaff Amendments to MAG Standard Specifications Section 104.2.3.

UTILITY COORDINATION

The Contractor shall coordinate utility relocations with the appropriate utility franchise and provide sufficient time for response prior to construction of proposed improvements (6 weeks minimum).

Utility company contacts are listed below:

Altice (formerly SuddenLink)	Sanford Yazzie	(928) 226-0672
Arizona Public Service	Ryan Weisner	(928) 773-6414
CenturyLink	Manny Hernandez	(928) 779-4935
Unisource	Martin Conboy	(928) 226-2269

The Contractor is responsible for locating and coordinating all utility conflicts/relocations in a timely manner as to not delay construction work. Coordination shall include, but not be limited to, direct contact and coordination with all public and private utilities, potholing, survey staking of new improvements, coordination between separate utilities, coordination between sub-contractors and utilities.

APS utility poles and down guys shall remain in place unless otherwise noted on the plans. The Contractor is responsible for maintaining the integrity of utility poles and down guys during construction. No separate payment shall be made for protecting, bracing, shoring or otherwise protecting utility poles. An existing APS pole on David Dr. requires relocating, contractor is responsible for coordination.

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Altice plans to relocate/replace some of their existing utility lines within the project limits. Schedule for utility relocation is unknown. The contractor shall coordinate with Altice for schedule and/or new utility locations.

Unisource plans to relocate/replace some of their existing utility lines within the project limits. Schedule for utility relocation is unknown. The contractor shall coordinate with Unisource for schedule and/or new utility locations.

SECTION 109 – MEASUREMENTS AND PAYMENTS

109.4 COMPENSATION FOR ALTERATION OF WORK:

(Revise to include)

Allowance and Contingency items will only be paid if explicitly authorized in a City of Flagstaff Construction Field Order from the City's Project Manager.

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PART 200 – EARTHWORK

SECTION 201 CLEARING AND GRUBBING

201.1 DESCRIPTION:

The work under this section shall be in accordance with Section 201 of the MAG Standard Specifications and the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction and as modified herein.

201.2 PRESERVATION OF PROPERTY

(revise to include the following)

Trees NOT identified for removal on the construction plans, including trees less than 12" diameter and that are within the construction limits are intended to be removed as part of clearing and grubbing unless otherwise indicated on the plans.

Prior to tree removal, the contractor shall perform a field visit with the City to determine if any trees called out for removal can be left in place. If any tree removals are in conflict with private or public property, including power lines, the Contractor is required to provide protection or relocation of the conflict as approved by the City.

The Contractor shall trim all existing trees, hedges and shrubs within the right-of-way that overhang or conflict with new or existing public improvements. Hedges and shrubs shall be trimmed to 6" from the back of sidewalk unless otherwise directed by the City. All work associated with tree, hedge and shrub trimming is included in the Clear and Grub Pay Item.

SECTION 205 ROADWAY EXCAVATION

(revise to include the following)

The work under this section shall be in accordance with Section 205 of the MAG Standard Specifications and the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction and as modified herein.

205.2 UNSUITABLE MATERIAL:

(revise to include the following)

See the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction (General Provisions).

PART 300 – STREETS AND RELATED WORK

SECTION 301 SUBGRADE PREPARATION

301.1 DESCRIPTION:

(revise to include the following)

The work under this section shall be in accordance with Section 301 of the MAG Standard Specifications, the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Section 13-21-001-0301.3, and the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction.

301.8 PAYMENT:

(revise as follows)

No separate payment will be made for Subgrade Preparation, it is incidental to roadway construction.

SECTION 310 PLACEMENT AND CONSTRUCTION OF AGGREGATE BASE COURSE

310.1 DESCRIPTION:

(revise to include the following)

The work under this section shall be in accordance with Section 310 of the MAG Standard Specifications and COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Section 13-21-001-0310.2.

310.5 PAYMENT:

(revise as follows)

Payment for aggregate base course shall be included in the contract unit prices for items of work that include aggregate base course.

SECTION 321 PLACEMENT AND CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT

321.1 DESCRIPTION:

The work under this section shall be in accordance with Section 321 of the MAG Standard Specifications, COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0321.5, 13-21-001-0321.5.3, 13-21-001-0321.5.4, and 13-21-001-0321.6, and the Report on Geotechnical Investigation prepared by Speedie & Associates dated November 15, 2018 (Project No. 181932SF).

321.2 MATERIALS AND MANUFACTURE:

The asphalt concrete mix designation for this project shall be ¾". See Specification Section 710.2.1 for Asphalt Binder.

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321.8 PLACEMENT:

(revise to include the following)

Sufficient trucks shall be available to enable paving to proceed continuously. Failure to provide a sufficient number of trucks may be considered a failure of the Contractor's responsibilities under Section 108.6 of the MAG Standard Specifications.

321.12 MEASUREMENT:

(revise to include the following)

Asphalt concrete will be measured by the square yard of material complete in place including base material (ABC), subgrade preparation, and tack coat.

321.13 PAYMENT:

(revise to include the following)

Payment for asphalt construction will be paid for at the contract price per square yard for asphalt concrete pavement section.

SECTION 329 TACK COAT

329.1 DESCRIPTION:

(revise to include the following)

The work under this section shall be in accordance with Section 329.

PAYMENT:

(replace with the following)

No separate payment shall be made for Tack Coat. Payment for Tack Coat is incidental to the cost of the Asphalt Concrete Pavement.

SECTION 336 PAVEMENT MATCHING AND SURFACE TREATMENT

336.1 DESCRIPTION:

(revise to include the following)

The work under this section shall be in accordance with Section 336 of the MAG Standard Specifications, the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Section 13-21-001-0336.2.4, and the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction.

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SECTION 340 CONCRETE CURB, GUTTER, SIDEWALK, CURB RAMPS, DRIVEWAY AND ALLEY ENTRANCE

340.1 DESCRIPTION

(revise to include the following)

The work under this section shall be in accordance with Section 340 of the MAG Standard Specifications and COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0340.2 and 13-21-001-0340.3 and as modified herein.

340.3 CONSTRUCTION METHODS

The existing roll curb along Canyon Terrace does not match the dimensions of MAG Standard Roll Curb details. Where new roll curb is replacing the existing roll curb, the contractor shall match the dimensions, height, width, and radii, of the existing roll curb as closely as possible.

340.6 PAYMENT

(revise to include)

Doweling and expansion joints are incidental to the installation of concrete.

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340.7 ACCEPTANCE

(revise to include new section)

In accordance with Section 107.10, the Contractor is responsible for protecting the finish surface of concrete by keeping footprints, names, etc., from becoming part of the finished product. This may require special scheduling of materials, delivery and/or manpower. All defaced concrete will be replaced by the Contractor at no extra cost to the City. Patching is not acceptable.

SECTION 342 INTERLOCKING CONCRETE PAVER INSTALLATIONS

342.1 DESCRIPTION:

(revise to include the following)

The work under this section shall be in accordance with Section 342 of the MAG Standard Specifications and COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0342.2.1, 13-21-001-0342.2.4, 13-21-001-0342.3.3, 13-21-001-342.3.4 and 13-21-001-342.3.6.

SECTION 345 ADJUSTING FRAMES, COVERS AND VALVE BOXES

345.1 DESCRIPTION

(revise to include the following)

The work under this section shall be in accordance with Section 345 of the MAG Standard Specifications and the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0345.2 and 13-21-001-0345.3 and as modified herein.

Manholes shall be adjusted to existing roadway grade per the City's Engineering Detail.

SECTION 350 REMOVAL OF EXISTING IMPROVEMENTS

350.1 DESCRIPTION

(revise to include the following)

The work under this section shall be in accordance with Section 350 of the MAG Standard Specifications, the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction and as modified herein.

This work includes removal of all existing improvements within the Construction Limits shown on the plans.

Existing fire hydrants to be removed shall be salvaged and delivered to the City of Flagstaff Utilities yard at 5401 E. Commerce Ave., Flagstaff AZ 86004. Contractor shall salvage and deliver only the nozzle (yellow part) portion of the fire hydrant, from the traffic flange and above. All other fire hydrant materials shall be disposed. Contractor shall schedule delivery of salvaged fire hydrants through the City's Engineering Construction Inspector.

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Where called for on the plans, the contractor shall remove and dispose valve box, cover, and concrete collar and abandon the valve in place.

Where called for on the plans, the contractor shall remove and dispose manhole collar, ring, frame and cover, and cone. If there is no cone, remove and dispose upper 36" of brick, and fill manhole base with slurry and abandon in place.

350.2 CONSTRUCTION METHODS:

Asphalt and concrete shall be sawcut at the construction limits. For asphalt and concrete driveway match-up, the sawcut shall be a straight line. For paver driveway match-up, the pavers shall be removed to a neat edge. The Contractor is responsible for maintaining the edge during construction.

350.2.1 Utilities

The removal of existing improvements shall be conducted in such a manner as not to injure active utilities or any portion of the improvement that is to remain in place.

A utility may be abandoned in place below a new major structure that is part of the work only if approved by the Agency and solidly filled with grout using methods approved by the City. For manholes the manhole collar, ring, frame and cover, and cone shall be removed and disposed. If there is no cone, remove and dispose upper 36" of brick. Fill manhole base with slurry, plug inlet/outlet if necessary. All abandoned utilities to remain and the approved abandonment method shall be noted on the installation record drawings.

Removal of asbestos containing material shall be in accordance with the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction Section 107.5.4.

All underground utility construction must be conducted via trench removal and the surrounding asphalt must be protected in place until full roadway removal and replacement is started.

350.3 MISCELLANEOUS REMOVAL AND OTHER WORK:

(B) Remove and reset mailboxes shall be in accordance with Specification Section 450.

350.4 PAYMENT

Payment for removal, salvage & storage driveway pavers shall be at the contract unit price bid and shall constitute full payment for equipment, tools, labor, storage, replacement necessary to complete the work. Broken pavers shall not be reinstalled. Broken pavers shall be replaced with new pavers matching existing.

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PART 400 – RIGHT-OF-WAY AND TRAFFIC CONTROL

SECTION 401 TRAFFIC CONTROL

401.1 DESCRIPTION

(revise to include the following)

The work under this section shall be in accordance with Section 401 of the MAG Standard Specifications and the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction.

SECTION 405 SURVEY MONUMENTS

405.1 DESCRIPTION:

(revise to include the following)

The work under this section shall be in accordance with Section 405 of the MAG Standard Specifications and COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-03-002-0007 and 13-21-001-0405.2 and as modified herein.

All right-of-way centerline monuments shall be set as part of this project. Existing right-of-way monuments shall be reset in accordance with Section 13-03-005-0004 of the City Engineering Standards. In locations where right-of-way centerline monuments are missing, monument locations shall be calculated by a registered land surveyor in the State of Arizona and new monuments shall be set by the same.

405.3 CONSTRUCTION

(revise to read)

Survey monuments shall be set by a licensed land surveyor registered in the State of Arizona. Survey monuments shall be installed accurately per City of Flagstaff Engineering Detail 3-02-070

Monument information shall be documented in accordance with section 13-03-002-0007 of the City Engineering Standards. Information on the as-built plans shall be furnished by a registered land surveyor and include all the information listed in the City engineering standards, Section 13-03-002-0007(I). including, but not limited to: City assigned point number, street location, monument type, and NAVD88 elevation. The surveyor shall submit a shop drawing of the proposed monument locations, per City of Flagstaff Engineering Standards, through the Contractor to the City for approval prior to setting the new monuments. The surveyor shall prepare and record a Record of Survey map showing the monuments found and set. This map shall include the City's unique identifying number for each point. The Result of Survey shall be reviewed and accepted by the City prior to recordation.

Any survey monuments with boxes and covers shall be adjusted to grade by the Contractor without disturbing the survey monument.

405.4 MEASUREMENT

(revise as follows)

Special Provisions

Survey monuments on Canyon Terrace shall be measured by lump sum for all monument constructed and accepted.

SECTION 430 LANDSCAPING AND PLANTING

430.1 DESCRIPTION:

(revise to include the following)

The work under this section shall be in accordance with Section 430 of the MAG Standard Specifications, the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction, and as modified herein.

403.2 GENERAL

(revise to include the following)

The contractor shall prepare shop drawings showing proposed landscaping for replacement of landscape materials to pre-existing conditions. Shop drawings shall include at a minimum the location, number, size, and type of plantings.

430.10 MEASUREMENT AND PAYMENT

Payment for replacing and/or restoring site, landscaping and owner's improvements to the pre-existing condition using in-kind materials, shall be lump sum per the contract bid and shall be full compensation for furnishing all shop drawings, labor, materials, tools, and equipment and for performing all work necessary to complete the landscaping operation to include planting of trees, shrubs, ground cover, and irrigation.

PART 500 – STRUCTURES

SECTION 505 CONCRETE STRUCTURES

501.1 DESCRIPTION

The work under this section shall be in accordance with Section 501 of the MAG Standard Specifications and the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0505.3, 13-21-001-0505.6, and 13-21-001-0505.6.2.

Special Provisions

PART 600 – WATER, SEWER, STORM DRAIN AND IRRIGATION

SECTION 601 TRENCH EXCAVATION, BACKFILLING AND COMPACTION

601.1 DESCRIPTION

The work under this section shall be in accordance with Section 601 of the MAG Standard Specifications, the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0601.2.3, 13-21-001-0601.2.9, 13-21-001-0601.4.3, and 13-21-001-0601.4.4 and the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction.

Trench Rock Excavation is defined by the City of Flagstaff Amendments to MAG Standard Specifications for Public Works Construction Section 601.2.1

601.4 FOUNDATION, BEDDING, HAUNCHING, BACKFILL AND COMPACTION

The bedding material shall be granular material $\frac{3}{4}$ " max size per City of Flagstaff Engineering Details.

601.7 PAYMENT

Payment for Trench Rock Excavation shall be at the contract unit price bid and shall constitute full payment for equipment, tools, labor, disposal necessary to complete the work.

SECTION 610 WATERLINE CONSTRUCTION

610.1 DESCRIPTION

The work under this section shall be in accordance with Section 610 of the MAG Standard Specifications, the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, and as modified herein.

The Contractor shall notify residents 96 hours in advance of any scheduled water service interruption. Contractor shall submit water service interruption notifications to the City's Project Manager for approval prior to distribution. Unless otherwise approved by the City's Project Manager water service interruptions shall begin no earlier than 8:00 AM.

610.4 CONSTRUCTION METHODS

(revise to include new section)

The contractor is responsible for determining safe working and separation distances between existing live water mains and new utility mains during construction. In locations where maintaining a safe working distance is not possible the contractor shall identify the means for maintaining utility service during construction, in the Utility Phasing Plan, see Section 610.11.

If the Utility Phasing Plan includes cutting and capping an existing water main and leaving a portion of the dead-end water main in service, the cap shall be an MJ cap and include thrust restraint in accordance with MAG Standard Det. 380 or joint restraint per MAG Standard Det. 303 as needed to construct the proposed improvements and maintain water service to adjacent residents.

610.4.2 Laying Pipe:

Special Provisions

(revise as follows)

To the extent feasible avoid joint deflection and bending the pipe on a radius.

Fittings shall be installed using joint restraints per MAG Standard Detail 303 instead of thrust blocks unless otherwise allowed by the City's Project Manager.

610.4.3 Blocking and Restraints

(revise as follows)

Joint restraints shall be used in lieu of thrust blocks except where there is insufficient distance to properly restrain the pipe. Joint restraints shall be Meg-A-Lug or approved equal. 11.25° fittings shall be restrained the same length as 22.5° fittings.

If allowed thrust blocks shall be per COF Engineering Standards table 13-21-002-0380.

610.5 SEPARATION:**610.5.5 Extra Protection:**

(revise to include the following)

Extra protection waterline shall be constructed with Class 350 Ductile Iron Pipe (DIP). Extra protection sewer line shall be constructed with Class 150 Ductile Iron Pipe (DIP). Ductile iron pipe material shall be constructed in accordance with MAG Specification Section 750 and the City of Flagstaff Revisions to MAG Uniform Standards Specifications and MAG Uniform Standard Details.

(delete paragraphs 5, 11, & 14)

Paragraph 5 (2) shall be encased in 6 inches of concrete for the horizontal distance of the line that requires extra protection but for a distance no less than ten (10) feet horizontal.

Paragraph 11 (2) encasement of both the existing water line and the new sewer line in six (6) inches of concrete for the horizontal distance of the lines that require extra protection but for a distance no less than ten (10) feet horizontal.

Paragraph 14 (b) encasement of the new sewer line in 6 inches of concrete for the horizontal distance of the line that requires extra protection but for a distance no less than ten (10) feet horizontal.

610.6 POLYETHYLENE CORROSION PROTECTION:**610.6.1 General:**

(revise to include the following)

All ductile iron pipe, valves and fittings shall be protected from corrosion by encasement in a polyethylene protective wrapping.

610.9 FIRE HYDRANTS:

(revise to include the following)

Special Provisions

Fire hydrant installation shall include the materials shown in City of Flagstaff Engineering Detail 13-03-011 including, but not limited to, the gate valve, box, cover, & collar, MJ DIP pipe and fittings, thrust blocking, gravel, and pad, and be installed per City of Flagstaff Engineering Standards Section 13-09-006-0006.

610.11 CONNECTION TO EXISTING MAINS

(revise to include the following)

See Section 13-21-001-0610.10 of the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details

Prior to starting construction, the contractor shall provide a Utility Phasing Plan. The intent for utility construction is to, to the greatest extent possible, maintain water and sewer utility service to properties & residences during construction using existing mains and service lines. The Utility Phasing Plan shall communicate with sufficient detail how the contractor plans to accomplish this. The Contractor shall revise the Utility Phasing Plan per city Comments.

When maintaining service is not possible, in addition to notifying residents & property owners in accordance with the special provisions, the contractor shall ensure that the shutdown will be the shortest possible time (8-hours maximum). For service down time longer than allowed, the contractor shall provide utility service to residences until service is restored. The Utility Phasing Plan shall be tied to the contractor's critical path schedule. The Utility Phasing Plan shall include at a minimum the following elements:

- Shop drawing of waterline construction plan showing:
 - Construction phasing;
 - Locations where existing water mains will be removed from service during construction;
 - Locations of caps for temporary dead-end water lines that will remain in service during all or part of construction.
 - Locations of plugs for permanent water line abandonment.
- Temporary Utility Service Plan for service down time longer than allowed. Temporary Utility Service Plan shall at a minimum include:
 - Shop drawing in plan view showing location of temporary water mains and water services;
 - Narrative describing the plan.
- Schedule, including anticipated duration of temporary water service.

Contractor shall verify location and depth of existing waterlines and notify the City's representative of any conflict with any proposed improvements. For connection to existing waterlines the Contractor shall expose the existing waterline and make the connection as instructed by the City of Flagstaff after the City conducts a field inspection.

610.13 METER SERVICE CONNECTIONS

(revise to include the following)

Water meters shall be installed per City of Flagstaff Engineering Standards Section 13-09-003-0008 and the City of Flagstaff Engineering Details.

Special Provisions

The Contractor shall salvage and reuse existing water meters. Salvaged water meters shall be labeled with the residential/commercial address associated with the meter and approximate station where the water meter was removed. Meters shall be packaged, protected and stored in a manner approved by the City's Project Manager until reinstalled.

Water meters shall be installed at the original residential/commercial address per the City of Flagstaff Engineering Details at the locations shown on the waterline plans. The water service connection shall be installed as necessary to avoid utility conflicts. Water meter shall be reinstalled by the City of Flagstaff.

The private side connection for the residential and commercial water services shall be performed by the appropriately licensed Contractor.

In locations where water services are being replaced and the existing curb and gutter is not being replaced as part of the roadway improvements, removal and replacement of the curb and gutter is incidental to water service replacement.

610.16 MEASUREMENT AND PAYMENT

(revise to include the following)

Payment for work under this section will be made in accordance with Subsection 610.16 of the MAG Standard Specifications at the contract unit prices complete and in place, which price shall be full compensation for the work, as described and specified herein and on the project plans, or as determined by the Owner's Engineer. Waterline pipe is measured horizontally in plan view in 2 dimensions. No separate payment shall be made for horizontal or vertical bend fittings, tees, crosses, elbows, restraints, blocking/anchors, reducers or couplers. No separate payment shall be made for preparation and implementation of the Utility Phasing Plan, including but not limited to temporary water main caps and thrust restraints, temporary utility service, removal of existing water main required for installation of the new water main. Removal and replacement of improvements not specifically called for on the plans, such as curb and gutter, required for construction of water mains is incidental to the waterline construction.

Measurement and payment for extra protection of water mains includes pipe for both water and sewer mains at crossings and shall be per the contract unit prices and shall include all materials and labor for a complete and operational service installation.

Measurement and payment for new water services includes water service taps, meter placement, and service connections and shall be per the contract unit prices and shall include all materials and labor for a complete and operational service installation. Work also includes proper disconnection of existing water services. Measurement and payment for new water services also includes curb removal and replacement, sidewalk removal and replacement, and removal and replacement of private improvements such as driveways or landscaping, in kind, not specifically identified on the plans, as required for water service construction. Measurement and payment for new water services also includes adjustment of meter boxes to finished grade. Payment shall be at the contract unit prices and shall include all materials and labor for a complete and operational service installation. Curb removal and replacement shall be to the nearest joint. Sidewalk removal and replacement shall be to the nearest joint. Water meter boxes located in driveways or other locations that could see vehicle traffic shall be installed with a traffic rated water meter box per COF Engineering Detail 9-03-080A. Traffic rated box is incidental to water meter construction.

(G) **Fire Hydrants:** Measurement and payment for fire hydrant assemblies shall be the number of fire hydrants installed and shall include the 6-inch ductile iron pipe and fittings, gate valve, and all other

Special Provisions

materials, labor, and equipment necessary for a complete installation as shown in COF Engineering Detail 13-03-011.

Measurement and payment for new fire hydrant assemblies also includes curb removal and replacement, sidewalk removal and replacement, and removal and replacement of private improvements such as driveways or landscaping, in kind, not specifically identified on the plans, as required for fire hydrant assembly construction.

SECTION 615 SANITARY SEWER LINE CONSTRUCTION**615.1 DESCRIPTION**

The work under this section shall be in accordance with Section 615 of the MAG Standard Specifications, and the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-002-0440.1 and 13-21-002-0440.2 and as modified herein.

The Contractor shall conform to the requirements of the Arizona Department of Environmental Quality (ADEQ) for all water construction. Reference: Title 18, Chapter 9 of the Arizona Administrative Code. Where ADEQ construction requirements differ from the requirements of the Standard Specifications, or these Special Provisions, the more restrictive provisions shall apply.

Contractor shall maintain full sewer service to the adjacent community, with the exception of minimal shutdown as required to install replacement sewer line and new connections. Contractor shall ensure that full sewer service is restored to all customers at the close of business each day. Sewer construction phasing, bypass pumping, and shutdowns shall be included in the Utility Phasing Plan, see Section 610.11.

Construction of new sewer services to existing sewer mains includes reconnection to the existing service at the property line and to the existing wye at the sewer main.

615.5 PIPE INSTALLATION

(revise to include the following)

When a shutdown of an existing sewer is necessary in order to construct replacement lines, the Contractor shall schedule a pre-shutdown conference with the Contractor's representative, City Inspector, and City Project Manager. This conference shall establish the timeline and procedures to ensure that the shutdown will be the shortest possible time (8-hours maximum). Contractor may temporarily need to bypass pump sewage flow around the immediate construction site. After the procedures and time for a shutdown are agreed upon, it shall be the Contractor's responsibility to notify all affected customers in advance, that sewer service will be interrupted. Customers shall be notified no less than seventy-two (72) hours in advance, except for emergency situations. Notification shall be in writing giving the reason for the shutdown, and the time and duration that sewer service will be shut off. All shutdown notifications to the customers must be approved by the City Project Manager.

All ductile iron pipe, valves and fittings shall be protected from corrosion by encasement in a polyethylene protective wrapping per MAG Specification Section 610.6.2.

615.5.1 SEWAGE BYPASS

(revise to include new subsection)

Special Provisions

If needed for the construction of the new sewer main, the Contractor may choose to maintain sewer service during the construction period by means of a sewage bypass system. The temporary sewer system shall be installed and tested prior to the removal of existing sewer main. The Contractor shall design and provide all labor, materials, and equipment to install and operate a sewage bypass system that bypasses sewage flows around each sewer rehabilitation work area. Each bypass system shall extend the entire length of the section of pipeline rehabilitation and shall remain in operation until the sewer rehabilitation work is complete and accepted by the Engineer. All bypass flows shall be discharged into a downstream sanitary sewer manhole. Bypass flows shall not be directed to ground surface receiving waters, storm drains, or wherever groundwater contamination is possible. The bypass system shall maintain flow to prevent wastewater backup into customer fixtures or discharge to the environment.

The design of the bypass system is the responsibility of the Contractor and shall be prepared and submitted to the Engineer for review and approval. The Contractor shall have each bypass system in place and tested before bypassing any sewage. The Contractor shall notify the Engineer 48 hours prior to shutting down or bypassing the pipeline to be rehabilitated.

Equipment shall be equipped with a specially designed, acoustically-silenced enclosure intended for use in any application where pumping is required, and engine and other noise must be kept to a minimum. The sound levels shall be within the limits specified in the City of Flagstaff codes or 69dBA at 30 feet. The bypass pumping system shall be of adequate capacity and size to handle the required flows with redundancy to bypass if the largest temporary pump is out of service.

The Contractor shall consider the existing conditions and ground features when designing and installing the aboveground discharge pipe system. Access to driveways shall be maintained.

615.5.1.3 SYSTEM MONITORING

(revise to include the following)

The wastewater levels in the upstream and discharge manholes shall be continuously monitored for the first 24-hours of operation by an on-site representative of the Contractor. After the first 24-hours of monitoring, the Engineer may allow the Contractor to perform monitoring only during daytime hours so long as the site is secured. The representative shall be Contractor staff and/or a subcontractor that has been directly responsible for the bypass pumping of sewage flows during completion of a similar pipeline rehabilitation project. The qualifications of the staff or subcontractor shall be submitted to the Engineer for approval 10 business days prior to any bypass pumping work.

The Engineer may also allow for the bypass pumping system to be removed at the end of construction each day and or week, provided the new sewer main in the sewer rehabilitation work area has been connected to the existing sewer main and sewage flow has been confirmed.

615.5.1.4 SYSTEM MAINTENANCE

(revise to include the following)

The Contractor shall provide qualified personnel on-site to maintain the bypass system for the entire time the bypass system is in operation, up to 24 hours per day 7 day per week. The Contractor shall maintain sufficient on-site equipment and materials to ensure continuous and successful operation of the bypass system. This includes a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping,

Special Provisions

fuel, and other parts or system hardware to ensure immediate repair or modification of any part of the system as necessary.

All equipment shall be placed on a new plastic tarp, adequately sized and bermed to protect against fuel, oil, and hydraulic fluid spills. The Contractor is responsible to notify the Engineer for immediate and proper cleanup should any spill occur, regardless of amount. The Contractor shall repair, without cost to the Owner, any damage that may result from its negligence, inadequate or improper mechanical or electrical failures.

615.5.1.5 MEASUREMENT AND PAYMENT

(revise to include the following)

Bypass pumping required to install the sewer system as shown on the plans while keeping the mains in service is considered incidental to the sewer items on the bid form with no additional compensation.

615.8 SANITARY SEWER TAPS

(revise to include the following)

Sanitary sewer service taps in accordance with COF Addendum to MAG Uniform Standard Details for Public Works Construction, including but not limited to Sections 13-21-002-0440.1 and 13-21-002-0440.3.

Measurement and payment for sewer services also includes curb removal and replacement, sidewalk removal and replacement, and removal and replacement of private improvements such as driveways or landscaping, in kind, not specifically identified on the plans, as required for service construction. Payment shall be at the contract unit prices and shall include all materials and labor for a complete and operational service installation. Curb removal and replacement shall be to the nearest joint. Sidewalk removal and replacement shall be to the nearest joint.

615.9 SANITARY SEWER CLEANOUTS

(revise to include the following)

Sanitary sewer service cleanouts in accordance with COF Addendum to MAG Uniform Standard Details for Public Works Construction, including but not limited to Sections 13-21-002-0440.1 and 13-21-002-0440.3.

615.16 MEASUREMENT AND PAYMENT

(revise to include the following)

(B) Sanitary Sewer Service Lines and Taps:

Payment shall include removals and improvements as indicated on the construction plans.

(C) Sanitary Sewer Cleanouts: No separate measurement and payment will be made for sewer cleanouts. Sewer cleanouts shall be included in the cost of the sewer service.

(D) Sanitary Sewer services include removal and replacement of curb and gutter, sidewalk, and landscaping where required for sewer service replacement.

SECTION 625 MANHOLE CONSTRUCTION AND DROP SEWER CONNECTIONS**625.1 DESCRIPTION**

Special Provisions

The work under this section shall be in accordance with Section 625 of the MAG Standard Specifications, COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0625.3, 13-21-002-0420, 13-21-002-0422, 13-21-002-0424, 13-21-002-0426, and the City of Flagstaff Engineering Standards Addendum issued on 10/8/2018 revising Sections 13-21-002-0420 and 13-21-002-0422 that requires all new manholes to be constructed without steps.

PART 700 – MATERIALS

SECTION 701 AGGREGATE

701 GENERAL

The work under this section shall be in accordance with Section 701 of the MAG Standard Specifications and the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0702.1 and 13-21-001-0702.2.2.

SECTION 710 ASPHALT CONCRETE

710.2.1 Asphalt Binder:

(Revise as follows)

The asphalt binder specified by the City of Flagstaff for use on this project shall be PG 58-28.

SECTION 725 PORTLAND CEMENT CONCRETE

725 GENERAL

The work under this section shall be in accordance with Section 725 of the MAG Standard Specifications and the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Sections 13-21-001-0725.1, 13-21-001-0725.3, and 13-21-001-0725.5.

SECTION 750 IRON WATER PIPE AND FITTINGS

750.1 CAST IRON WATER PIPE

The work under this section shall be in accordance with Section 750 of the MAG Standard Specifications and the COF Revisions to MAG Uniform Standard Specifications and MAG Uniform Standard Details, including but not limited to Section 13-21-001-0750.1.

END OF SPECIAL PROVISIONS

Appendix A

Report on Geotechnical Investigation

**REPORT ON GEOTECHNICAL
INVESTIGATION**

DESIGNATION: City of Flagstaff Road Improvements

LOCATION: North Canyon Terrace Drive, East David Drive,
and East Hutcheson Drive

CLIENT: Peak Engineering

PROJECT NO: 181932SF

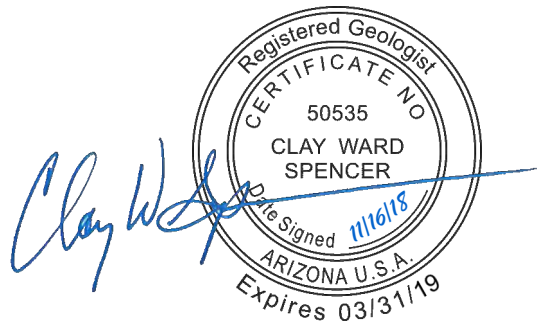
DATE: November 15, 2018



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APPENDIX – Field and Laboratory Data



1.0 INTRODUCTION

This report presents the results of a subsoil investigation carried out at the site of proposed roadway improvements on East Hutcheson Drive, East David Drive, and North Canyon Terrace Drive in Flagstaff, Arizona.

At the time of the investigation preliminary information indicated that the desire is to conduct mill and overlay and pavement replacement on East Hutcheson Drive, East David Drive, North Canyon Terrace Drive. The intent of this investigation was to obtain information regarding the existing asphalt, aggregate base, and subgrade soils for pavement design, as well as general soil/rock profile and trenching conditions. Traffic counts were not available at the time of this report.

If any significant changes are made in the scope of work or type of construction that was assumed in this report, we must review such revised conditions to confirm our findings if the conclusions and recommendations presented hereafter are to apply.

2.0 GENERAL SITE AND SOIL CONDITIONS

2.1 Site Conditions

2.1.1. East Hutcheson Drive

The proposed improvement area includes a portion of Hutcheson Drive between East Fine Avenue and David Drive. Hutcheson Drive primarily serves as access to the Cherry Hill neighborhood, and is subjected to light passenger vehicles and some local delivery/construction traffic. Drainage is to the west and to the south. **Pavement at the time of investigation was in moderate condition, and exhibited transverse block cracking and moderate amounts of alligator cracking.** A chip seal coat has been applied to the roadway surface within the last 5 years.

2.1.2. East David Drive

The proposed improvement area includes a portion of David Drive between Hutcheson Drive and North William Road. David Drive services residential properties within the Cherry Hill neighborhood. Drainage is to the south. **At the time of the investigation, pavement was in moderate to poor condition and exhibited moderate alligator cracking, transverse and longitudinal block cracking, and trench failure along the west side of the road south of the valley gutter. Visible distress was observed due to tree roots.** A valley gutter crosses the road approximately 930 feet south of the intersection of David Drive and Hutcheson Drive.

2.1.3. North Canyon Terrace Drive

The proposed improvement area includes the entirety of Canyon Terrace Drive. Canyon Terrace Drive services residential properties off of Switzer Canyon Road. Drainage is generally to the south. At the time of the investigation, pavement was in poor condition and exhibited severe alligator cracking, patches of previously repaired pavement sections, and severe transverse and longitudinal block cracking. These transverse cracks are as wide as 4 to 6 inches in some locations. Stripping of fines and spalling was also apparent on the majority of the roadway. In some areas, the asphalt surface has completely degraded into a gravel surface.

2.2 General Subsurface Conditions

The structural section of the roadways are quite variable (see Table 2.2.1). The aggregate base observed consisted of a cinder based material in some locations and a crushed aggregate in other locations. Native subsoil conditions are relatively variable at the 4 boring locations. The upper native soils consist of highly plastic “fat” clay with sand, clayey sand with gravel, and silty sand with gravel. Large basalt boulders or basalt bedrock was encountered at B-3 and B-4. Standard Penetration Resistance Tests (SPT) values range from 13 to greater than 50 blows per foot. SPT values of 50+ were typically encountered in the strata identified as moderately weathered basalt boulders or bedrock. Based on visual and tactile observation, the upper soils were typically in a moist to wet state at the time of investigation. Laboratory testing indicates liquid limits in the range of non-plastic to 64 percent with plasticity indices ranging from non-plastic to 41 percent. Percent passing the 200 sieve ranged from 14 to 78 percent. The existing pavement structural sections are summarized in the table below:

Table 2.2.1 – Existing Asphalt Conditions

Location	Boring	Asphalt Thickness	Aggregate Base
Canyon Terrace Drive	B-1	4.5”	4.0”
Hutcheson Drive	B-2	3.5”	3.0”
David Drive	B-3 ⁽¹⁾	3.75”	4.0”
David Drive	B-4 ⁽¹⁾	3.5”	4.0”
Canyon Terrace Drive	C-1	4.38”	-
Canyon Terrace Drive	C-2	4.0”	-
Canyon Terrace Drive	C-3	4.4”	-
Canyon Terrace Drive	C-4	5.0”	-
Canyon Terrace Drive	C-5	4.19”	-
Canyon Terrace Drive	C-6	4.06”	-
Canyon Terrace Drive	C-7	5.25”	-

Table 2.2.1 – Existing Asphalt Conditions

Location	Boring	Asphalt Thickness	Aggregate Base
Canyon Terrace Drive	C-8	4.75	-
Hutcheson Drive	C-9	3.25"	-
Hutcheson Drive	C-10	3.125"	-
Hutcheson Drive	C-11	2.9"	-
Hutcheson Drive	C-12	2.81"	-
Hutcheson Drive	C-13	2.88"	-
Hutcheson Drive	C-14	2.63"	-
Hutcheson Drive	C-15	4.1"	-
Hutcheson Drive	C-16	2.88"	-
David Drive	C-17	4.25"	-
David Drive	C-18	3.65"	-
David Drive	C-19	4.13"	-
David Drive	C-20	3.5"	-

Note 1: Aggregate base consisted of a cinder based product

No free groundwater was encountered at the time of our investigation to the depths investigated of 5.5 to 11.5 feet.

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Analysis

Analysis of the field and laboratory data indicates that subsoils at the site are marginally suitable for support of the proposed paving. Based on the existing moisture contents and clayey nature of subsoils, the subgrade will most likely become unstable once the existing pavement is removed. If unstable subgrade is encountered, subgrade stabilization will be necessary.

It is understood that mill and overlay is desired for Canyon Terrace Drive, Hutcheson Drive, and for the northern portion of David Drive. Pavement conditions and asphalt thickness were used to opine if mill and overlay is feasible. It is our opinion that of the three roads investigated, only the northern section of David Drive is suitable for an edge mill and overlay option. Hutcheson Drive, Canyon Terrace Drive, and the southern portion of David Drive are, in our opinion, not suitable for an edge mill and overlay option and will require full reconstruction. Options are provided for mill and overlay where appropriate and full reconstruction where not.

The existing structural sections encountered on David Drive were constructed on a cinder based aggregate base course. This was standard engineering practice for roadways in this area at the assumed time of the roadway's construction. The use of cinder based aggregate base courses is no longer considered acceptable as these materials have been observed to degrade over time under flexible pavements. Section 3.6 presents various structural sections with associated capacities for consideration depending on anticipated traffic volumes. These sections assume using new imported aggregate base meeting the MAG/Coconino County Standard Specifications. When transitioning from existing roadways to new roadways, all new pavement sections should meet or exceed the thickness of the existing pavement or be graded accordingly to maintain drainage within the aggregate base.

Depending on final grades and the pavement section selected, it may be possible to salvage a portion of the existing pavement and aggregate base by cold-milling and blending to create a subbase for the new pavement section. This would require selective stockpiling of the material as additional subgrade will require removal to maintain final elevations, and is only feasible in areas where non-cinder aggregate base has been used. For areas where full replacement will occur, allowance should still be made for at least 6 inches of new ABC under paving to meet local engineering standards/minimum design requirements. If approved by the City, consideration may be given to using less than 6 inches of new ABC by replacing half of the AB structural section with 200 percent (%) of reclaimed subbase. For example use 3 inches new ABC over 6 inches of reclaimed subbase.

The clayey and silty subgrade soils may be sensitive to excessive moisture content and may become unstable at elevated moisture contents. Accordingly, it may be necessary to compact soils on the dry side of optimum. The reduced moisture content under pavements should only be used upon approval of the engineer in the field.

With clayey/silty soils as subgrade beneath pavements, there is potential for the underlying finer grained soils to migrate into the aggregate base over time. This potential is increased in areas of wet unstable subgrade and decreases the strength and stability of the aggregate base. If geogrid is used for subgrade stabilization purposes, consideration should also be given to utilizing a geotextile non-woven filter fabric at the interface of the aggregate base and the subgrade to attempt to limit this migration. If utilized, the filter fabric should be placed below the geogrid (not above) so that it does not interfere with the interlock of the aggregate with the geogrid.

3.2 Site Preparation

For areas requiring full depth reconstruction of the roadway surfaces, pavement reconstruction will require the complete removal of the existing asphalt surface to be replaced with a new structural section

of asphalt surface on new aggregate base. Millings from the existing pavement may be reused if they meet MAG/Coconino County Standard Specifications and are selectively stockpiled. This removal process will likely disturb the underlying subgrade. After removal of the existing asphalt and aggregate base, the subgrade will require fine grading and compaction prior to the placement of new ABC and asphalt. Additional subgrade removal may be necessary to allow for a thicker structural section in some areas. The subgrade should be compacted to at least 95 percent of maximum dry density per ASTM D-698. The subgrade should be proof rolled with a heavy rubber tired vehicle such as a loaded water truck to locate unstable areas per MAG 301.

Anytime existing subgrade that has been covered with asphalt is opened up, it is not uncommon to find soft or loose, wet subgrade that will not stabilize or achieve the compaction required. It should be noted that the subgrade soils were moist at the time of the investigation. Depending on site conditions during construction, it is anticipated that some subgrade stabilization will be required. It is recommended to include a (time and materials) budget line to stabilize soft, wet subgrade in the most cost effective method. Several options are available including allowing time to dry out, removal and replacement with additional subbase (usually 2 feet of stockpiled asphalt millings is sufficient), cement treating (MAG Section 311), or the use of geogrid such as Tensar BX1200 or equivalent per 2014 MAG Section 796 Type 2 with an additional 12 inches of aggregate base. Due to the number of means and methods available, potential for shallow utility conflicts, and other restrictions, there is no one method that may work best. Once suspect areas are stabilized to the satisfaction of the engineer, the ABC should then be installed.

If the use of geogrid is chosen for stabilization, there are some fine points of installation that can be critical to a successful result. While there are many geotextile products available, it is our experience that some provide better results than others when stabilization of soft subgrade soils are concerned. If a geogrid stabilization option is selected, the use of Tensar Geogrid BX1200, or equivalent polypropylene welded grid meeting 2014 MAG Section 796 Type 2 or ADOT 2008 Standard Specification 1014-3 is recommended. The use of geogrid for subgrade stabilization is not meant to increase the allowable ESAL's for pavement design for this project. The geogrid should be placed according to manufacturer's recommendations, with appropriate overlaps along their sides and ends. With the installation of geogrid for stabilization, a minimum of 12.0 inches of aggregate subbase course is recommended on top of the geogrid. Depending upon the severity of the instability, additional thickness of ABC, and filter fabric, may be required. With clayey/silty soils as subgrade beneath pavements, there is potential for migration of the underlying finer grained soils to migrate into the aggregate base over time. This potential is increased in areas of wet unstable subgrade and decreases the strength and stability of the aggregate base. With the use of geogrid for subgrade stabilization purposes, consideration should also be given to utilizing a geotextile non-woven filter fabric at the interface of the aggregate base and the subgrade to attempt to limit this migration. If utilized, the filter fabric should be placed below the geogrid (not above) so that it does not interfere with the interlock of the aggregate with the geogrid. The ABC should be moisture conditioned to optimum moisture content, ± 2 percent prior to its placement on

the geogrid. **It is critical that the ABC is not moisture-conditioned in place, as any excess moisture may saturate the underlying subgrade and further decrease the stability of the clayey subgrade soils.** The aggregate base course material should be placed in a 12 inch lift and compacted to 95 percent of its maximum dry density, as determined by ASTM D698. **The first 12-inch lift should be placed full thickness prior to operating equipment over the geogrid.** Native soil should not be used as fill above the geogrid. **It is critical to provide and maintain positive drainage within the ABC material in order to minimize the potential for moisture infiltration and subsequent saturation of the underlying subgrade soils.**

3.3 Fill and Backfill

Native soils and milled asphalt are suitable for use in roadway subgrade and utility trench backfill. Oversized material (> 3 inches) should be removed or reduced in size. Imported fill, if required, should be the same or better quality as the existing subgrade. In general, it shall meet the following requirements:

Table 3.3.1 – Import Specifications

<u>Specification</u>	<u>Common</u>
Passing 3"/75mm	100%
Passing #200/.075mm	≤40%
Liquid Limit	<30%
Plasticity Index	<15%

Imported common fill for use in site grading should be examined by a Soils Engineer to ensure that it is of low swell potential and free of organic or otherwise deleterious material. The use of cinder material as fill and backfill should be avoided.

Although “clean” cinders often times meet these fill specifications for placement of common fill, they may pose difficulties during construction. Due to their granular nature and lack of sufficient fines, “clean” cinders are a free draining material. As a result, they may be difficult to properly moisture condition and water may infiltrate the cinders and saturate the underlying soils. This could result in an unstable support for pavement. Excess water, as a result of moisture conditioning, is often observed at the interface between the fill and underlying less permeable material. “Clean” cinders also pose difficulties in trenching operations due to the inability to excavate neat trenches. With the lack of fines and cohesive soils, the clean cinders generally slough and vertical walls are hard to maintain.

Fill should be placed on subgrade which has been properly prepared and approved by a Soils Engineer. Fill must be wetted and thoroughly mixed to achieve optimum moisture content, ±2 percent.

Granular fill (ASTM Classification GW, GP, SW, SP) can be placed on the dry side of optimum at the discretion of the geotechnical engineer on record. The clayey and silty soils may be sensitive to excessive moisture and may become unstable at elevated moisture contents. Accordingly, it may be necessary to compact soils on the dry side of optimum. The reduced moisture content under pavements should only be used upon approval of the engineer in the field.

Fill should be placed in horizontal lifts of 8-inch thickness (or as dictated by compaction equipment) and compacted to the percent of maximum dry density per ASTM D-698 as set forth below.

Frozen material shall not be placed, nor shall fill be placed upon frozen grade.

A. Sidewalk/Pavement Subgrade or Fill	95
B. Utility Trench Backfill	
1. More than 2.0' below finish subgrade	95
2. Within 2.0' of finish subgrade (non-granular)	95
3. Within 2.0' of finish subgrade (granular)	100
C. Aggregate Base Course & Subbase Material	
1. Below concrete slabs	95
2. Below asphalt paving	100
D. Landscape Areas	90

3.4 Utilities Installation

Depending on location, trench excavations for shallow utilities (3 to 4 feet) could encounter rock. Two out of the 4 borings encountered rock before 4 feet, with one boring encountering rock as shallow as 2 feet. Rock removal equipment will be necessary where rock is encountered. It is anticipated that trench walls will stand near-vertically for short periods of time required to install utilities. As the trench walls dry out, additional sloughing should be anticipated. Appropriate lay back or shoring of the trenches should be provided to protect workers entering the trenches. If trenches are greater than shoulder-height, precautions must be taken to protect workmen

Backfill of trenches above bedding zones may be carried out with native excavated material provided material greater than 8 inches is broken down or removed. Material up to 8 inches is allowed provided it does not impact the ability to properly compact the backfill lifts. Removing 3" to 8" material may make proper compaction more readily attainable. Material used for backfill of trenches should be moisture-conditioned, placed in 8 inch lifts and mechanically compacted. Water settling is not recommended. Compaction requirements are summarized in the "Fill and Backfill" section of this report.

3.5 Mill and Overlay

As previously indicated, mill and overlay options will work on the northern portion of David Drive. In general, asphalt thicknesses less than 3 inches do not hold up to the milling process. Edge corings along Hutcheson Drive C-10, C-11, C-12, C-13, C-14, and C-16 all measured to be less than 3 inches in thickness. While asphalt thickness on Canyon Terrace Drive will permit mill and overlay, pavement in this area is in poor enough condition that removal and replacement is recommended.

Given the current site grading, numerous fixed grade points, and erosion control systems it is assumed that a standalone overlay cannot be completed. Therefore, it is recommended to conduct an edge mill and overlay. This can be done by conducting an edge mill along the curb/edge of pavement and other fixed grade points to provide space for the overlay. It is recommended to mill to a depth of 1½ inches below the existing asphalt surface, tapering to zero inches at a distance of 8-feet away from the pavement edge. Using the taper option will allow for a slightly thicker section of asphalt to be placed back, adding to the structural capacity of the pavement. Areas where pavement is tied in to curbs and/or gutters should be milled to provide space for the new overlay allowing for ¼ inch of asphalt above the lip of the curb/gutter elevation.

An asphalt overlay will eventually result in a similar crack pattern as the old cracks reflect through to the surface. Prior to overlaying, consideration can be given to installing a crack reducing interlayer product. This could consist of a Petromat® 4597 (www.geotextile.com) paving fabric or approved equal. Petromat® is a non-woven polypropylene geofabric that is embedded in an asphalt tack coat on top of the old pavement prior to overlay. When overlaid, the heat of the new asphalt allows the asphalt binder to penetrate the fabric creating a stress absorbing layer that also adds protection against water intrusion through new cracks as they form. Alternates to using a Petromat could include GlasGrid or PavePrep products which have self-adhesive and can be placed over the crack to aid in reducing reflective cracking. Without one of the above products reflective cracking could begin to appear within 1-2 years from placement of the overlay. If larger cracks have occurred during the time of mill and overlay operations, cracking can be expected to begin within 2 years as a result of the highly cracked pavement surface.

If standard conventional mix asphalt is to be used, overlay the pavement with at least 1½ inches of new hot mix asphalt concrete with the edge of the pavement elevated ¼-inch above the lip of the gutter per MAG Detail 220-2. It is recommended that Maricopa Association of Governments (MAG) Standard Specification Section 710 be specified. Depending on the final overlay thickness a ½ or ¾ inch mix designation should be used, using the Marshall mix design for light traffic. While the ¾ inch mix has a somewhat rougher texture, it offers more stability and resistance to scuffing, particularly in truck turning areas. Pavement should be installed per the quality standard of MAG Standard Specification Section 322. Life expectancy is on the order of 5 to 10 years with maintenance. See Section 3.9 for additional material specifications. Deleting the

major crack repairs is possible with this option but early reflective cracking should be expected. This will increase maintenance requirements.

3.6 New/Completely Reconstructed Asphalt Pavement

It must be noted that all new asphalt pavements will eventually crack. Cracking in asphalt pavement is typical and should be expected over the life of the pavement. In fact, it has been our experience that we are seeing the onset of earlier aging and block shrinkage cracking in the new asphalt binders that are available. These require routine maintenance to prevent accelerated deterioration. Accordingly, it is highly recommended to establish a maintenance program where the cracks are routinely filled as they appear beginning at about the second year of life. It is also recommended that surface fog seal coats be considered beginning at about year 5 and every 5 years after. This will help preserve the pavement, extending the service life.

If earthwork in paved areas is carried out to finish subgrade elevation as set forth herein, the subgrade will provide adequate support for pavements. The section capacity is reported as daily ESALs, Equivalent 18 kip Single Axle Loads. Typical heavy trucks impart 1.0 to 2.5 ESALs per truck depending on load. It takes approximately 1200 passenger cars to impart 1 ESAL. In residential subdivisions, the worst offender, construction traffic, is often over looked. Buildout is relatively complete along these sections of roadway, so construction traffic may be minimal, however delivery traffic may increase volumes. Based on the existing structural sections, it appears that the existing roadways should have provided for approximately 3 to over 23 daily ESALs over a 20 year life. The age of the existing roadways and subsequent maintenance is unknown and it is therefore unknown if the pavement provided the anticipated life expectancy or not. Several structural sections have been provided to account for different traffic volumes. The designer/owner is ultimately responsible for choosing the appropriate section to meet the anticipated traffic volume and life expectancy.

Table 3.6.1 – City of Flagstaff Asphalt Pavement

Option	18 KIP ESAL's		Flexible Pavement	
	Daily	Total	AC	AB
A	5.9	42,901	3"	6"
B	13.1	95,4859	4"	4"
C	18.3	133,572	4"	5"

Note:

1. Designs are based on AASHTO design equations and Arizona Department of Transportation (ADOT) correlated R-values.

Pavement Design Parameters:

Assume: One 18 kip Equivalent Single Axle Load (ESAL)/Truck

Life: 20 years

Subgrade Soil Profile:

% Passing No. 200 Sieve: 48% (avg)

Plasticity Index: 21 (avg)

R-value: 30.7 (per ADOT Tables and R-Value Tests)

M_R: 8600 (per AASHTO formula)

Serviceability

Initial: 4.5

Final: 2.5

Reliability: 90%

Structural Coefficients:

Asphalt <4": 0.39

Asphalt >4": 0.42

These structural sections assume that all subgrades are prepared in accordance with the recommendations contained in the "Site Preparation" and "Fill and Backfill" sections of this report, and paving operations carried out in a proper manner. If pavement subgrade preparation is not carried out immediately prior to paving, the entire area should be proof-rolled at that time with a heavy pneumatic-tired roller to identify locally unstable areas for repair. Site drainage should be designed to ensure positive drainage of the base and sub base materials. Improper grading of sub base materials will drastically reduce the overall life of the pavement.

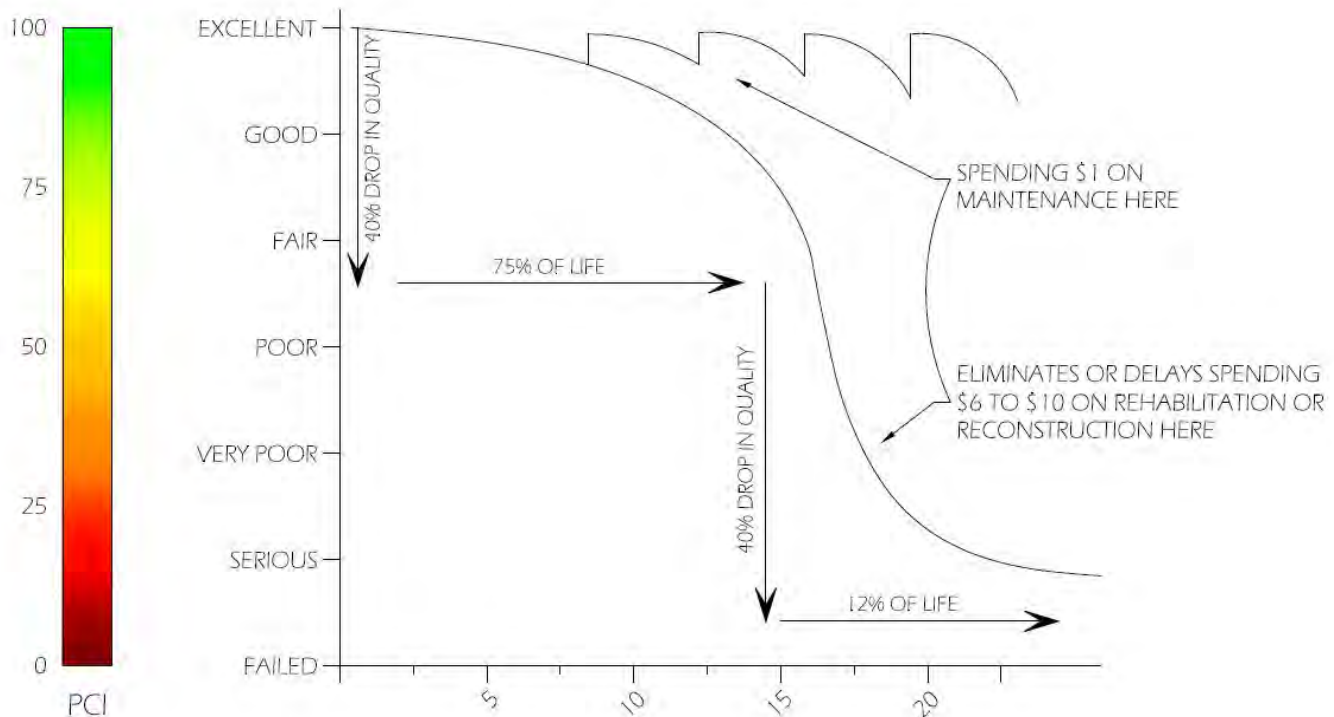
Pavement base course material should be aggregate base per M.A.G. Section 702 Specifications. Asphalt concrete materials and mix design should conform to M.A.G. 710 using the Marshall mix design criteria for low volume traffic and PG 58-28 for the asphalt grade. **Reducing the air void content to 3 percent** will aid in reducing thermal cracking typical in the area. **It is recommended that a ½ inch or ¾ inch mix designation be used for the pavements.** While a ¾ inch mix may have a somewhat rougher texture, it offers more stability and resistance to scuffing, particularly in truck turning areas. Pavement installation should be carried out under applicable portions of M.A.G. Section 321 and municipality standards. The asphalt supplier should be informed of the pavement use and be required to provide a mix that will provide stability and be aesthetically acceptable. Some of the newer M.A.G. mixes are very coarse and could cause placing and finish problems. A mix design should be submitted for review to determine if it will be acceptable for the intended use.

3.7 Preventative Maintenance Plan

In order to achieve an extended life in the pavement it is highly recommended that a maintenance plan be constructed to address the aging process of the pavement. It has been well documented that proper pavement maintenance will prolong the life of the pavement at a lower cost than letting the pavement age with no maintenance. Figure 3.7.1 shows through the Pavement Condition Index (PCI), a typical visual condition scale ranging from 0 (failed) to 100 (new), how spending money on pavement preservation at the correct time will be a significantly more cost effective means for extending the life of the pavement. As long as the pavement remains in a fair to excellent state, the cost of pavement preservation is relatively small. However, as the pavement deteriorates, the pavement life becomes significantly shorter and there is a change from preservation to rehabilitation, and reconstruction.

A well formed maintenance plan should include budgeting for crack sealing on an annual basis beginning the 2nd or 3rd year, and resealing every 4 to 5 years after. Budget estimates should assume that approximately 25 percent of the pavement areas will need isolated crack sealing every year. It is also recommended that surface fog seal coats be considered about year 5 and every 5 years after. This will help preserve the pavement surface as well as minimize the effects from moisture infiltration. Depending on the progression of the aging, more costly surface treatments such as thin overlays or slurry seals should be anticipated at the 15 to 20 year point of the pavements life.

Figure 3.7.1 - Life Cycle Cost Analysis



It is recommended that an initial PCI (Pavement Condition Index) survey be completed on all new pavements at around 4 years old, at which time the pavement should start showing signs of aging. The pavement condition survey will allow for better prediction modeling, permit planning of maintenance and operations, and maximize the life of the roadway. PCI surveys should be conducted every 3 to 5 years to determine progression of aging. A 10 year maintenance plan can be created with each one of these surveys to help for budgeting over a 10 year period.

4.0 GENERAL

The scope of this investigation and report does not include regional considerations such as seismic activity and ground fissures resulting from subsidence due to groundwater withdrawal, nor any considerations of hazardous releases or toxic contamination of any type.

Our analysis of data and the recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been

performed in accordance with generally accepted engineering principles and practice; this warranty is in lieu of all other warranties expressed or implied.

We recommend that a representative of the Geotechnical Engineer observe and test the earthwork and grading portions of this project to ensure compliance to project specifications and the field applicability of subsurface conditions which are the basis of the recommendations presented in this report. If any significant changes are made in the scope of work or type of construction that was assumed in this report, we must review such revised conditions to confirm our findings if the conclusions and recommendations presented herein are to apply.

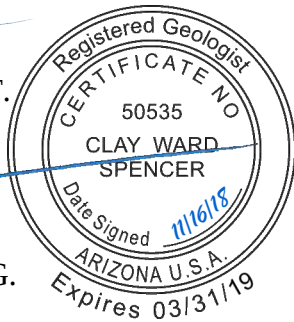
Respectfully submitted,
SPEEDIE & ASSOCIATES, INC.



Garrett J. Chott, E.I.T.



Clay W. Spencer, R.G.





Gregg A. Creaser, P.E.



APPENDIX

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLAN

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

PHOTOGRAPHS OF ASPHALT CORES

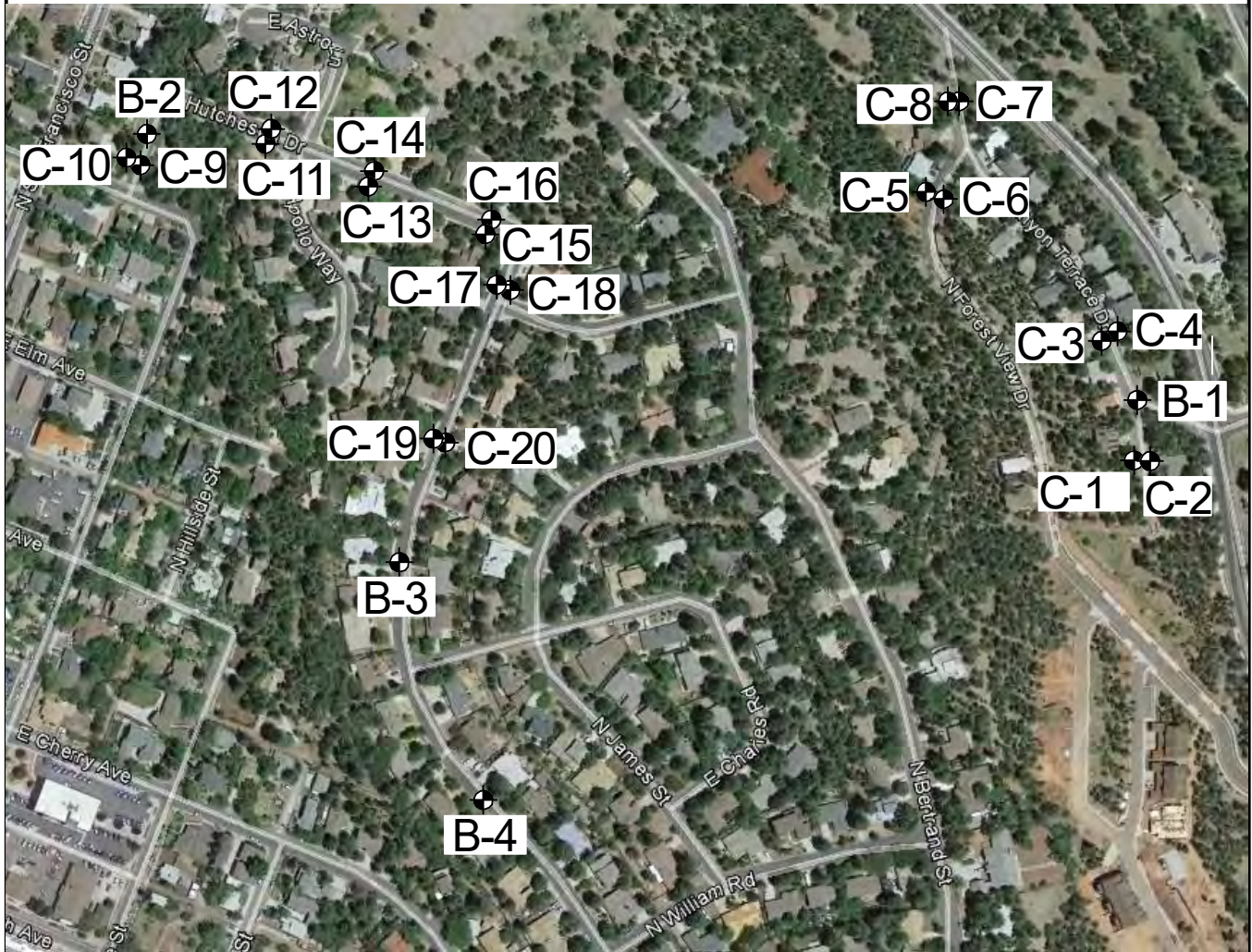
PHOTOGRAPHS OF SITE CONDITIONS

FIELD AND LABORATORY INVESTIGATION

On October 23rd and 25th, 2018, 4 pavement soil borings were excavated and 20 cores were taken at the approximate locations shown on the attached Soil Boring Location Plan. All exploration work was carried out under the full-time supervision of our staff engineer, who recorded subsurface conditions and obtained samples for laboratory testing. The borings were excavated with a CME-75 drill rig utilizing 7.5-inch diameter hollow stem augers. Detailed information regarding the soil borings and samples obtained can be found on an individual Log of Test Boring prepared for each location.

Pavement coring was conducted at 8 locations along N. Canyon Terrace Drive, 8 locations along E. Hutcheson Drive, and 4 locations along E. David Drive. Coring took place on opposing edges of the roadway, offset approximately 5.5 feet off of the curb of the road, utilizing a 4.0 inch core barrel and coring machine. Photos of the asphalt cores recovered are provided in this appendix.

Laboratory testing consisted of grain-size distribution and plasticity (Atterberg Limits) tests for classification and pavement design parameters. All field and laboratory data are presented in this appendix.



- APPROXIMATE SOIL BORING LOCATIONS

Drawing Courtesy of Google Maps

City of Flagstaff Road Improvements
East David Dr, East Hucheson Dr,
North Canyon Terrace Dr
Flagstaff, Arizona

**SPEEDIE
AND ASSOCIATES**
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
2026 N. Third Street FLAGSTAFF, ARIZONA 86004

DR:GJC

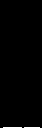
CHK:CWS

REV:

DATE: 11-8-18

PROJECT NO. 181932SF

SOIL LEGEND

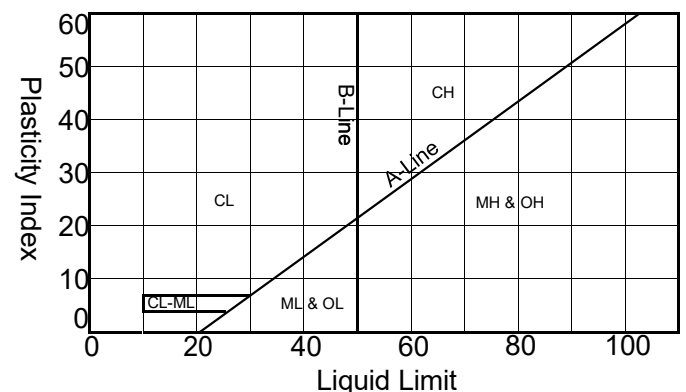
SAMPLE DESIGNATION		DESCRIPTION	
	AS	Auger Sample	A grab sample taken directly from auger flights.
	BS	Large Bulk Sample	A grab sample taken from auger spoils or from bucket of backhoe.
	S	Spoon Sample	Standard Penetration Test (ASTM D-1586) Driving a 2.0 inch outside diameter split spoon sampler into undisturbed soil for three successive 6-inch increments by means of a 140 lb. weight free falling through a distance of 30 inches. The cumulative number of blows for the final 12 inches of penetration is the Standard Penetration Resistance.
	RS	Ring Sample	Driving a 3.0 inch outside diameter spoon equipped with a series of 2.42-inch inside diameter, 1-inch long brass rings, into undisturbed soil for one 12-inch increment by the same means of the Spoon Sample. The blows required for the 12 inches of penetration are recorded.
	LS	Liner Sample	Standard Penetration Test driving a 2.0-inch outside diameter split spoon equipped with two 3-inch long, 3/8-inch inside diameter brass liners, separated by a 1-inch long spacer, into undisturbed soil by the same means of the Spoon Sample.
	ST	Shelby Tube	A 3.0-inch outside diameter thin-walled tube continuously pushed into the undisturbed soil by a rapid motion, without impact or twisting (ASTM D-1587).
	--	Continuous Penetration Resistance	Driving a 2.0-inch outside diameter "Bullnose Penetrometer" continuously into undisturbed soil by the same means of the spoon sample. The blows for each successive 12-inch increment are recorded.

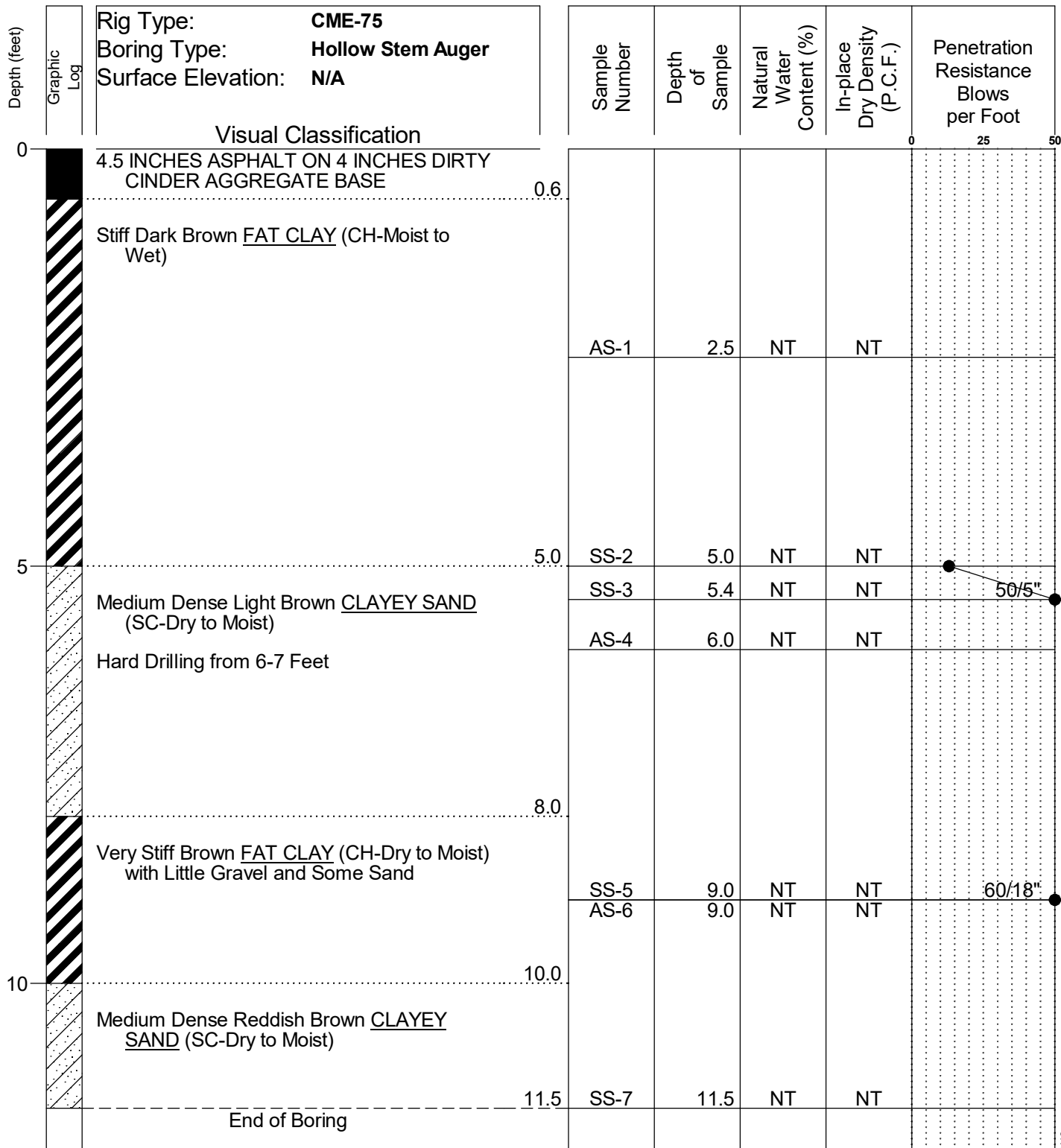
CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot	Strength (tons/sq ft)	Sands & Gravels	Blows/Foot
Very Soft	0 - 2	0 - 0.25	Very Loose	0 - 4
Soft	2 - 4	0.25 - 0.5	Loose	5 - 10
Firm	5 - 8	0.5 - 1.0	Medium Dense	11 - 30
Stiff	9 - 15	1 - 2	Dense	31 - 50
Very Stiff	16 - 30	2 - 4	Very Dense	> 50
Hard	> 30	> 4		

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
		CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
FINE GRAINED SOILS	SILTS AND CLAYS	CLEAN SANDS (LITTLE OR NO FINES)		SM	SAND - SILT MIXTURES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
		LIQUID LIMIT LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		LIQUID LIMIT GREATER THAN 50		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
HIGHLY ORGANIC SOILS	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
		LIQUID LIMIT GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY
		LIQUID LIMIT GREATER THAN 50		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS			PT	

NOTE: DUAL OR MODIFIED SYMBOLS MAY BE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS OR TO PROVIDE A BETTER GRAPHICAL PRESENTATION OF THE SOIL

MATERIAL SIZE	PARTICLE SIZE			
	Lower Limit		Upper Limit	
	mm	Sieve Size ♦	mm	Sieve Size ♦
SANDS				
Fine	0.075	#200	0.42	#40
Medium	0.420	#40	2.00	#10
Coarse	2.000	#10	4.75	#4
GRAVELS				
Fine	4.75	#4	19	0.75" x
Coarse	19	0.75" x	75	3" x
COBBLES	75	3" x	300	12" x
BOULDERS	300	12" x	900	36" x
♦U.S. Standard		xClear Square Openings		





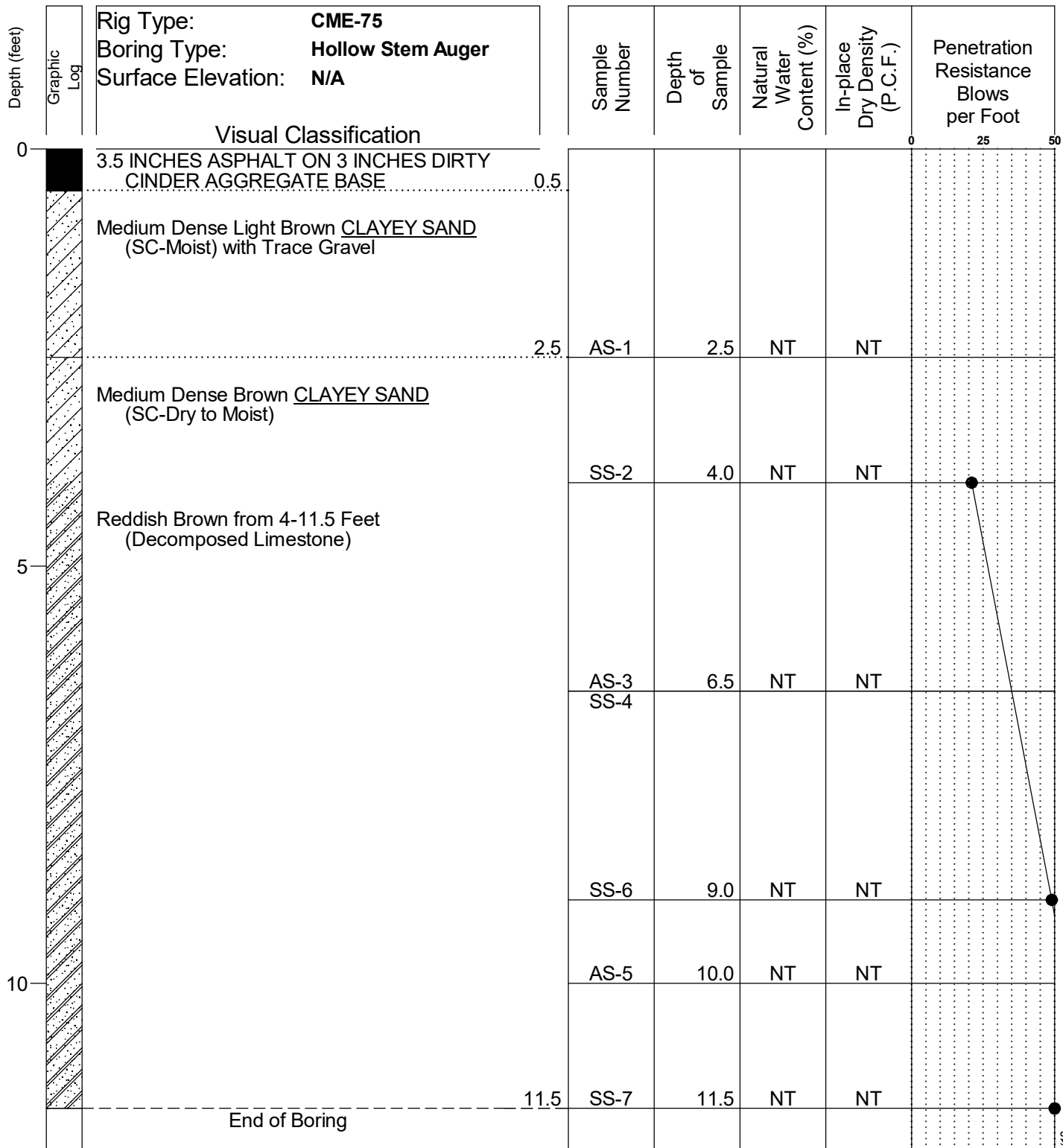
Boring Date: **10-23-18**
 Field Engineer/Technician: **G. Chott**
 Driller: **F. Esparza**
 Contractor: **Resilient Drilling**

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES	
Log of Test Boring Number: B-1	
City of Flagstaff Road Improvements North Canyon Terrace Drive Flagstaff, Arizona	
Project No.: 181932SF	

SPEEDIE 181932SF.GPJ GENGEODT 11/15/18



Boring Date: **10-23-18**
 Field Engineer/Technician: **G. Chott**
 Driller: **F. Esparza**
 Contractor: **Resilient Drilling**

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

**SPEEDIE
AND ASSOCIATES**

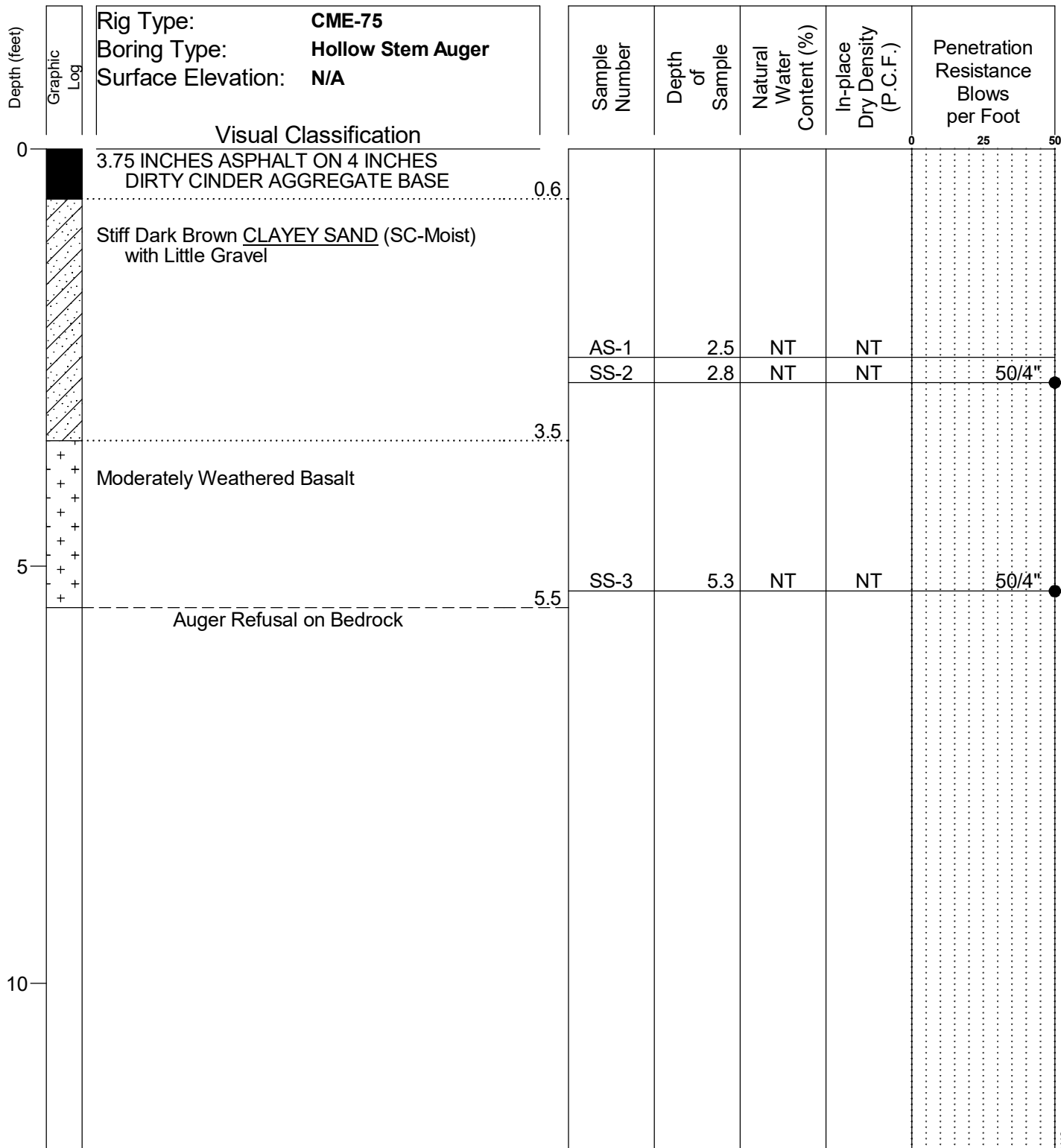
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City of Flagstaff Road Improvements

East Huteson Drive

Flagstaff, Arizona

Project No.: **181932SF**



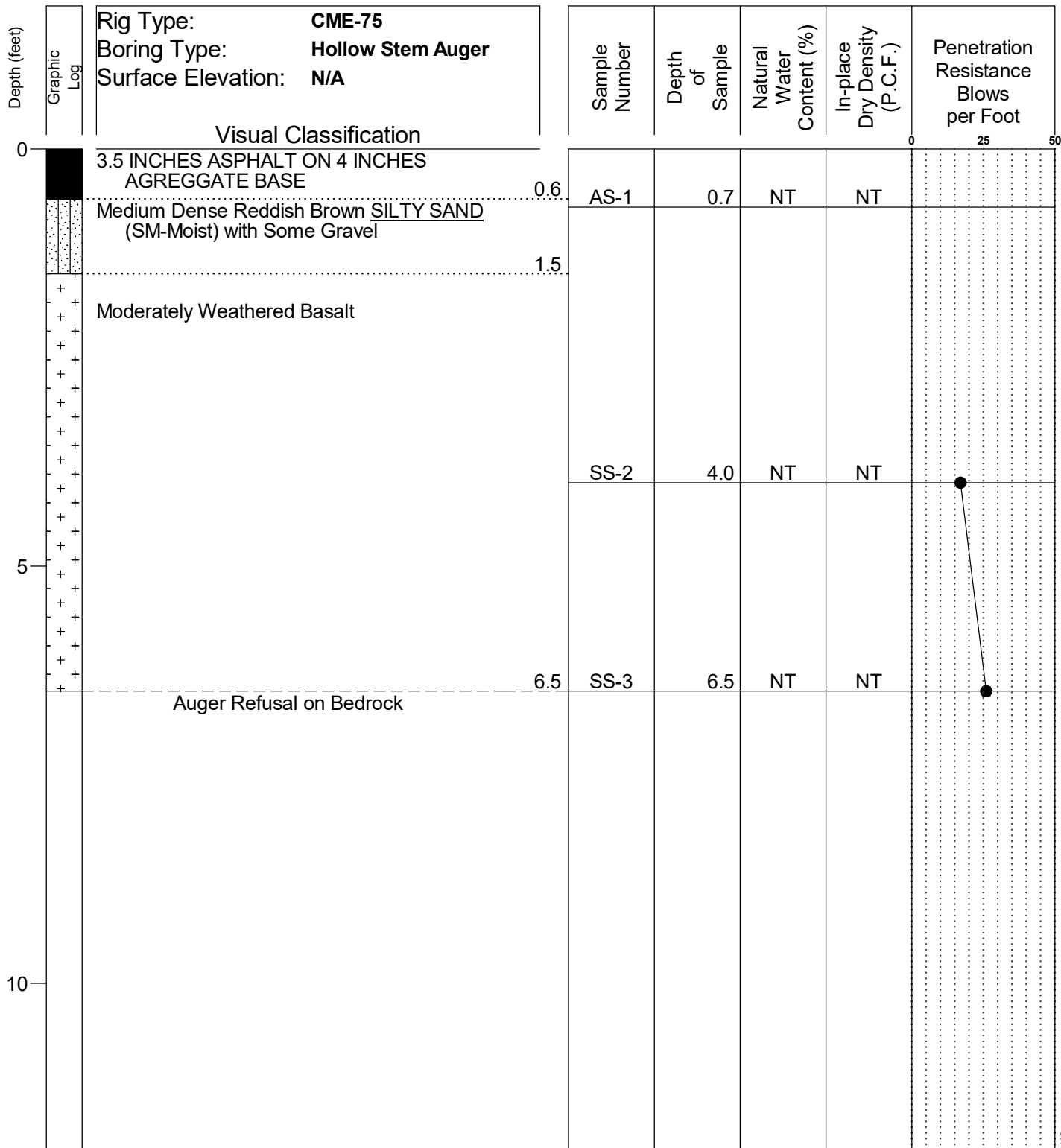
Boring Date: **10-23-18**
 Field Engineer/Technician: **G. Chott**
 Driller: **F. Esparza**
 Contractor: **Resilient Drilling**

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES	
Log of Test Boring Number: B-3	
City of Flagstaff Road Improvements East David Drive Flagstaff, Arizona	
Project No.:	181932SF

SPEEDIE 181932SF.GPJ GENGEODT 11/15/18



Boring Date: **10-23-18**
 Field Engineer/Technician: **G. Chott**
 Driller: **F. Esparza**
 Contractor: **Resilient Drilling**

Water Level		
Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES	
Log of Test Boring Number: B-4	
City of Flagstaff Road Improvements East David Drive Flagstaff, Arizona	
Project No.:	181932SF

SPEEDIE 181932SF.GPJ GENGEO.GDT 11/15/18

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B-1	AS-1	AUGER	0.8 - 2.5	NT	NT	78	90	97	99	100	64	23	41	CH	FAT CLAY with SAND
B-2	AS-1	AUGER	1.5 - 2.5	NT	NT	44	67	81	89	100	27	16	11	SC	CLAYEY SAND
B-3	AS-1	AUGER	0.8 - 2.5	NT	NT	22	37	61	81	100	27	17	10	SC	CLAYEY SAND with GRAVEL
B-4	AS-1	AUGER	0.4 - 0.7	NT	NT	14	32	50	67	100	NP	NP	NP	SM	SILTY SAND with GRAVEL

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

NT=Not Tested
Sheet 1 of 1

City of Flagstaff Road Improvements
E. David Drive, E. Hutcheson Drive, N. Canyon Terrace Drive
Flagstaff, Arizona
Project No. 181932SF

**SPEEDIE
AND ASSOCIATES**



Figure 1: Core Location C-1

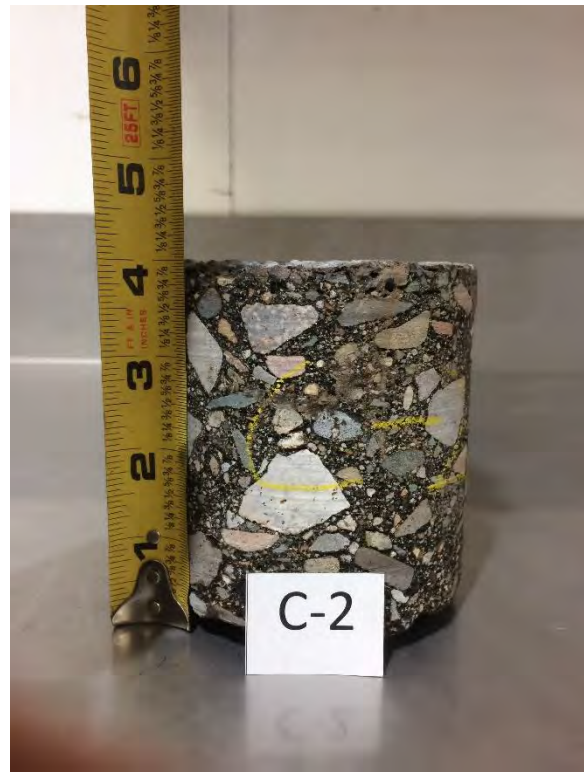


Figure 2: Core Location C-2

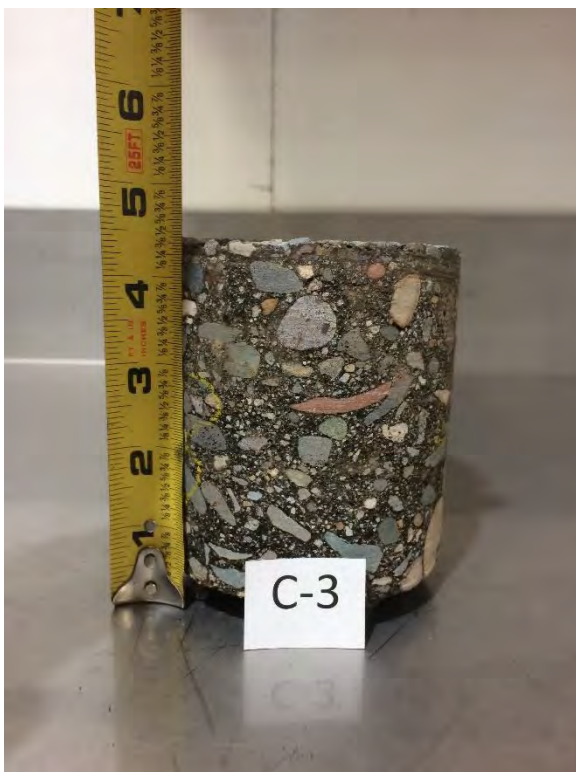


Figure 3: Core Location C-3



Figure 4: Core Location C-4

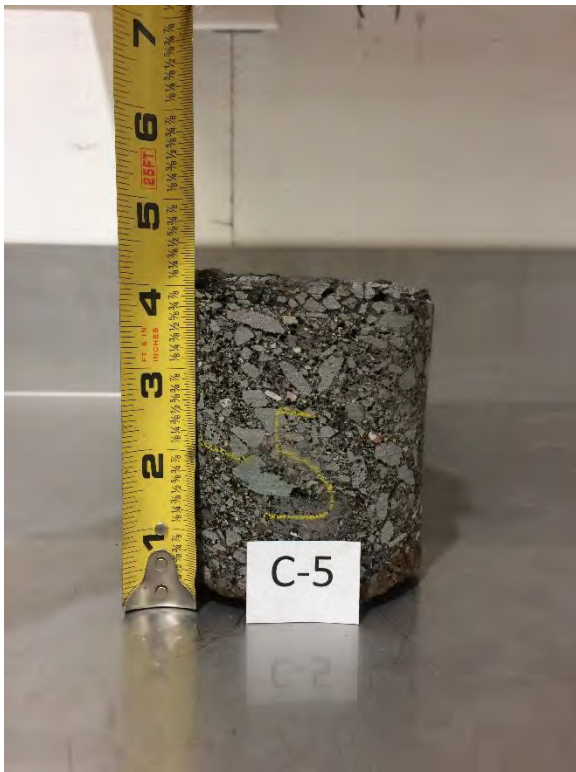


Figure 5: Core Location C-5

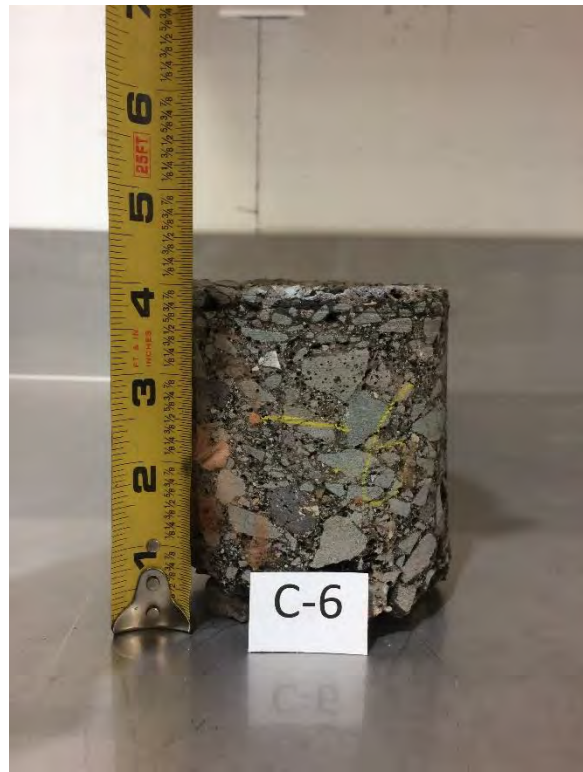


Figure 6: Core Location C-6

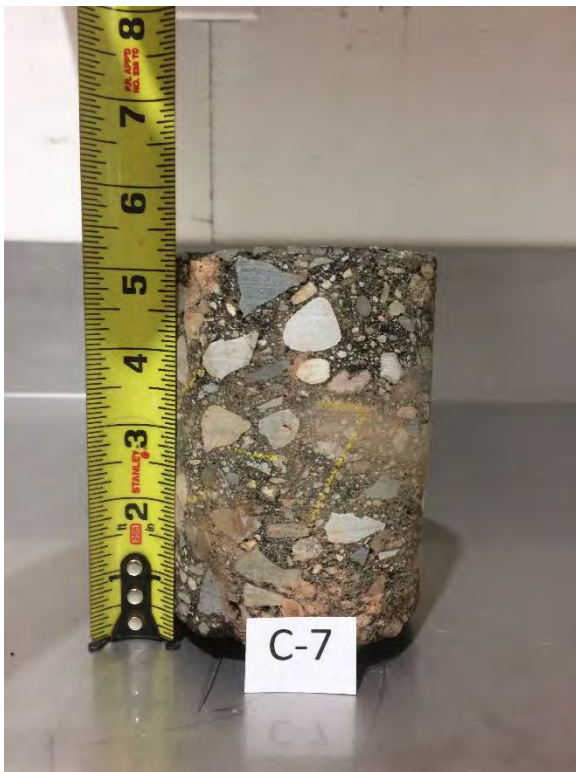


Figure 7: Core Location C-7

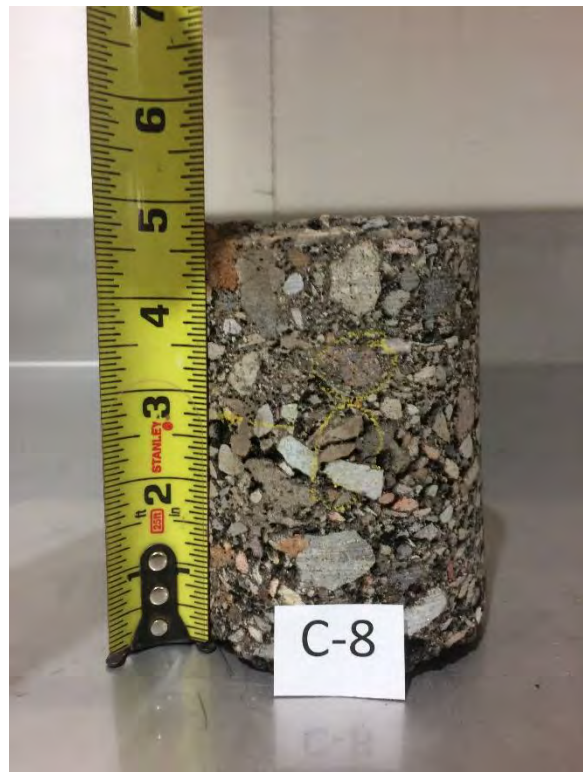


Figure 8: Core Location C-8

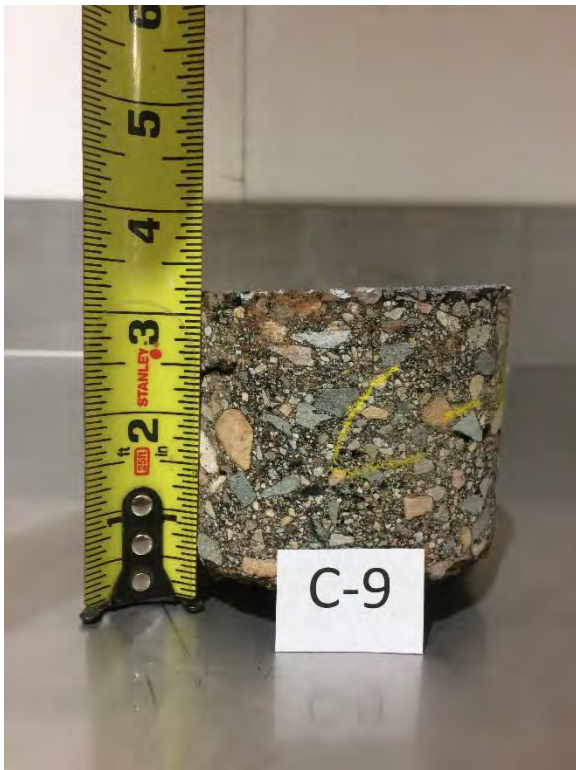


Figure 9: Core Location C-9

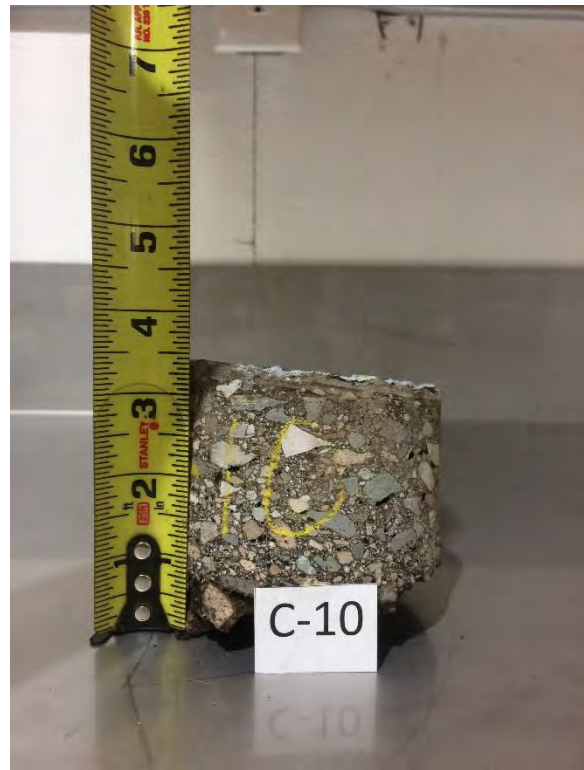


Figure 10: Core Location C-10

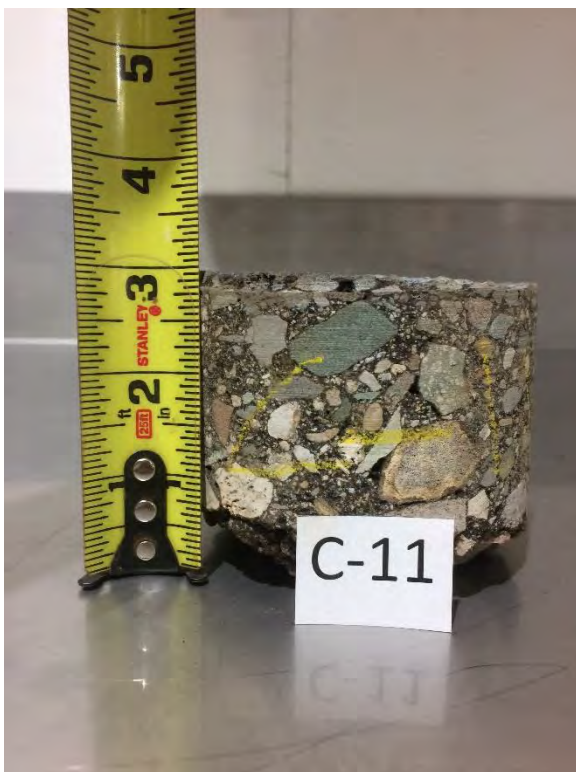


Figure 11: Core Location C-11

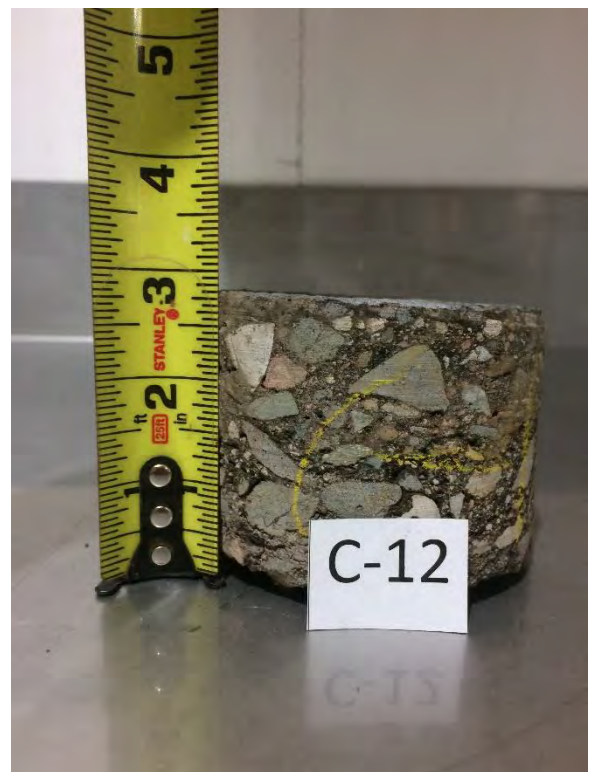


Figure 12: Core Location C-12

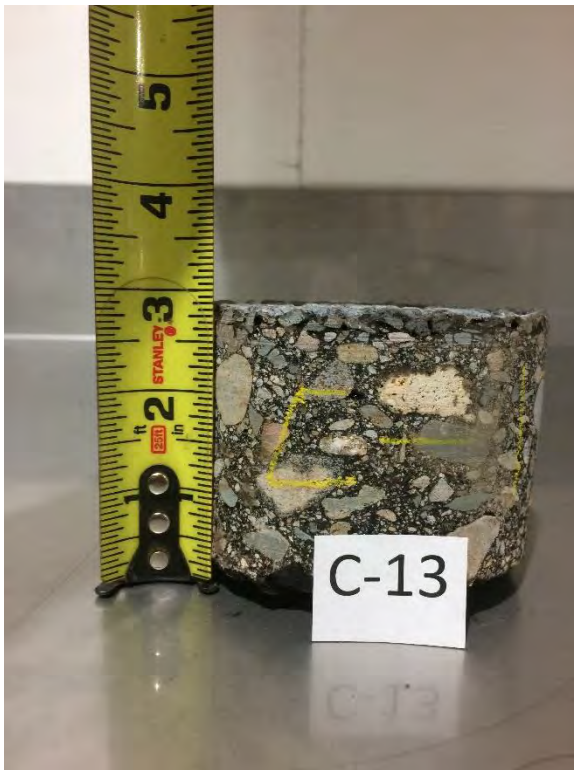


Figure 13: Core Location C-13



Figure 14: Core Location C-14



Figure 15: Core Location C-15



Figure 16: Core Location C-16



Figure 17: Core Location C-17



Figure 18: Core Location C-18



Figure 19: Core Location C-19

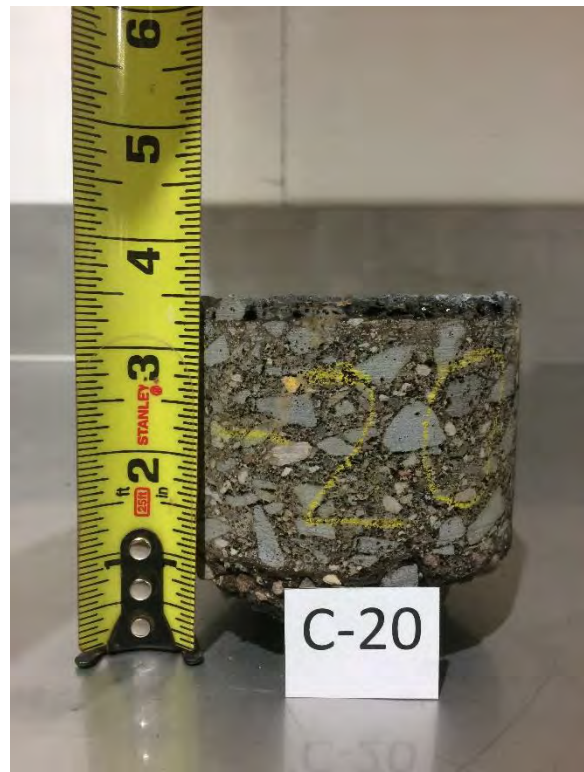


Figure 20: Core Location C-20



Photo No. 1: Alligator cracking, utility patching, and loss of asphalt wear surface on Canyon Terrace Drive



Photo No. 2: Advanced block cracking and utility patches on Canyon Terrace Drive



Photo No. 3: Advanced block cracking on Canyon Terrace Drive



Photo No. 4: Transverse cracking on Hutcheson Drive



Photo No. 1: Alligator cracking on Hutcheson Drive

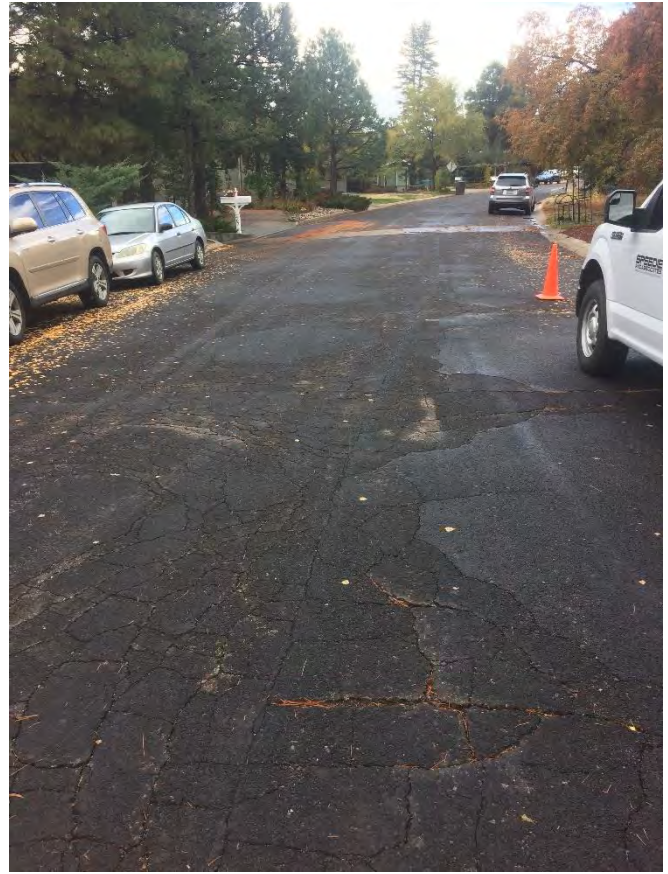


Photo No. 2: Typical existing condition on David Drive



Photo No. 3: Alligator cracking and trench failure on David Drive



Photo No. 4: Transverse crack and alligator cracking on David Drive

Appendix B

APS & Century Link Supplemental Utility Information

Date: July 22, 2019

To: Ryan Wiesner

Agency: APS

☐ Delivered to Office

☒ Submitted via e-mail

☐ Mailed

☒ Digital

☐ Hard Copy

☐ CD

Project Identification: COF West Flag Improvements

Project Number: 18COF03

Please review the PDF plans for the above captioned project. Paper copies of the plans are available upon request however we are trying to reduce our environmental footprint.

When you complete your review please check for the appropriate condition below, list any conditions, and affix your signature. Return this correspondence to us via mail or e-mail. If you have any questions please feel free to call or e-mail me.

We would appreciate a response by: **August 5, 2019**

Thank you for your attention to this project.

____ Issues to be addressed prior to approval:

☒ The project is approved with the following conditions:

Please See Attached

____ The project is approved as submitted:

Signature: _____

Ry Wiesner

7/23/19
Date

Printed name: _____

Ryan Wiesner

By: **PEAK ENGINEERING, INC.**

Caleb Lanting, P.E.

caleb@peakegr.com

(928) 774-4046

Attachments: 1 Plan Set, Dated: June 2019

Date: 7/23/2019



To: Peak Engineering, INC.

Regarding: COF West Flag Improvements

To whom it may concern,

Thank you for contacting us with your preliminary plans and drawings. We have reviewed your paper work and have found:

APS has existing facilities in this area. Remember to always bluestake prior to any digging. Please allow for adequate design time (1-16 weeks) from APS in the event that our facilities need to be relocated, removed, or we find we have to add to our system.

Please note that this response does not act as a Project Initiation Request. You will need to contact an APS Customer Project Manager directly when you are ready to initiate your project.

Thank you for your time and patience,



A handwritten signature in blue ink, appearing to read "Ryan Wiesner", is written over a light blue horizontal line.

Ryan Wiesner
Customer Project Manager,
Flagstaff Construction
2200 E. Huntington Dr. Flagstaff, AZ 86004
928-773-6447
Ryan.Wiesner@APS.com

* Our ESRM can be found at aps.com, by searching ESRM in the search bar.



CenturyLink™ Conflict Memorandum

Date: August 3, 2019

To: Caleb Lanting (Peak Engineering, Inc.)
caleb@peakegr.com

From: Kevin Wagner, Terra Technologies LLC

Subject: CenturyLink™ – Conflict Memo – Project No. 03-19001 & ST3346 – City of Flagstaff – West Flag Improvements – 90%

Terra Technologies is in receipt of the 90% plans. Below you will see an overview of CenturyLink™ facilities within the project limits, and a brief project overview along with comments regarding any CenturyLink™ facilities with respect to the proposed project.

Inventory of CenturyLink™ Facilities

CenturyLink™ has facilities within the project limits. Terra Technologies anticipates that due to the roadway improvements that the CenturyLink™ facilities (buried cables, aerial cable & pedestals) will be impacted. Plan markups have been attached showing approximate locations of CenturyLink™ facilities.

Project Overview

The design intent of this project appears to be a roadway improvement project.

Facility Locations and Impacts

CenturyLink™ underground facility mapping provided is based on NDS mapping and accuracy of vertical and horizontal location is only a representation of the exact field location. Any additional utility information gathered by CenturyLink™ will be promptly coordinated with the City of Flagstaff and/or its representative. Please notify Terra Technologies LLC and CenturyLink™ with additional utility locating information if acquired.

Based on CenturyLink™ mapping, street view imagery and the construction drawings the following conflicts and/or potential conflicts should be addressed as part of this construction project.



CenturyLink™ Conflict Memorandum

(Note: Stations and Offsets are approximate)(See attached plan mark-ups for additional clarification of conflict locations)

PROBABILITY OF CONFLICT (POC)

L = Low M = Medium H = High K = Known (100%)

No.	LINE	STATION	OFFSET	FACILITY	CONFLICT	POC	ACTION
1	David Dr	20+50	LT	Joint Utility Pole	Proposed Roadway Improvements	K	Design engineer to coordinate with CenturyLink on impact and mitigation of joint utility pole.
2	Hutcheson Dr	41+25 to 47+75	RT/LT	Buried Cable	Proposed Water Line, Water & Sewer Service Lines	M	Protect in place. Contractor to adjust water line, water and sewer service lines as necessary to avoid conflict, maintaining 12"vertical separation.
3	Canyon Terrace Dr	60+50 to 68+50	RT/LT	Buried Cable	Proposed Water Line, Water & Sewer Service Lines	M	Protect in place. Contractor to adjust water line, water and sewer service lines as necessary to avoid conflict, maintaining 12"vertical separation.



CenturyLink™ Conflict Memorandum

4	Canyon Terrace Dr	60+50 to 66+90	Crossing	Buried Cable	Proposed Sewer Line	L	Profiles indicate that proposed sewer line will be deep enough not to be in conflict. Protect and support in place.
---	-------------------	----------------	----------	--------------	---------------------	---	---

Please notify Terra Technologies LLC and CenturyLink™ when further milestone coordination or a Preconstruction Meeting will take place so a representative can be in attendance.

As previously noted, design appears to be at the 90% stage. Terra Technologies and CenturyLink™ request to review the updated plans for any conflicts prior to disbursement for advertising.

In accordance with state law, Blue Staking for location of CenturyLink™ facilities must be completed prior to any construction. When crossing CenturyLink™ facilities you will be required to pothole to determine depth and maintain a minimum of 12 inch vertical and horizontal separation from facilities.

Pursuant to state law, support and protection is required for all CenturyLink™ facilities during construction.

Should the Contractor locate or expose an unknown CenturyLink™ facility, please contact CenturyLink™ as soon as possible.

Acquisition of required public Rights-of-Way, and removal of encumbrances from those Rights-of-Way, is the responsibility of the municipality or their agent prior to CenturyLink™ excavation in, or relocation to, the newly acquired Rights-of-Way.

In the event CenturyLink™ facilities need to be removed or relocated, some or all cost may be at the expense of the sponsoring agency.

If you have any questions or concerns regarding this review feel free to contact me immediately, either by phone or email at the number/address provided below. The contractor is also responsible for contacting CenturyLink™ prior to construction around the CenturyLink™ facilities.



CenturyLink™ Conflict Memorandum

Notification List

Terra Technologies LLC Kevin Wagner, Project Manager kwagner@terratechllc.net 815-245-9640	Terra Technologies LLC Chad Dalton, EIT cdalton@terratechllc.net 520-891-1726
Terra Technologies LLC Jason Jensen, P.E. jjensen@terratechllc.net 801-735-2464	CenturyLink™(Engineer II) Manuel Hernandez Manuel.Hernandez4@centurylink.com 928-779-435
CenturyLink™ (MGR Network Impl.) Dell Howard dell.w.howard@centurylink.com 500 S Calvary Way Cottonwood, AZ 86326 Office: 928-649-9318	

CenturyLink Markups

Wire Center: FLGSAZMA

COF PROJECT NO. 03-19001 & ST3346

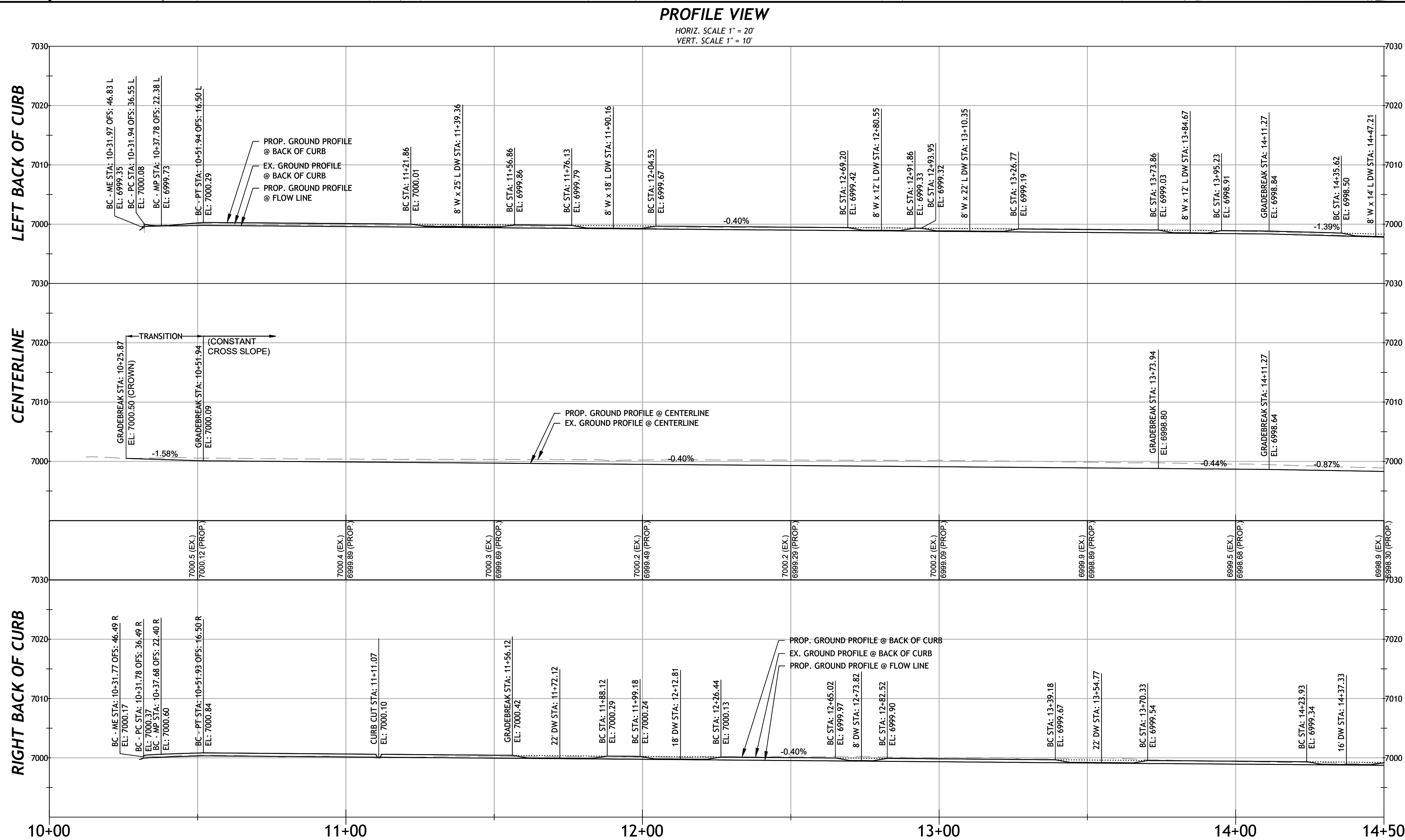
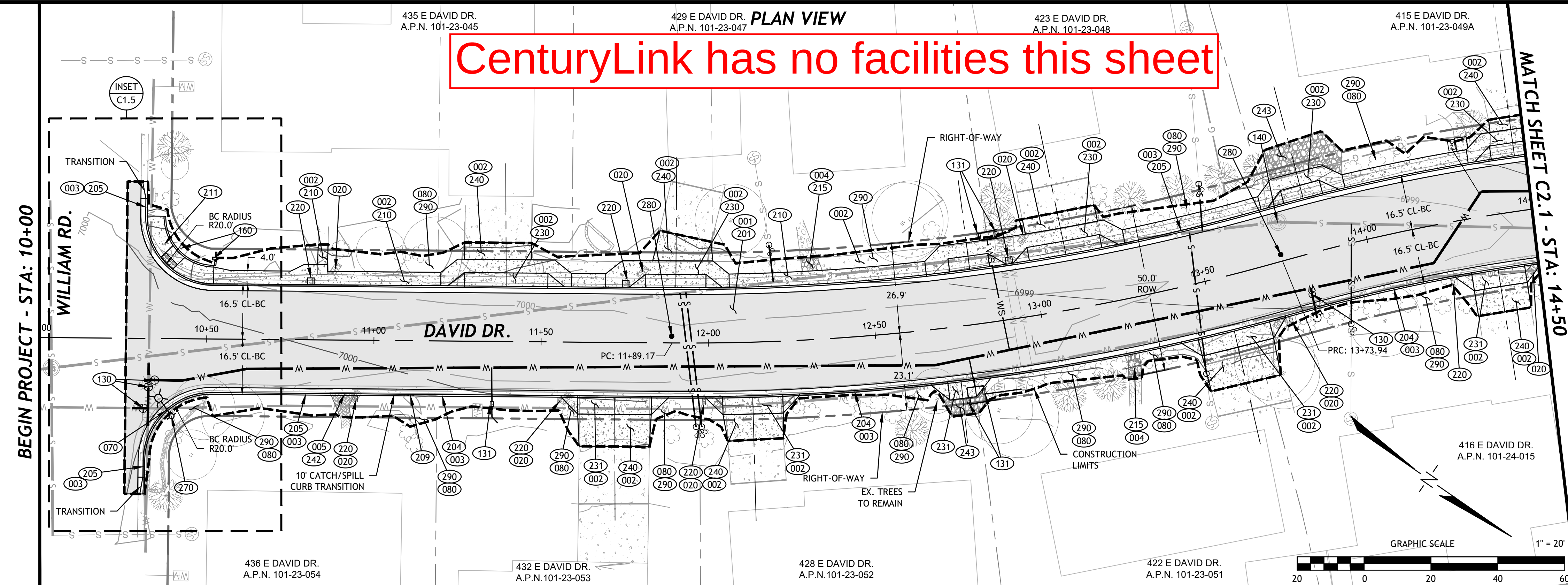


C1.0	COVER
C1.1	GENERAL NOTES & LEGEND
C1.2	SHEET INDEX
C1.3 - C1.4	DETAILS
C1.5 - C1.6	CURB RAMP AND VALLEY GUTTER DETAILS
C1.7	STORM DRAIN DETAILS
C1.8	QUANTITY SUMMARY
C2.0 - C2.3	DAVID DR. - ROADWAY PLAN & PROFILE
C3.0 - C3.2	HUTCHESON DR. - ROADWAY PLAN & PROFILE
C4.0 - C4.2	CANYON TERRACE DR. - ROADWAY PLAN & PROFILE
UT1.0	UTILITY COVER & GENERAL NOTES
UT1.1	UTILITY INDEX MAP
UT1.2 - UT1.5	UTILITY DETAILS
UT1.6	UTILITY QUANTITY SUMMARY & LEGEND
WL2.0 - WL2.3	DAVID DR. - WATER PLAN & PROFILE
WL3.0 - WL3.3	HUTCHESON DR. - WATER PLAN & PROFILE
SL3.0 - SL3.2	HUTCHESON DR. - SEWER PLAN & PROFILE
WL4.0 - WL4.3	CANYON TERRACE DR. - WATER PLAN & PROFILE
SL4.0 - SL4.2	CANYON TERRACE DR. - SEWER PLAN & PROFILE
EC5.0 - EC5.3	EROSION CONTROL PLANS
C6.0 - C6.1	CONTROL

Peak Engineering, Inc.
110 N. Agassiz ST.
Flagstaff, AZ 86001
Contact: Thomas E. Smith, P.E.
Phone: (928) 774-4046

UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND WERE COMPILED FROM FIELD MEASUREMENTS, CONSTRUCTION PLANS, RECORD PLANS, OR UTILITY MAPS FURNISHED BY OTHERS. THE CONTRACTOR IS ULTIMATELY RESPONSIBLE FOR DETERMINING THE ACTUAL LOCATIONS OF ALL UNDERGROUND LINES THAT MAY AFFECT THE WORK PRIOR TO CONSTRUCTION. SEE SHEET C1.1 FOR A LIST OF KNOWN UTILITY CROSSINGS.

[illegible]



REMOVALS (000)

001 1,530 SY
Sawcut, remove & dispose asphaltic concrete pavement at the limits shown.

002 2,735 SF
Remove & dispose Portland cement concrete to the joint nearest the limits shown.

003 880 LF
Remove & dispose concrete curb & gutter (vertical or rolled) to the nearest joint.

004 1 EA
Remove & dispose flagstone walkway.

005 35 SF
Remove, salvage & store driveway/walkway pavers. Contractor is responsible for storing pavers during construction.

020 8 EA
Remove & dispose mailbox and post.

070 1 EA
Remove & salvage street light pole, mast arm, and luminaire. Coordinate salvage location with the City's Project Manager & power disconnect with APS.

080 1 LS
Clear & grub within the construction limits, includes miscellaneous rocks. Includes trimming trees and shrubs that overhang sidewalk to 8-ft vertical (vertical). Contractor shall limit disturbed landscaping to the greatest extent possible.

RELOCATIONS & ADJUSTMENTS (100)

130 4 EA
Adjust valve box & cover to finished grade per COF Engineering Det. 9-03-060 and 9-03-062.

131 NPI (Included with water service installation)
Adjust water meter box to finished grade per COF Engineering Det. 9-03-070.

140 1 EA
Adjust manhole frame & cover to finished grade per COF Engineering Det. 9-03-062.

160 1 EA
Remove & relocate street sign on new 2" post per ADOT Standard Dwg. S-1, Sheet C1.3.

ROADWAY CONSTRUCTION (200)

201 1,419 SY
3" AC / 6" ABC pavement section per Detail A, Sheet C1.3, match-up at existing roadways per Detail F, Sheet C1.3.

204 432 LF
Type A vertical curb & gutter (spill) on 3" ABC per MAG Standard Det. 220, Detail E, Sheet C1.3.

205 448 LF
Type A vertical curb & gutter (standard) on 3" ABC per MAG Standard Det. 220 and the special provisions. Includes transition to spill curb as required.

209 1 EA
Curb cut per Detail I, Sheet C1.3.

210 956 SF
4" PCC / 3" ABC sidewalk per MAG Standard Det. 230 and the special provisions.

211 1 EA
20-ft Curb Ramp per MAG standard Det. 236-5 (25' - 35' R - Radial Parallel Curb Ramp) and Sheet C1.5 & C1.6, modified for a 20-ft radius and per the special provisions. Cast iron detectable warning per COF Engineering Det. 10-10-043.

215 48 SF
Flagstone walkway. Match existing type and size of stones and grout.

220 8 EA
Mailbox per Detail D, Sheet C1.3.

230 1,290 SF
6" PCC / 3" ABC, 6-ft and 8-ft, residential driveway per Detail C, Sheet C1.3.

231 555 SF
6" PCC / 3" ABC, 5-ft, residential driveway per MAG Standard Det. 250-1, wings modified as shown.

240 1,065 SF
6" PCC / 3" ABC driveway matchup.

242 30 SY
Paver driveway/walkway matchup per COF Engineering Det. 16-01-241. Reinstall salvaged pavers.

243 30 SY
ABC Driveway Matchup, 4" thick minimum.

270 1 EA
Street light pole, mast arm, & luminaire per APS Construction Standard Drawing 1944 and 8040. Luminaire: Narrow Band Amber LED - 1500 lumens, Type 1 distribution, coordinate luminaire with the City of Flagstaff. Set pole minimum 2-ft behind sidewalk or curb. Includes relocation & reattachment of ex. sign as required.

280 1 EA
Survey monument, Type B, per COF Engineering Det. 3-02-070 and the special provisions.

290 1 LS
Restore landscaping per the special provisions.

[illegible]



140 1 EA
Adjust manhole frame & cover to finished grade per COF Engineering Det. 9-03-062.

160 1 EA
Remove & relocate street sign on new 2" post per ADOT Standard Dwg. 5-1, Sheet C1.3.

ROADWAY CONSTRUCTION (200)

201 1,672 SY
3" AC / 6" ABC pavement section per Detail A, Sheet C1.3, match-up at existing roadways per Detail F, Sheet C1.3.

204 74 LF
Type A vertical curb & gutter (spill) on 3" ABC per MAG Standard Det. 220, Detail E, Sheet C1.3.

205 897 LF
Type A vertical curb & gutter (standard) on 3" ABC per MAG Standard Det. 220 and the special provisions. Includes transition to spill curb as required.

210 1,720 SF
4" PCC / 3" ABC sidewalk per MAG Standard Det. 230 and the special provisions.

213 1 EA
Curb Ramp (Parallel) per MAG standard Det. 238-3 and Sheet C1.5, as modified by the special provisions. Cast iron detectable warning per COF Engineering Det. 10-10-043.

215 4 SF
Flagstone walkway. Match existing type and size of stones and grout.

216 1 EA
20-ft Curb Ramp per MAG standard Det. 236-5 (25' - 35' R - Radial Parallel Curb Ramp) and Sheet C1.5, modified for a 20-ft radius, added integral curb, and per the special provisions. Cast iron detectable warning per COF Engineering Det. 10-10-043.

220 6 EA
Mailbox per Detail D, Sheet C1.3.

230 2,194 SF
6" PCC / 3" ABC, 6-ft and 8-ft, residential driveway per Detail C, Sheet C1.3.

231 370 SF
6" PCC / 3" ABC, 5-ft, residential driveway per MAG Standard Det. 250-1, wings modified as shown.

240 1,832 SF
6" PCC / 3" ABC driveway matchup.

242 50 SY
Paver driveway/walkway matchup per COF Engineering Det. 16-01-241. Reinstall salvaged pavers.

243 20 SY
ABC Driveway Matchup, 4" thick minimum.

250 583 SF
8-ft valley gutter on 8" ABC per COF Engineering Det. 8-06-010 & 10-10-038.

255 326 SF
10.9-ft valley gutter on 8" ABC per COF Engineering Det. 8-06-010 & 10-10-038 modified for 10.9-ft width with wings as shown.

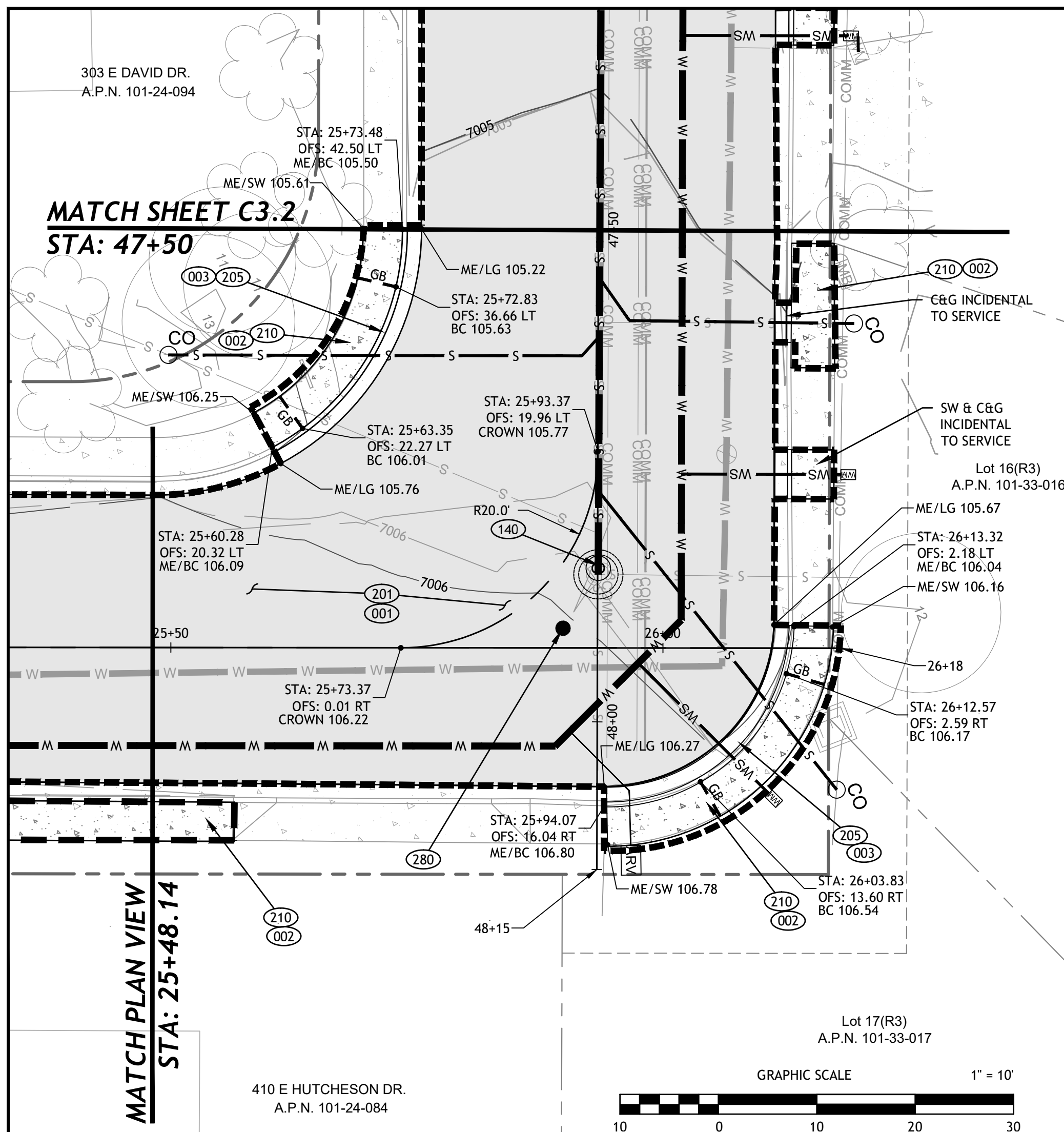
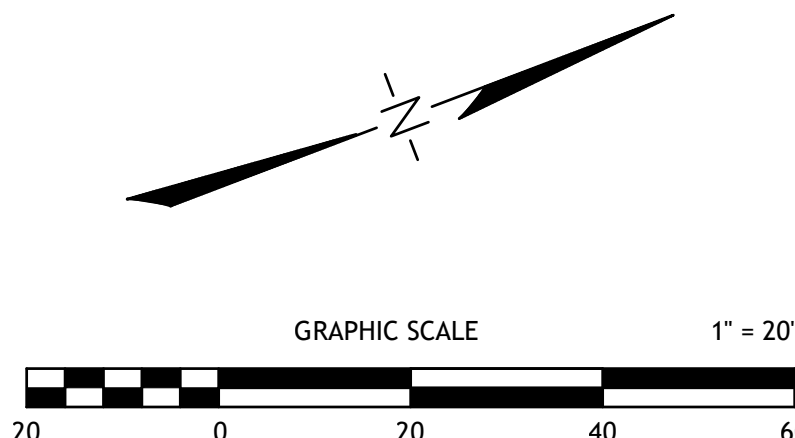
270 1 EA
Street light pole, mast arm, & luminaire per APS Construction Standard Drawings 1944 and 8040. Luminaire: Narrow Band Amber LED - 1500 lumens, Type 1 distribution, coordinate luminaire with the City of Flagstaff. Set pole minimum 2-ft behind sidewalk or curb. Includes relocation & reattachment of ex. sign as required.

280 1 EA
Survey monument, Type B, per COF Engineering Det. 3-02-070 and the special provisions.

290 1 LS
Restore landscaping per the special provisions.

COF PROJECT NO. 03-1900

[illegible]



OTHER
801 NPI Protect gas line.



COF PROJECT NO. 03-19001



214 2 EA
15-ft Curb Ramp per MAG standard Det. 236-5 (25' - 35' R - Radial Parallel Curb Ramp) and Sheet C1.5 & C1.6, modified for a 15-ft radius and per the special provisions. Cast iron detectable warning per COF Engineering Det. 10-10-043.

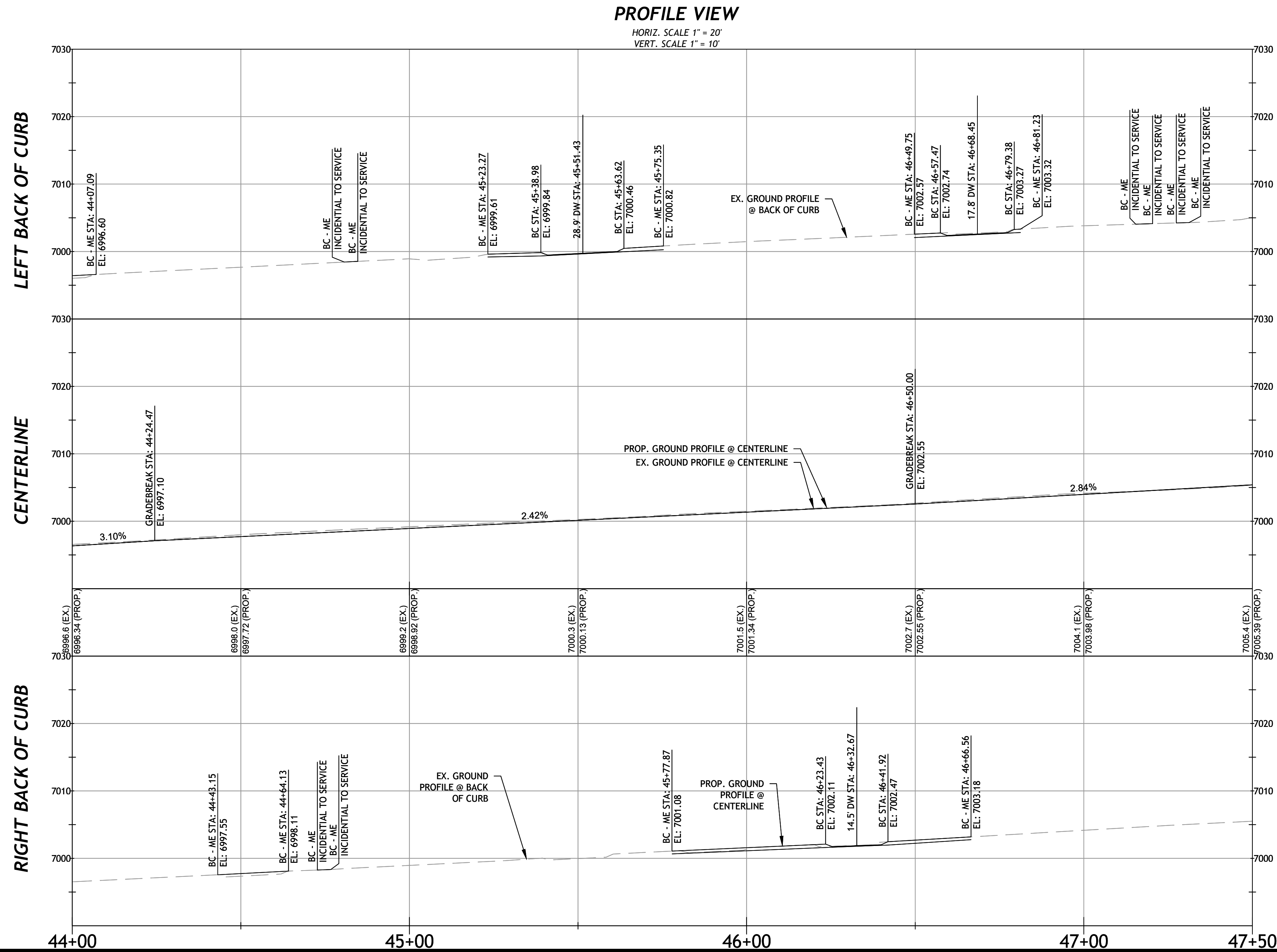
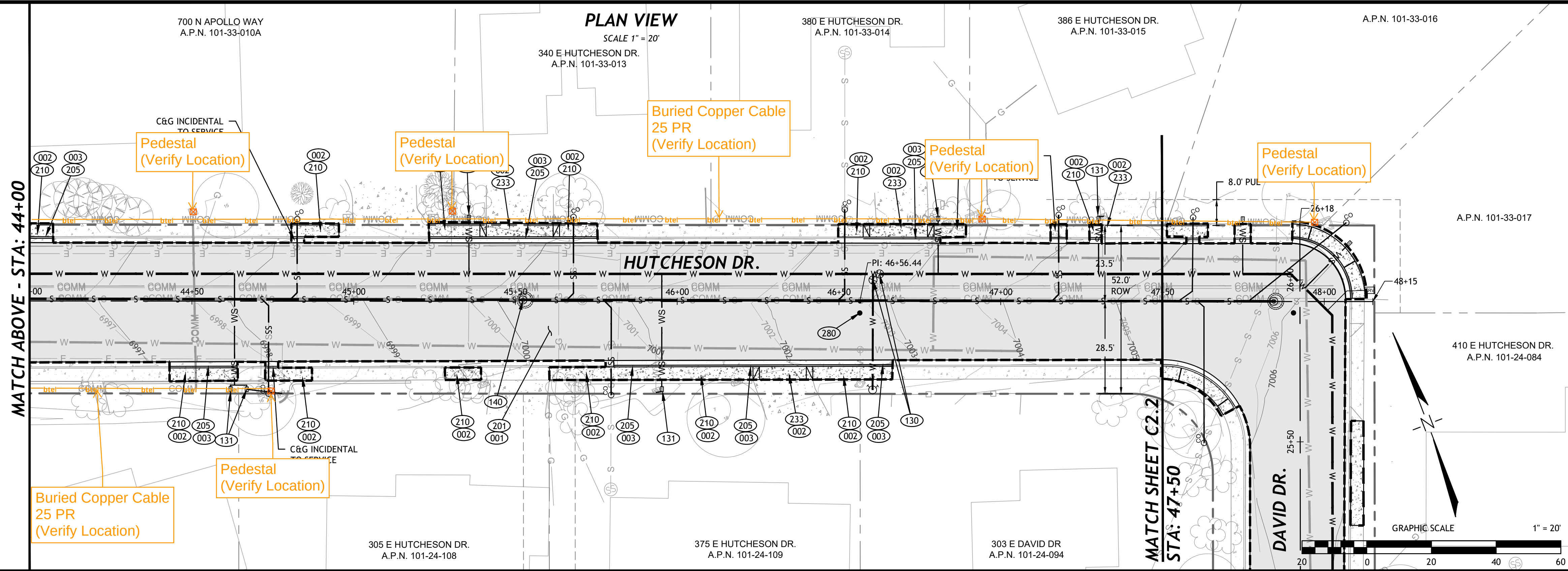
250 1,477 SF
8-ft valley gutter on 8" ABC per COF Engineering Det. 8-06-010 & 10-10-038.

260 1 EA
Scupper per MAG Standard Det. 203.

280 1 EA
Survey monument, Type B, per COF Engineering Det. 3-02-070 and the special provisions.

290 1 LS
Restore landscaping per the special provisions.

110 N. Agassiz St.
Flagstaff, AZ 86001
(928) 774-4046
Web: www.peakegr.com



COF PROJECT NO. 03-19001

ARIZONA811
Call 811 or click Arizona811.com

Contact Arizona 811 at least two full working days before you begin excavation

**110 N. Agassiz St.
Flagstaff, AZ 86001
(928) 774-4046
Web: www.peakengr.com**

Peak ENGINEERING, INC.
Connecting Place to People

**CITY OF FLAGSTAFF
WEST FLAG IMPROVEMENTS
HUTCHESON DR. - ROADWAY PLAN & PROFILE
STA: 44+50 - 47+50**

FINAL 1

C3.2

JOB NO: 18COF03 BY: DCW DATE: JUN 2019
SCALE: 1"=20'

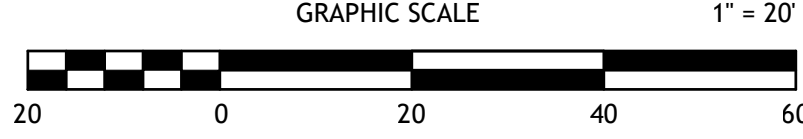
CVD: TES/CAL

THOMAS E. SMITH
Professional Engineer (Civil)
43777
PE License No. 18032



602 1 EA
End of road barricade, Type A, per MAG Standard Det. 130, modified as follows:
includes installation of Dead End sign (MUTCD: W14-1, 30"x30")

FINAL 1	C4.0	JOB NO:18COF03	BY: DCW	CK'D: TES/CAL
		SCALE: 1"=20'		



REMOVALS (000)
001 1,230 SY
Sawcut, remove & dispose asphaltic concrete pavement at the limits shown.

002 55 SF
Remove & dispose Portland cement concrete to the joint nearest the limits shown.

003 46 LF
Remove & dispose concrete curb & gutter (vertical or rolled) to the nearest joint.

RELOCATIONS & ADJUSTMENTS (100)
130 2 EA
Adjust valve box & cover to finished grade per COF Engineering Det. 9-03-060 and 9-03-062.

131 NPI (Included with water service installation)
Adjust water meter box to finished grade per COF Engineering Det. 9-03-070.

140 2 EA
Adjust manhole frame & cover to finished grade per COF Engineering Det. 9-03-062.

ROADWAY CONSTRUCTION (200)
201 1,230 SY
3" AC / 6" ABC pavement section per Detail A, Sheet C1.3, match-up at existing roadways per Detail F, Sheet C1.3.

207 46 LF
Roll curb, match existing curb configuration. Includes 5-ft transitions as required.

240 55 SF
6" PCC / 3" ABC driveway matchup.

281 1 LS
Set new right-of-way centerline monuments the full length of Canyon Terrace
All monuments shall be Type B, per COF Engineering Det. 3-02-070 and the special provisions.

[illegible]

110 N. Agassiz St.
Flagstaff, AZ 86001
(928) 774-4046
Web: www.peakegr.com



CITY OF FLAGSTAFF

WEST FLAG IMPROVEMENTS

CANYON TERRACE DR. - ROADWAY PLAN & PROFILE

STA: 6+4=50 - 68+50

FINAL 1

C4.1

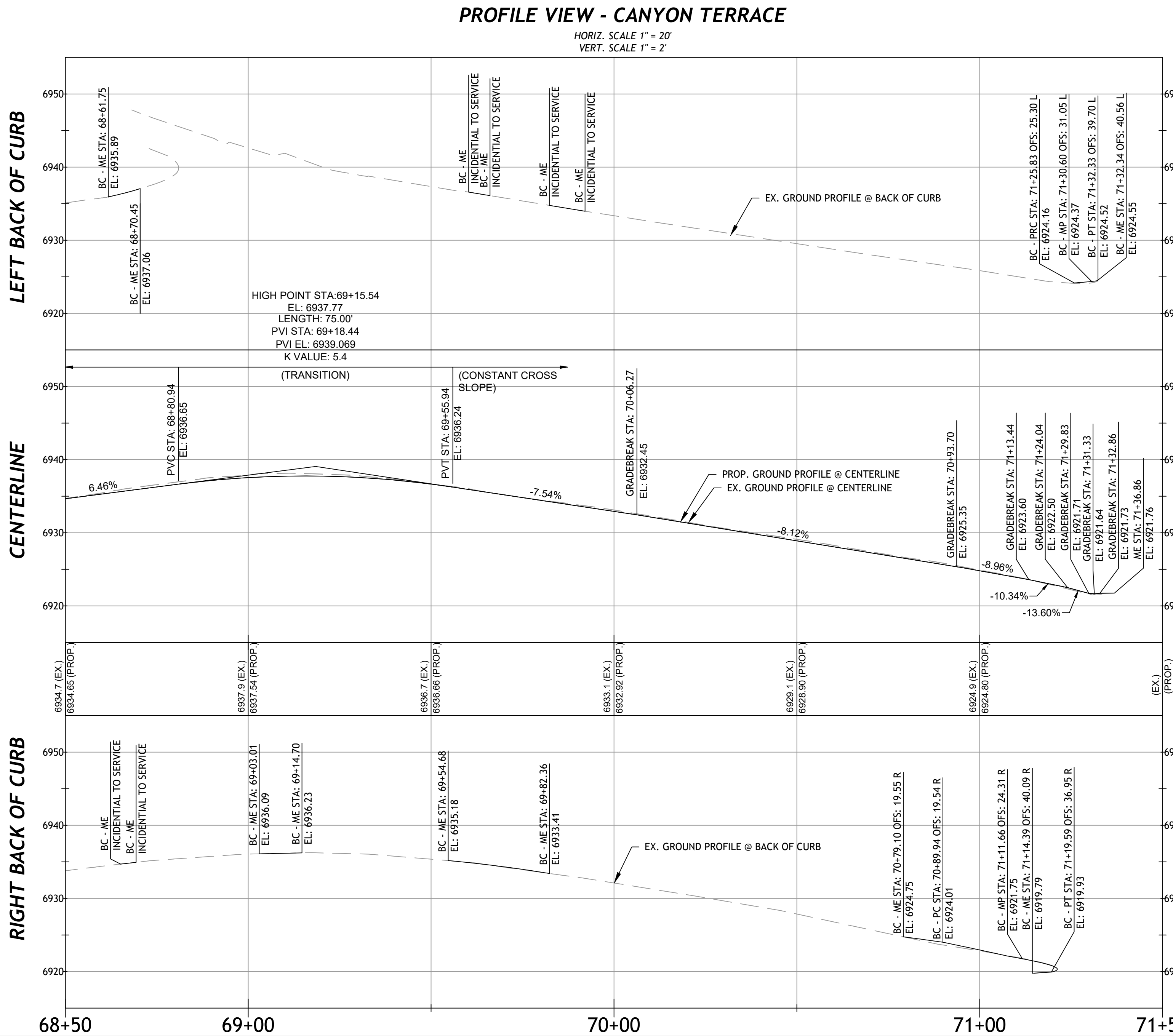
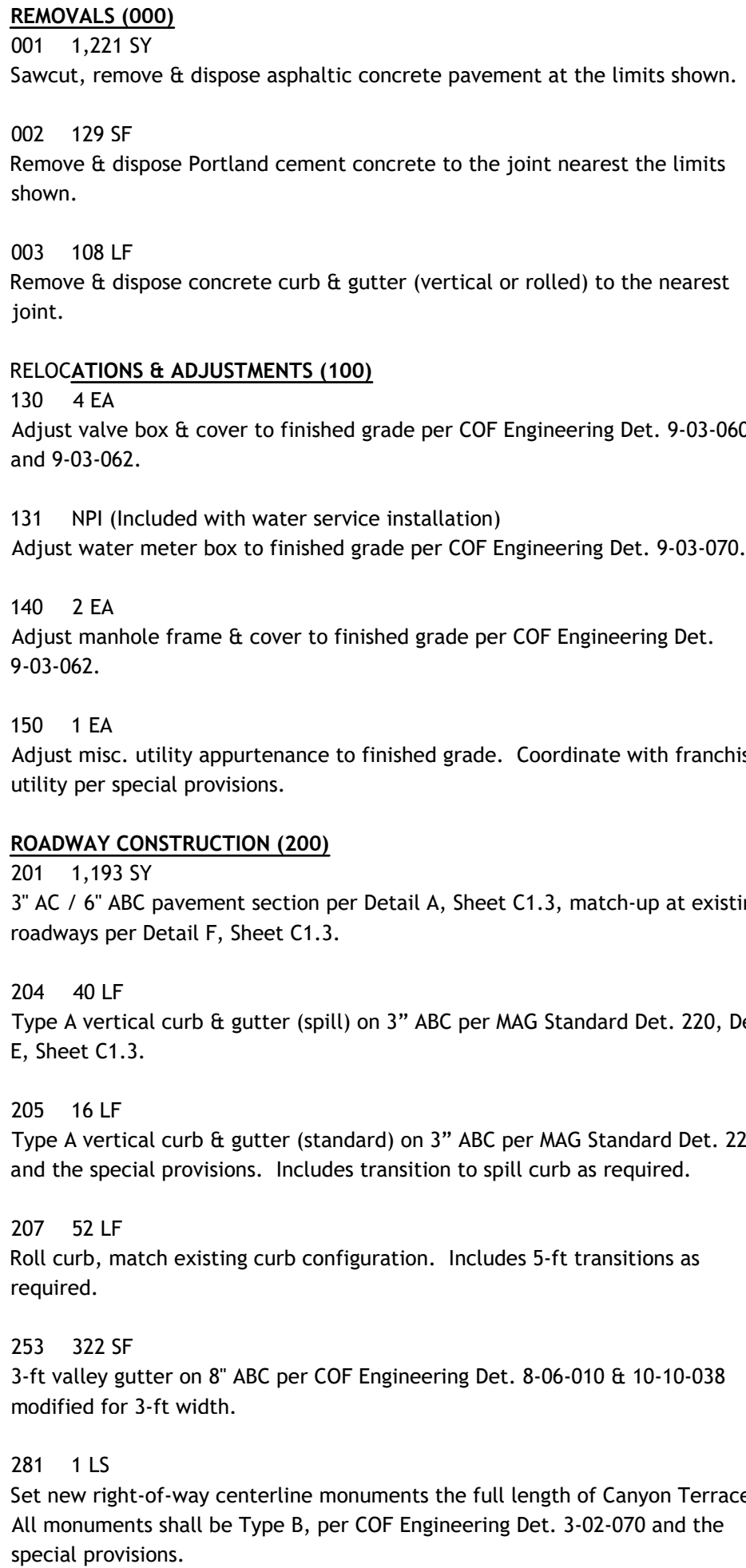
JOB NO: 18CF03

BY: DCW

CKD: TES/CAL

SCALE: 1"=20'

DATE: JUN 2019



CITY OF FLAGSTAFF WEST FLAG IMPROVEMENTS CANYON TERRACE DR. - ROADWAY PLAN & PROFILE STA: 68+50 - 71+50 & STA: 90+00 - 91+65		JOB NO: 18COP03 BY: DCW CK'D: TES/CAL	
SCALE: 1"=20'		DATE: JUN 2019	
C4.2		DATE: JUN 2019	

FINAL 1

C4.2

CITY OF FLAGSTAFF
WEST FLAG IMPROVEMENTS
 CANYON TERRACE DR. - ROADWAY PLAN & PROFILE
 STA: 68+50 - 71+50 & STA: 90+00 - 91+65

JOB NO: 18COP03 BY: DCW CK'D: TES/CAL

SCALE: 1"=20'

DATE: JUN 2019

C4.2

DATE: JUN 2019

FINAL 1

C4.2

CITY OF FLAGSTAFF
WEST FLAG IMPROVEMENTS
 CANYON TERRACE DR. - ROADWAY PLAN & PROFILE
 STA: 68+50 - 71+50 & STA: 90+00 - 91+65

JOB NO: 18COP03 BY: DCW CK'D: TES/CAL

SCALE: 1"=20'

DATE: JUN 2019

C4.2

DATE: JUN 2019

FINAL 1

C4.2

CITY OF FLAGSTAFF
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JOB NO: 18COP03 BY: DCW CK'D: TES/CAL

SCALE: 1"=20'

DATE: JUN 2019

C4.2

DATE: JUN 2019

FINAL

Contact Arizona 811 at least two full working days before you begin excavation

ARIZONA811
THE SAFE DIGGING WAY

Call 811 or click Arizona811.com

COF PROJECT NO. 03-19001 & ST3346

UT1.0	UTILITY COVER & GENERAL NOTES
UT1.1	UTILITY INDEX MAP
UT1.2-UT1.5	UTILITY DETAILS
UT1.6	UTILITY QUANTITY SUMMARY & LEGEND
WL2.0-WL2.3	DAVID DR. - WATER PLAN & PROFILE
WL3.0-WL3.3	HUTCHESON DR. - WATER PLAN & PROFILE
SL3.0-SL3.2	HUTCHESON DR. - SEWER PLAN & PROFILE
WL4.0-WL4.3	CANYON TERRACE DR. - WATER PLAN & PROFILE
SL4.0-SL4.2	CANYON TERRACE DR. - SEWER PLAN & PROFILE

VICINITY MAP
N.T.S.

The new water and sewer mains are in FEMA Zone X, areas determined to be outside the 0.2% annual chance flood. No scour or special flood considerations are necessary.

[illegible]

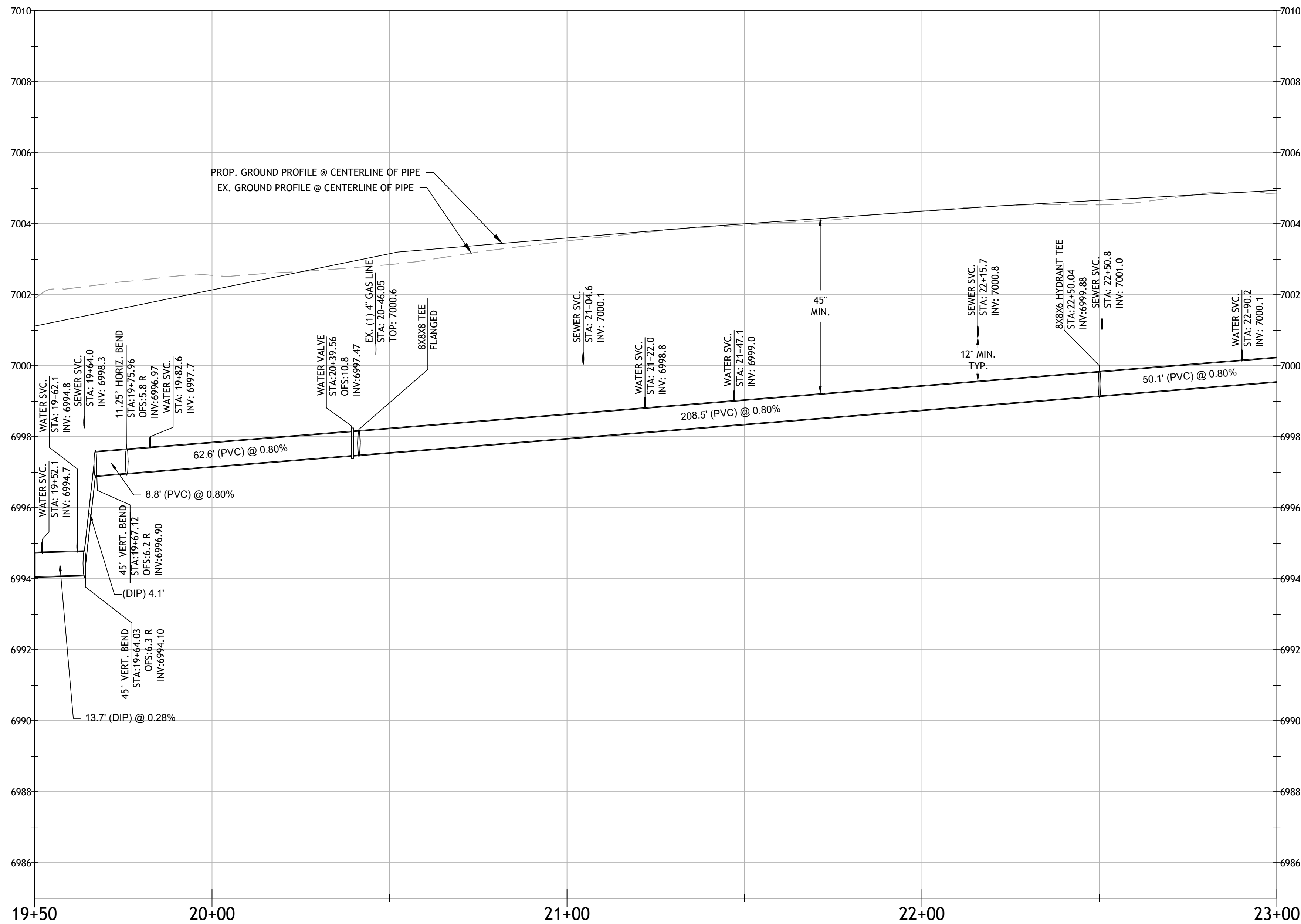
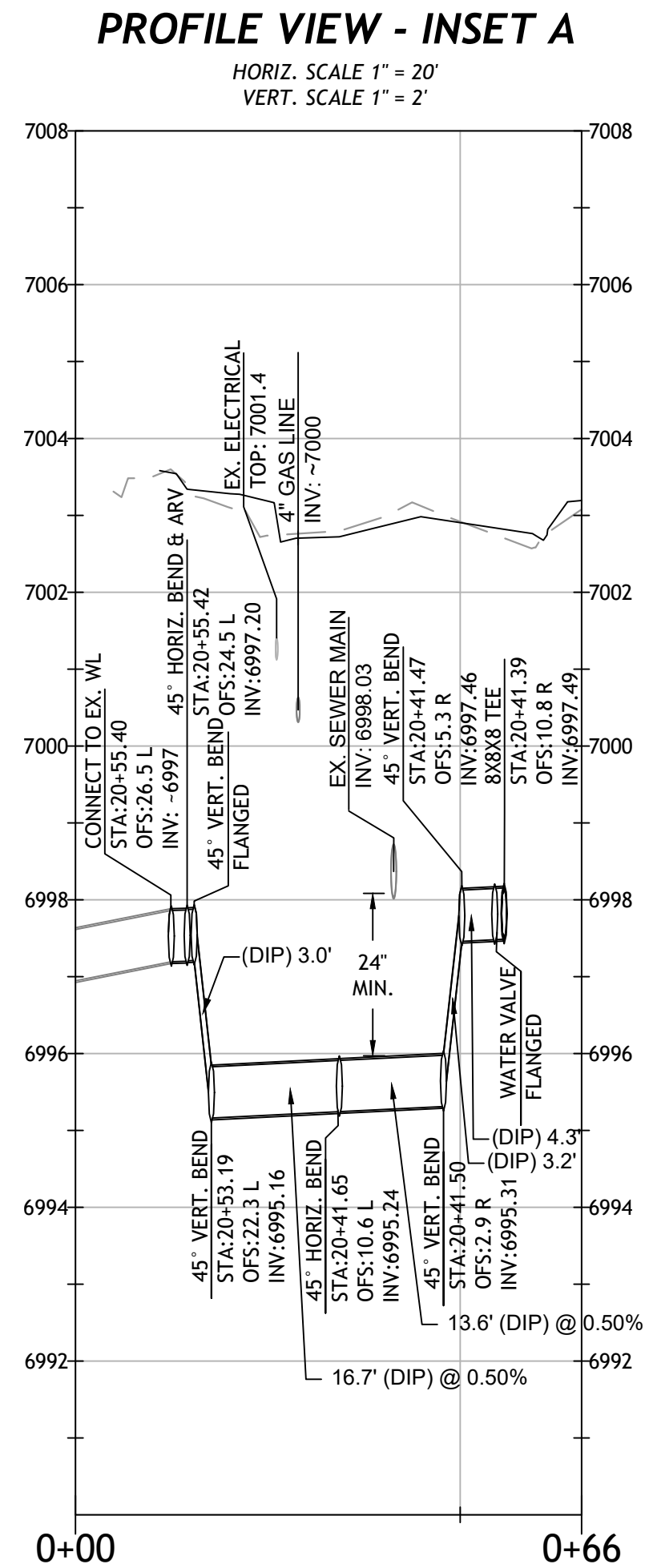
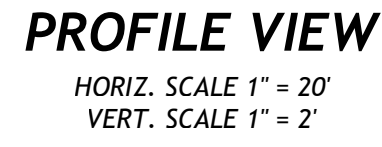
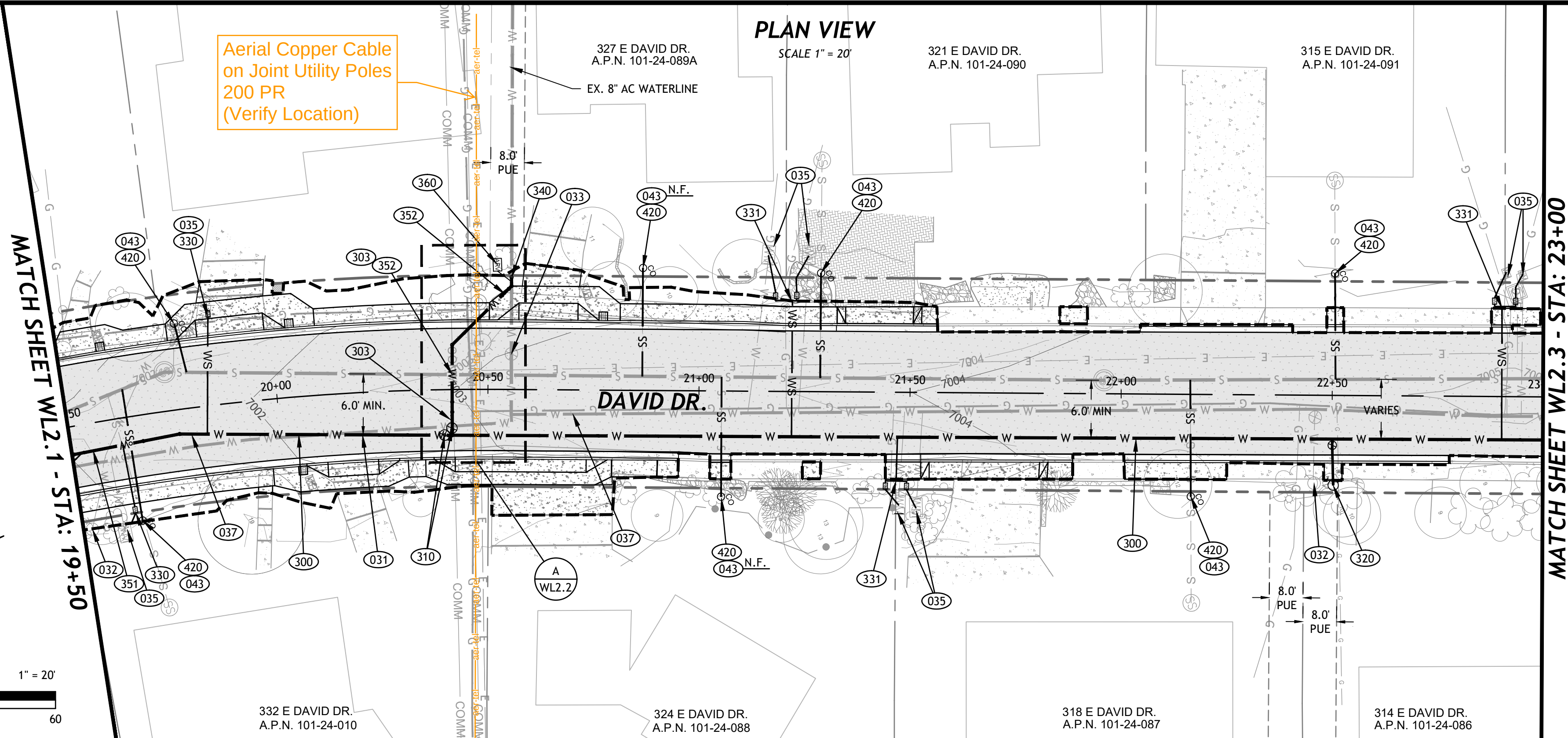
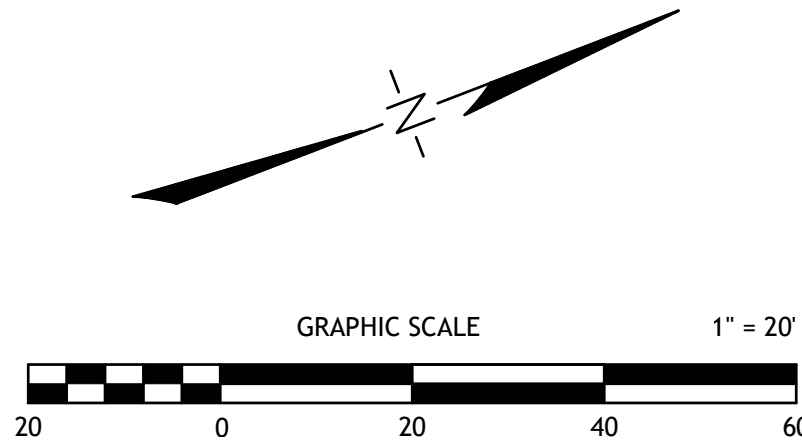
Peak
ENGINEERING, INC.
Connecting Place to People



CITY OF FLAGSTAFF WEST FLAG IMPROVEMENTS UTILITY COVER & GENERAL NOTES	JOB NO:18COP03	BY:DCW	CK'D:TES/CAL
	UT1.0		#
	SCALE: N/A	DATE: JUN 2019	

CONSTRUCTION DOCUMENTS PREPARED IN ACCORDANCE WITH 2019
REVISION TO THE 2015 EDITION OF THE MARICOPA ASSOCIATION OF
GOVERNMENTS (MAG) STANDARD SPECIFICATIONS AND DETAILS,
AND THE CITY OF FLAGSTAFF REVISIONS TO MAG UNIFORM
STANDARD SPECIFICATIONS AND MAG UNIFORM STANDARD DETAILS.

COF PROJECT NO. 03-19001



ABBREVIATION

N.F. - meter box or sewer cleanout not found in the field, location assumed.
Investigate water service & box or sewer service & cleanout location prior to construction.

T.L. - traffic rated meter box lid.

[illegible]

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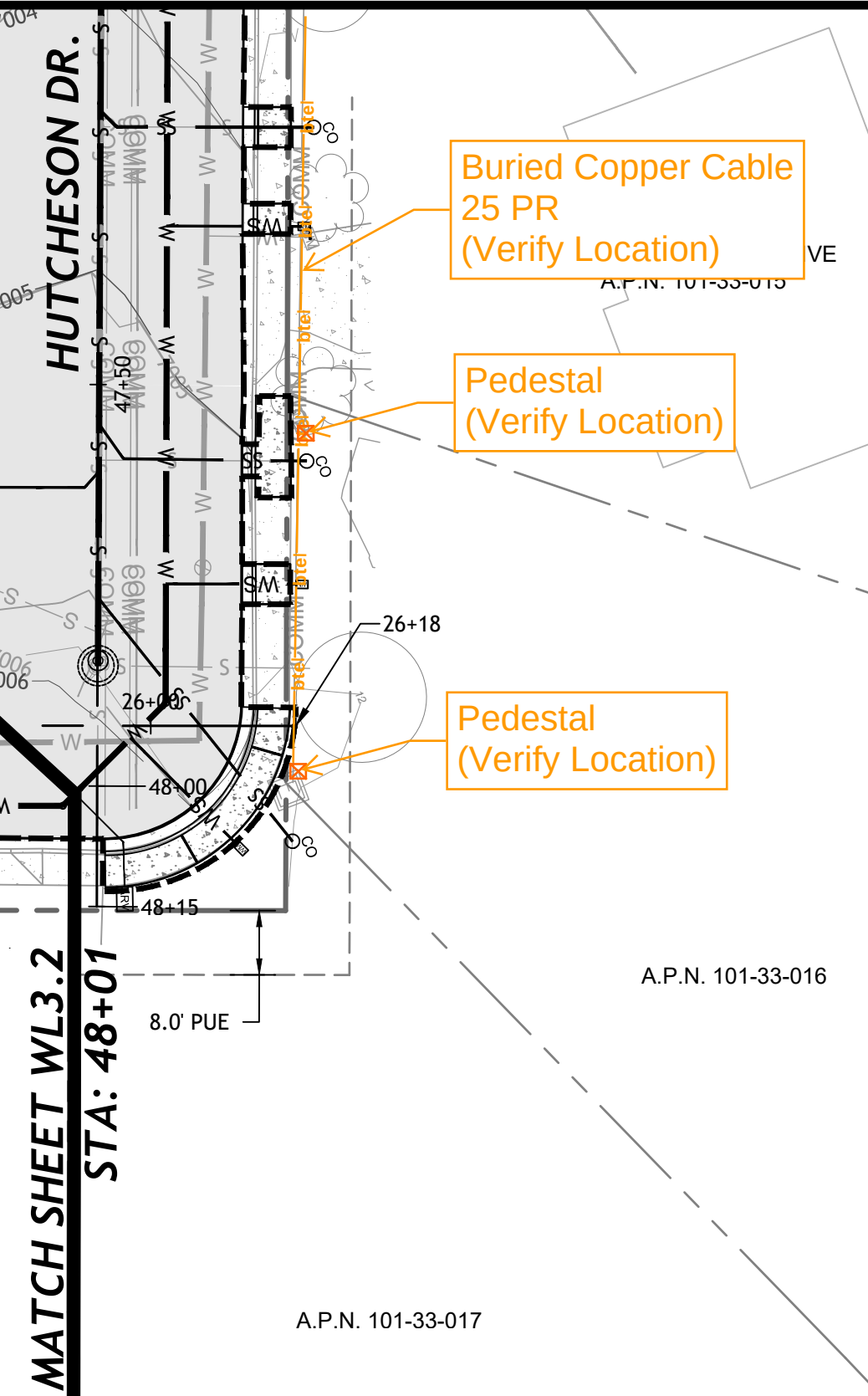
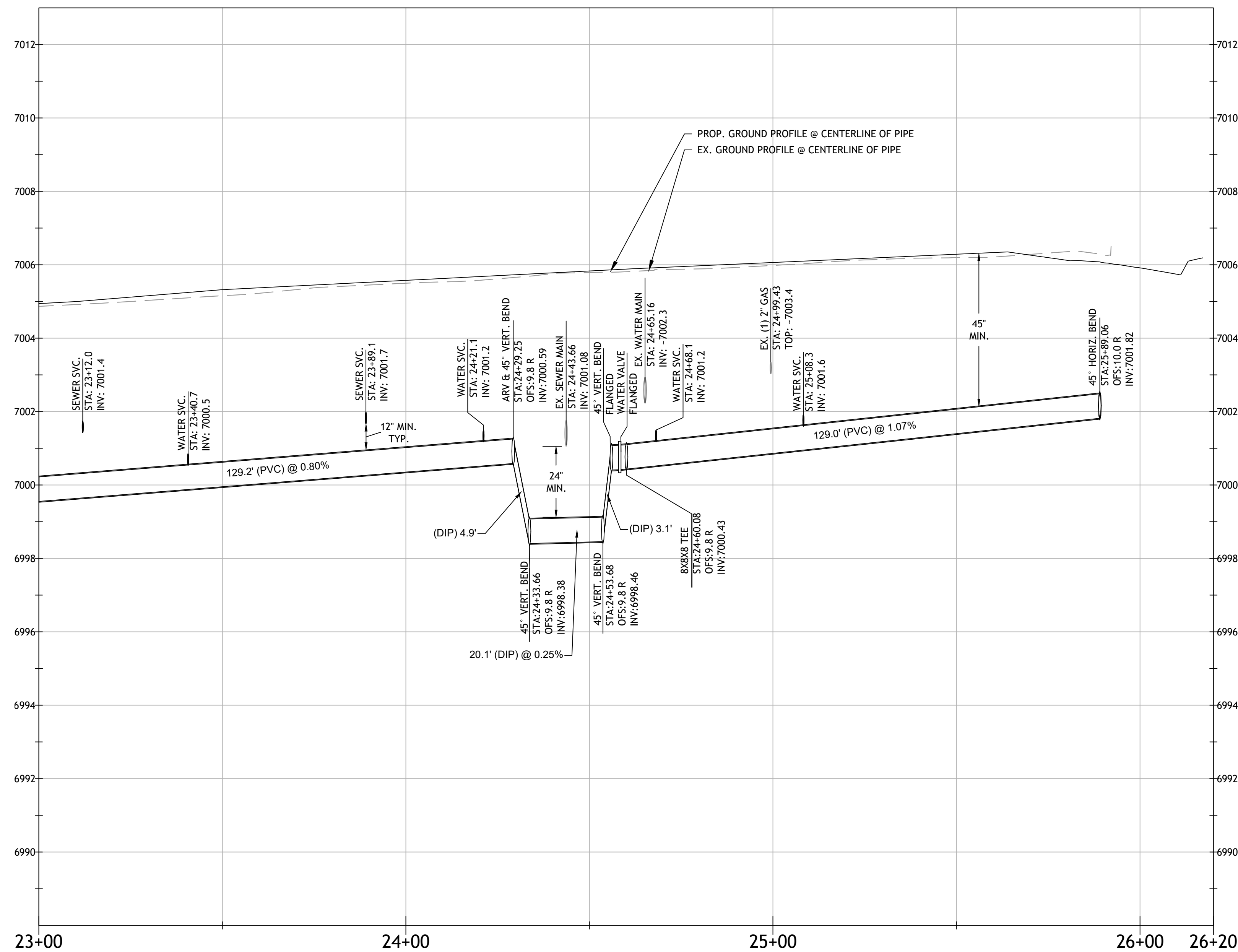
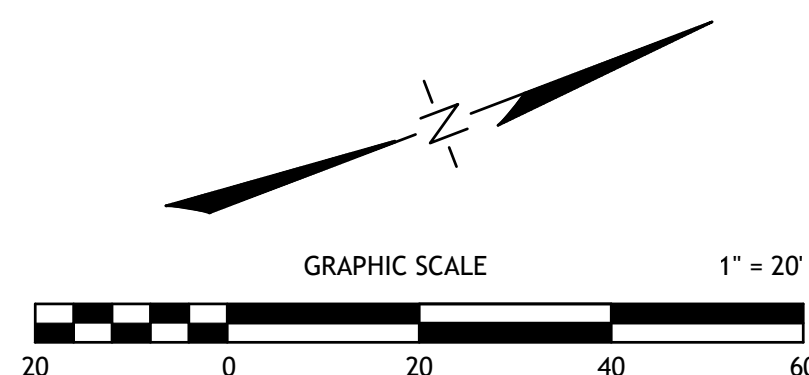
**CITY OF FLAGSTAFF
WEST FLAG IMPROVEMENTS
DAVID DR. - WATER PLAN & PROFILE
STA: 19+50 - 23+00**

WL2.2	JOB NO:18COF03	BY:DCW	CK'D: TES/CAL
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JOB NO:18COF03	BY:DCW
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JOB NO:18CO

COF PROJECT NO. 03-1900



REMOVALS (000)

031 1 LS
Remove & dispose AC waterline to the nearest collar as required to construct the new improvements. Asbestos removal and disposal per the Asbestos Notes, Sheet UT1.0 and the special provisions, coordinate with the City's Project Manager. Waterline removal includes temporary caps to maintain water service per the special provisions.

033 1EA

Remove & dispose water valve box, cover, & collar. Abandon water valve in place.

035 5 E

Remove & dispose water service. Remove & store water meter per the special provisions. Contractor is responsible for reinstalling water meter at the original address.

037 1 L

Plug & abandon waterline, coordinate with the City's Project Manager. Cap tee at the main.

043 4 E

Remove & dispose sewer service and cleanout

WATER CONSTRUCTION (300)

300 265 LF

8" Class C-900 PVC. Avoid joint deflection and bending the pipe on a radius.
 3. Tracing per COF Engineering Det. 9-01-010, 9-01-031 (Paved Street), &
 9-01-030 (Ex. Paved Street), Sheet UT1.2; tracer wire per COF Engineering Det.
 9-01-020, Sheet UT1.2. Provide joint restraints at fittings per MAG Standard Det.
 303 in lieu of thrust blocks. Includes removal and replacement of improvements
 not specifically called for on the plans but required for construction per the
 special provisions.

303 43 LI

8" Class 350 DIP mechanical joint waterline, fully restrained per MAG Std Det. 303, Sheet UT1.3. Avoid joint deflection and bending the pipe on a radius. Trenching per COF Engineering Det. 9-01-010 & 9-01-031 (Paved Street), Sheet UT1.2; and tracer wire per COF Engineering Det. 9-01-020, Sheet UT1.2.

310 2 EA

8" gate valve, class 250, epoxy coated resilient seat, box, cover, and assembly per COF Engineering Det. 9-03-060, 9-03-061 & 9-03-062, Sheet UT1.2; blocking per MAG Standard Det. 301, Sheet UT1.3 as modified by the special provisions. Valves shall be flanged directly to the tee or fitting.

330 3 EA

3/4" copper water service and meter box per COF Engineering Det. 9-03-070, 9-03-080, & 9-03-080A, Sheet UT1.2. Coordinate reinstall of meter from this residence with the City of Flagstaff. Connect from meter to existing water service on the customer side of the meter. Trenching per COF Engineering Det. 9-01-031, (Paved Street) and COF Engineering Det. 9-01-032 (Unpaved), Sheet UT1.2. Includes removal and replacement of improvements, including curb and gutter, and sidewalk not specifically called for on the plans, but required for construction, per the special provisions.

331 1 EA

1" copper water service per COF Engineering Det. 9-03-070 & 9-03-081 manifolded to two 3/4" water meters, meter boxes per COF Engineering Det. 9-03-080 & 9-03-080A, Sheet UT1.2. Coordinate reinstall of meter from this residence with the City of Flagstaff. Connect from meter to existing water service on the customer side of the meter. Trenching per COF Engineering Det. 9-01-031, (Paved Street) and COF Engineering Det. 9-01-032 (Unpaved), Sheet UT1.2.

341 1 EA

Connect to 6" PVC, AC or CI waterline with 8" x 6" Powerseal 3506R PowerMax Reducing Coupling or approved equal.

350 1 EA

Install full-vertical realignment (4-45° Class 350 DIP bends) per MAG Standard Detail 370, Sheet UT1.3. Drop section shall be prefabricated mechanical joint Class 350 DIP installed as a single unit. Installation shall include joint restraint per MAG Standard Det. 303, Sheet UT1.3, MEGALUG or approved equal or thrust and anchor blocks per MAG Standard Det. 380 & 381, Sheet UT1.3. Provide separation per MAG Standard Det. 404, Sheet UT1.3.

352 1 EA

Extra protection ductile iron water and sewer lines per MAG Standard Detail 404 Sheet UT1.3, restrained or mechanical joints 10-ft either side of the pipe crossing.

360 1 EA

1" Combination Air Release Valve per COF Engineering Det. 9-03-101, Sheet UT1.2.

SEWER CONSTRUCTION (400)

420 4 EA

4" dia. SDR-35 PVC sanitary sewer service and cleanout per MAG Standard Det. 440-1, Sheet UT1.3 and the special provisions. Reconnect to existing sewer service. Trenching per COF Engineering Det. 9-01-031, (Paved Street), 9-01-032 (Unpaved), Sheet UT1.2.

ABBREVIATION

N.F. - meter box or sewer cleanout not found in the field, location assumed.
Investigate water service & box or sewer service & cleanout location prior to construction.

T.L. - traffic rated meter box lid.

[illegible]

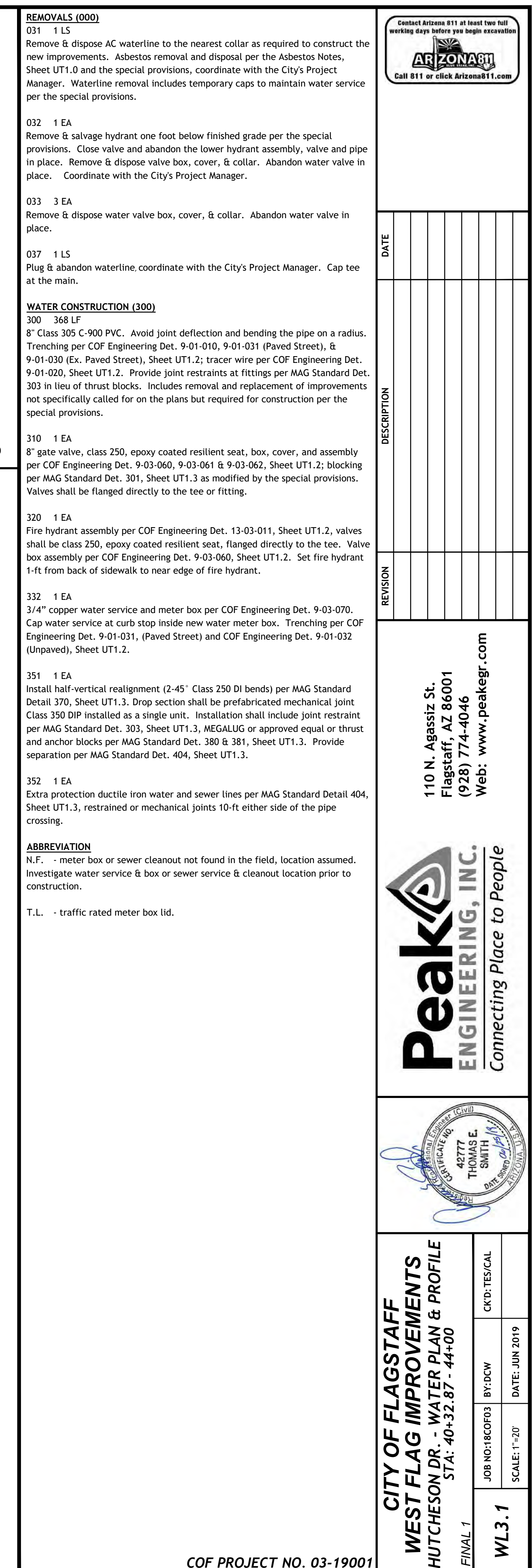
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Flagstaff, AZ 86001
(928) 774-4046
Web: www.peakegr.com

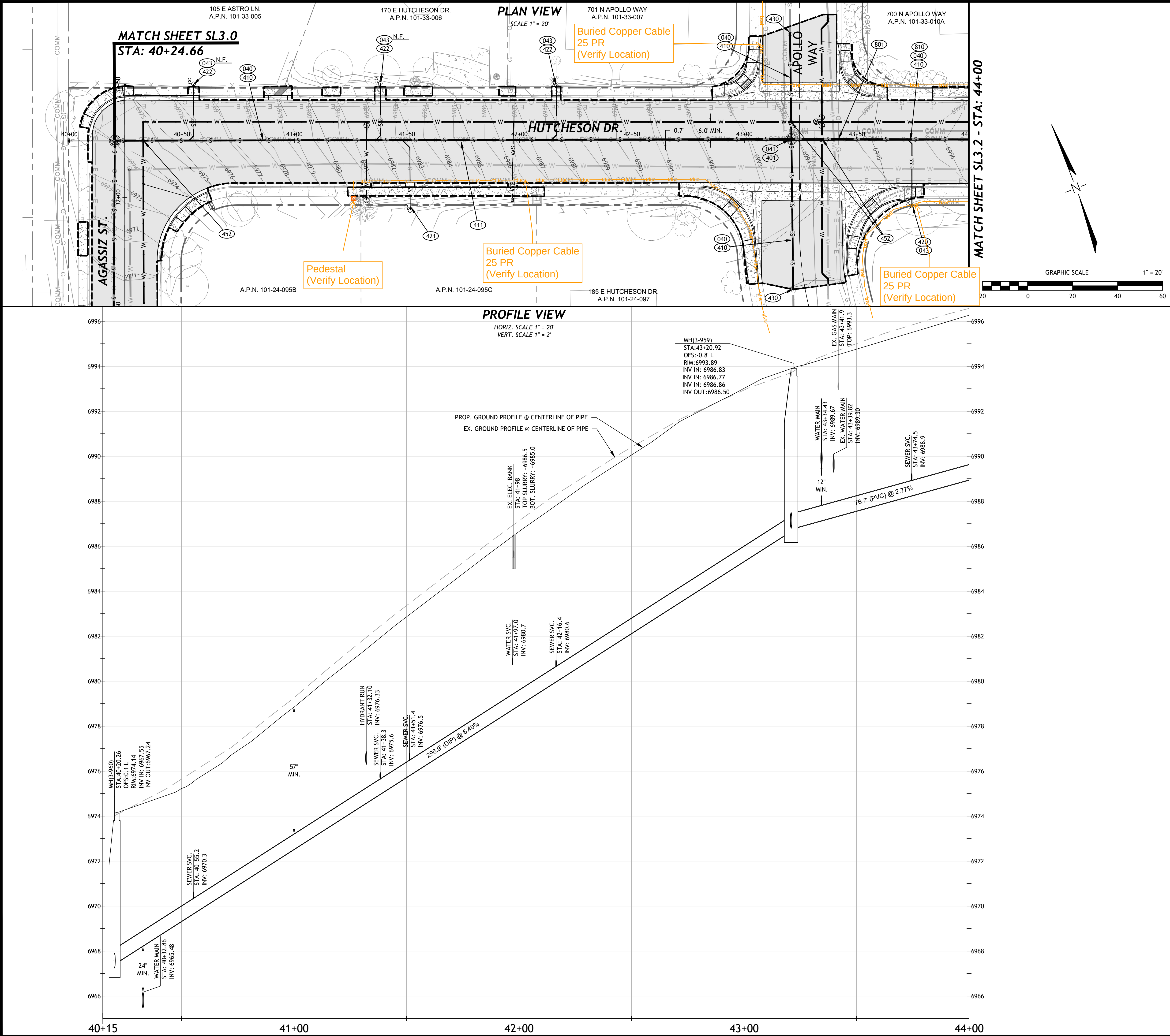


**CITY OF FLAGSTAFF
WEST FLAG IMPROVEMENTS
DAVID DR. - WATER PLAN & PROFILE
STA: 23+00 - 26+20**

FINAL 1	JOB NO:18COF03	BY:DCW	CK'D: TES/CAL
WL2.3	SCALE: 40' TO 1"	DATE: JUN 2010	

COF PROJECT NO. 03-19001





REMOVALS (000)

040 494 LF
Remove & dispose sewer line.

041 1 EA
Remove & dispose manhole.

043 4 EA
Remove & dispose sewer service and cleanout.

SEWER CONSTRUCTION (400)

401 1 EA
60" dia. manhole per MAG Standard Det. 420, Sheet UT1.3; as modified by the special provisions.

410 194 LF
8" dia. SDR-35 PVC sanitary sewer main. Trenching per COF Engineering Det. 9-01-010, 9-01-031 (Paved Street), & 9-01-030, (Ex. Paved Street), Sheet UT1.2.

411 301 LF
8" dia. class 150 ductile iron sanitary sewer main lined with Protecto 401 ceramic epoxy or approved equal. Trenching per COF Engineering Det. 9-01-010, 9-01-031 (Paved Street), & 9-01-030, (Ex. Paved Street), Sheet UT1.2.

420 1 EA
4" dia. SDR-35 PVC sanitary sewer service and cleanout per MAG Standard Det. 440-1, Sheet UT1.3 and the special provisions. Reconnect to existing sewer service. Trenching per COF Engineering Det. 9-01-031, (Paved Street), 9-01-032 (Unpaved), Sheet UT1.2.

421 1 EA
4" dia. SDR-35 PVC sanitary sewer service and cleanout per MAG Standard Det. 440-1, Sheet UT1.3 and the special provisions. Cap service at property line Trenching per COF Engineering Det. 9-01-031, (Paved Street) and COF Engineering Det. 9-01-032 (Unpaved), Sheet UT1.2.

422 3 EA
4" dia. SDR-35 PVC deep sanitary sewer service and cleanout per MAG Standard Det. 440-1 and COF Engineering Det. 9-02-080, Sheet UT1.3 and the special provisions. Reconnect to existing sewer service. Trenching per COF Engineering Det. 9-01-031, (Paved Street), 9-01-032 (Unpaved), Sheet UT1.2.

430 2 EA
Connect to existing sewer main with sewer transition coupling, manufactured by Powerseal, Ford or approved equal.

452 NPI
Extra protection ductile iron water and sewer lines per MAG Standard Detail 404, Sheet UT1.3, restrained or mechanical joints 10-ft either side of the pipe crossing.

OTHER
801 NPI Protect gas line.

810 NPI Coordinate utility relocation.

ABBREVIATION
N.F. - meter box or sewer cleanout not found in the field, location assumed. Investigation water service & box or sewer service & cleanout location prior to construction.



DATE	
DESCRIPTION	
REVISION	

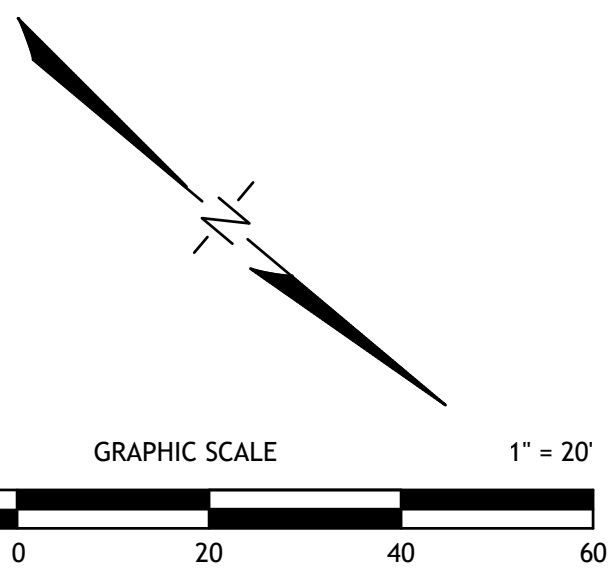
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Web: www.peakengr.com



CITY OF FLAGSTAFF
WEST FLAG IMPROVEMENTS
HUTCHESON DR. - SEWER PLAN & PROFILE
STA: 40+24.66 - 44+00

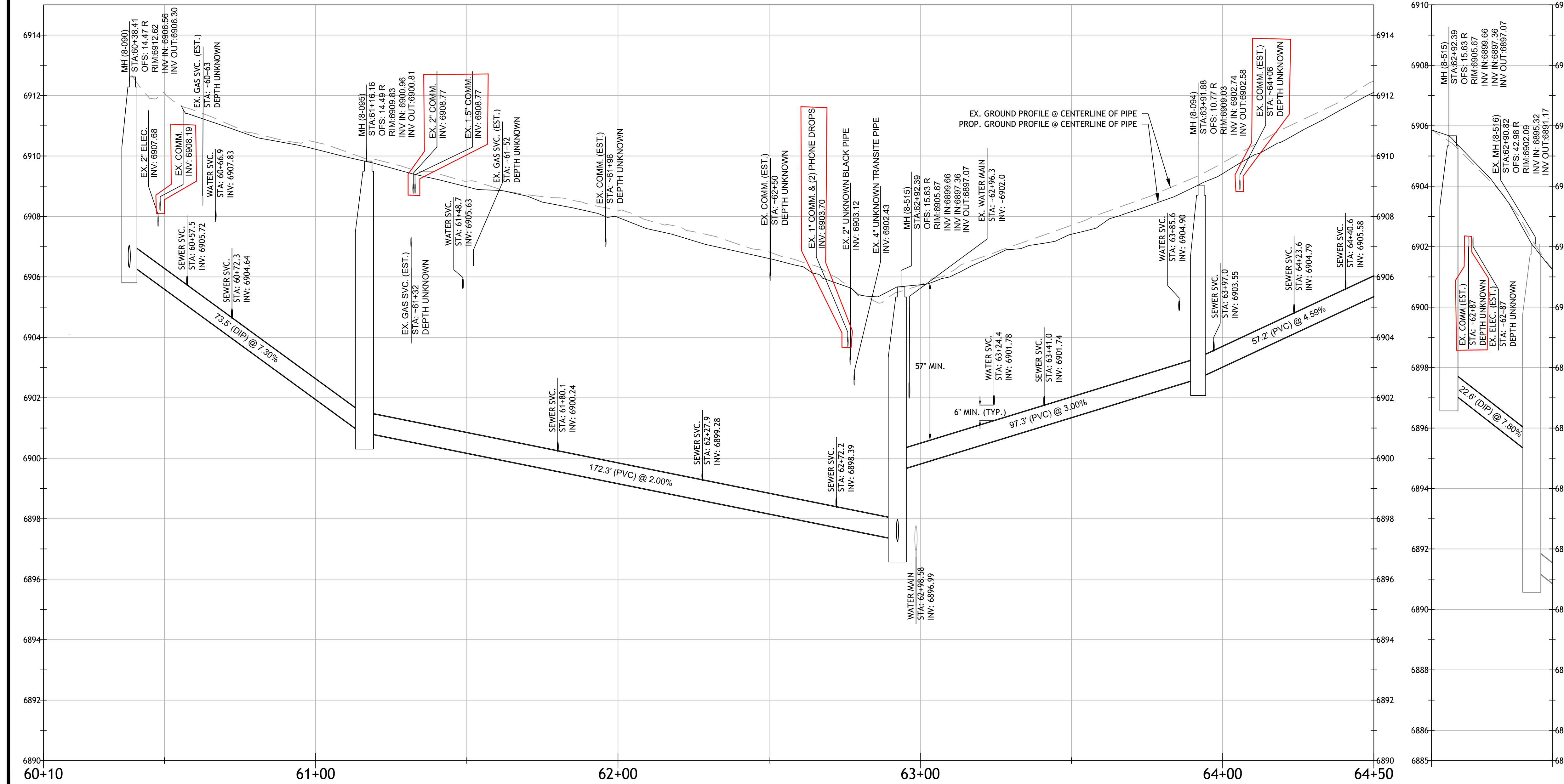
FINAL 1	JOB NO:18COF03	BY:DCW	CKD:TES/CAL
SL3.1	SCALE: 1"=20'	DATE: JUN 2019	

COF PROJECT NO. 03-19001



CITY OF FLAGSTAFF WEST FLAG IMPROVEMENTS CANYON TERRACE DR. - WATER PLAN & PROFILE STA: 64+50 - 68+50		CK'D: TES/CAL
FINAL 1	JOB NO: 18CF03 BY: DCW	DATE: 04/10/2018 TIME: 11:00 AM
WL4.1		

COF PROJECT NO. 03-1900



430 1 EA
Connect to existing sewer main with sewer transition coupling, manufactured by Powerseal, Ford or approved equal.

450 1 EA
Drop sewer connection per MAG Standard Det. 426, Sheet UT1.3. Core new sewer into existing manhole and connect to sewer stub out.

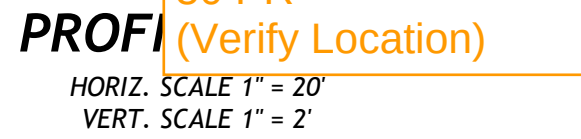
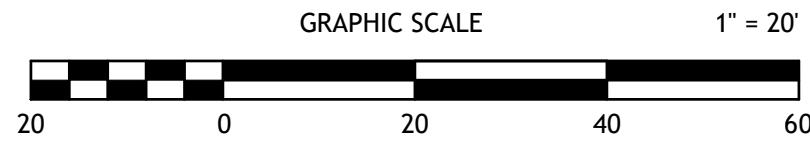
452 NPI
Extra protection ductile iron water and sewer lines per MAG Standard Detail 404, Sheet UT1.3, restrained or mechanical joints 10-ft either side of the pipe crossing.

ABBREVIATION
N.F. - meter box or sewer cleanout not found in the field, location assumed.
Investigation water service & box or sewer service & cleanout location prior to construction.

[illegible]

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CITY OF FLAGSTAFF WEST FLAG IMPROVEMENTS CANYON TERRACE DR. - SEWER PLAN & PROFILE STA. 60+00 - 64+50		CK'D: TES/CAL
FINAL 1	JOB NO:18C0F03 BY:DCW	DATE: JUN 2019
SL 4.0		SCALE: 1"=20'



CITY OF FLAGSTAFF WEST FLAG IMPROVEMENTS CANYON TERRACE DR. - SEWER PLAN & PROFILE STA: 64+50 - 68+50	FINAL 1	JOB NO:18C0F03	BY:DCW	CKD:TES/CAL
	SL4.1	SCALE: 1"=20'	DATE: JUN 2019	

COF PROJECT NO. 03-19001

Appendix C

Utility Information Exhibits

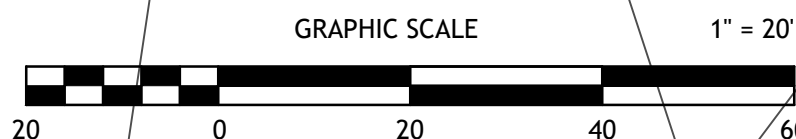
A note on Basis of Bearing and Coordinate System:

Projection: Transverse Mercator
Latitude of grid origin: 35-deg. 00' 00" N
Longitude of Central Meridian: 111-deg. 37' 00" W
Northing at grid origin: 0.000 ft
Easting at Central Meridian: 70,000.000 ft.
Central Meridian Scale Factor: 1.000333 (exact)

The Basis of Bearings is Geodetic North based on GPS measurements. These bearings have been rotated to grid for the City of Flagstaff Low Distortion Projection. All bearings and distances shown on this map are grid per the preceding definition.

Elevations: The benchmarks and elevations on this survey were derived through GPS RTK observations and are on NAVD88 Datum.

	SEWER
	WATER
	GAS
	COMMUNICATION (TV & TELEPHONE)
	UNDERGROUND ELECTRIC
	OVERHEAD ELECTRIC
	RIGHT OF WAY
	PROPERTY
	EASEMENT
	SANITARY SEWER MANHOLE
	SEWER CLEANOUT
	WATER VALVE
	GAS VALVE
	CONTROL POINT



Horizontal locations and depth of utilities shown on the Utility Information Exhibits are based on information gathered from a variety of sources. Water and sewer utilities are shown based on a combination of as-built information, construction plans, and GIS information furnished by the City of Flagstaff, measured manhole inverts, water valve nut elevations, and photorecognition information for natural gas (Unisource), communication (SuddenLink & CenturyLink), and electric (APS) utilities are shown based on maps provided by each utility and information shown on these exhibits. These maps are schematic and do not provide detailed horizontal or vertical information. Several gas, communication, and electrical utilities on the southern leg of Canyon Terrace were recently relocated within the last 2 years and were not reflected in the utility maps provided. These utilities are shown based on bluestake information.

In January and February of 2019, Adams Trenching conducted a limited pothole investigation along David Dr., Hutcheson Dr., & Canyon Terrace Dr. The intent of potholing was to determine potential conflicts between the proposed water and sewer infrastructure, and the existing utility infrastructure. The potholing investigation involved the use of cameras, and exhibits and in the pothole report from Adams Trenching. Pothole locations were surveyed and are presented relative to the project survey control. Pothole locations were based on utility map information furnished by the City of Flagstaff and franchise utilities and the 30% utility design. All underground utilities were potholed, an existing utility was not potholed, and one utility was not potholed. Conflicts may still exist that are not noted on the construction plans.

Utility services, except as shown, were not potholed. Water services are shown based on water meter boxes located during the project survey. Location of water services where meter boxes were not found are estimated. Water service depths are assumed relative to existing water main depth. Sewer services are shown horizontally based on City of Flagstaff sewer logs, and depths are approximate based on typical minimum slopes for shallow sewers and maximum slopes for deeper sewers. Slopes are based on MAG Standard Detail 440. Gas services are shown based on utility map information provided by Unisource. Communication services are shown based on maps provided by SuddenLink, CenturyLink, and APS. Gas, communication, and electric maps are schematic and do not provide detailed horizontal or vertical information. For design purposes, service depths are shown based on estimated depths.

The Contractor will need to fully locate all utilities before work is started in the area.

[illegible]

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(928) 774-4046
Web: www.peakegr.com



**CITY OF FLAGSTAFF
WEST FLAG IMPROVEMENTS
UTILITY INFORMATION EXHIBIT
DAVID DR**

OF 4

