

RULE NO.: R161-21.06

NOTICE OF PROPOSED RULE

POSTING DATE: January 14, 2021

The Director of the Department of Austin Water proposes to adopt the following rule on or after February 15, 2021.

Comments on the proposed rule are requested from the public. Comments should be submitted to Mr. Eric Langhout, P.E.; Austin Water, 3907 S. Industrial Dr., Suite 236, Austin, Texas 78744, 512-972-0073, or via email at Eric.Langhout@austintexas.gov . To be considered, comments must be submitted before February 15, 2021, the 32nd day after the date this notice is posted. A summary of the written comments received will be included in the notice of rule adoption that must be posted for the rule to become effective.

An affordability impact statement regarding the proposed rule has been obtained and is available for inspection or copying at the address noted in the preceding paragraph.

EFFECTIVE DATE OF PROPOSED RULE

A rule proposed in this notice may not become effective before the effective date established by a separate notice of rule adoption. A notice of rule adoption may not be posted before February 15, 2021 (the 32nd day after the date of this notice) or not after March 25, 2021 (the 70th day after the date of this notice).

If a proposed rule is not adopted on or before March 25, 2021, it is automatically withdrawn and cannot be adopted without first posting a new notice of a proposed rule.

TEXT OF PROPOSED RULE

The text of the proposed rule, indicating changes from the current text, is attached to this notice.

BRIEF EXPLANATION OF PROPOSED RULE

R161-21.06: Proposed revision to the UCM 2.9.5

Rule 1 – UCM 2.9.5

- Section 2.9.5.A.3 – Deleted the last two sentences of A.3 and incorporated the last sentence into new A.4 which addresses terminology.
- Section 2.9.5.A.4 – Created new A.4 to address definitions and provide a reference for all related terminology.
- Section 2.9.5.B.2 – Broadened the basic elements considered essential in defining the expertise required for tunneling and trenchless engineers and geoscientists.
- Section 2.9.5.C.1 – Added a requirement that the locations of borings for projects requiring a Geotechnical Baseline Report must be determined by engineers whose expertise is tunneling and trenchless construction.
- Section 2.9.5.C.2 – The Standards Committee has made a change to the UCM to use the marks ‘ and “ to represent feet and inches.
- Section 2.9.5.C.3 – Formerly C.10. Relocated it to an earlier position in the list and expanded it to raise awareness about evaluating the need for borings at pits and shafts that are closely spaced. i.e., are closely spaced borings really needed.
- Section 2.9.5.C.4 – Formerly C.3. It has been expanded to draw attention to factors that may influence the location of borings relative to the pipeline alignment.
- Section 2.9.5.C.5 – Formerly C.4, expanded to address quality of survey needed to locate borings. Hand-held GPS units and unproven topographic maps are no longer allowed.
- Section 2.9.5.C.6 – Formerly C.5. The boring depth has been changed from 5 feet to 10 feet. Borings extending just 5 feet below the proposed profile grades that are available early in the design, when geotechnical investigations are typically performed, have repeatedly proven to be too shallow because of later grade changes or minor shifts in alignment. Borings made just 5 feet deeper, originally, would have been far less expensive than doing additional, deeper borings, later.
- Section 2.9.5.C.10 – Formerly C.9. Clarified that the listed tests are just examples.
- Section 2.9.5.C.11 – Added the reference to TAC to be specific about the requirement.
- Section 2.9.5.C.12 – Added the reference to TAC and specific requirements.
- Section 2.9.5.D.3 – Provided specifics about who will specify corrosion testing and when it is needed.
- Section 2.6.5.E – Added to title to broaden the scope of analyses.

- Section 2.9.5.E.1 – Revised to provide guidance on use and limitations of available geologic maps and the need for site specific field confirmation.
- Section 2.9.5.E.2 – This change was made to clarify the sentence.
- Section 2.9.5.F.1.a – Deleted details about the format of reports.
- Section 2.9.5.F.1.b – Added requirement that preliminary reports be in electronic format.
- Section 2.9.5.F.1.c – Added requirement that final reports be in electronic format.
- Section 2.9.5.F.2 – This section covering Geotechnical Data Reports consists of portions of the original 2.9.5.F that have been reorganized and renumbered. The additions address problems or issues that have arisen, some repeatedly, since 2.9.5 was first adopted. The reorganization and additions are intended to provide clearer, more concise, and thorough language.
- Section 2.9.5.F.2.c.i – Specified the types of data that need not be included in the body of the report.
- Section 2.9.5.F.2.c.ii – Deleted references to geologic maps
- Section 2.9.5.F.2.c.iii – Specified the types of data that need not be included in the body of the report.
- Section 2.9.5.F.2.c.iv – Deleted reference to geologic maps.
- Section 2.9.5.F.2.c.v – Specified the types of data that need not be included in the body of the report.
- Section 2.9.5.F.3 – This section covering Geotechnical Design Memoranda consists of portions of the original 2.9.5.F that have been reorganized and renumbered. The additions address problems or issues that have arisen, some repeatedly, since 2.9.5 was first adopted. The reorganization and additions are intended to provide clearer, more concise, and thorough language.
- Section 2.9.5.F.3.c.ii – Added examples of the types of information to be provided with and excluded from Memoranda.
- Section 2.9.5.F.9(old) – This section covering reports has been reorganized and renumbered. The additions address problems or issues that have arisen, some repeatedly, since 2.9.5 was first adopted. The reorganization and additions are intended to provide clearer, more concise, and thorough language.
- Section 2.9.5.F.4 – This section covering Geotechnical Baseline Reports consists of portions of the original 2.9.5.F that have been reorganized and renumbered. The additions address problems or issues that have arisen, some repeatedly, since 2.9.5 was first adopted. The reorganization and additions are intended to provide clearer, more concise, and thorough language.
- Section 2.9.5.F.4.a – Clarifies the types of construction requiring GBRs.
- Section 2.9.5.F.4.b – Indicates where the GBR is to be included in construction contract documents.

- Section 2.9.5.F.4.c.i – This section includes requirements contained in the original 2.9.5 about report content and added requirements about the qualification of individuals preparing the GBRs.
- Section 2.9.5.F.4.c.iii – This section includes requirements contained in the original 2.9.5 about report content and added requirements about very specific aspects of the report.
- Section 2.9.5.F.4.c.iv – Added this requirement for reporting groundwater inflow rate.
- Section 2.9.5.F.4.c.v – Added this requirement for the GBR to include exhibits showing certain geologic information.
- Section 2.9.5.F.5 – This fixes the name change to our Department.
- Section 2.9.5.G – Added source descriptions of new material (Hair, et al and NASTT) that is now referenced in the 2.9.5.

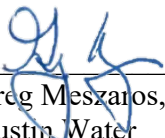
AUTHORITY FOR ADOPTION OF PROPOSED RULE

The authority and procedure for adoption of a rule to assist in the implementation, administration, or enforcement of a provision of the City Code is provided in Chapter 1-2 of the City Code. The authority to regulate construction requirements is established in Section 552.001 of the Texas Local Government Code and Title 15 of the City Code.

CERTIFICATION BY CITY ATTORNEY

By signing this Notice of Proposed Rule R161-21.06, the City Attorney certifies the City Attorney has reviewed the rule and finds that adoption of the rule is a valid exercise of the Director's administrative authority.

REVIEWED AND APPROVED



Greg Meszaros, Director
Austin Water

Date: 01/07/2021

Anne L Morgan

Anne L. Morgan
City Attorney

Date: 1/11/2021

SUMMARY OF 1st QUARTER 2021 UCM CHANGES

Rule 1 – UCM 2.9.5

- Section 2.9.5.A.3 – Deleted the last two sentences of A.3 and incorporated the last sentence into new A.4 which addresses terminology.
- Section 2.9.5.A.4 – Created new A.4 to address definitions and provide a reference for all related terminology.
- Section 2.9.5.B.2 – Broadened the basic elements considered essential in defining the expertise required for tunneling and trenchless engineers and geoscientists.
- Section 2.9.5.C.1 – Added a requirement that the locations of borings for projects requiring a Geotechnical Baseline Report must be determined by engineers whose expertise is tunneling and trenchless construction.
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Utilities Criteria Manual

2.9.5 - Requirements for Geotechnical Investigations for Pipeline Projects

A. General.

1. This section applies only to water, wastewater, and reclaimed water pipeline projects with construction funded by the City of Austin. These include Capital Improvement Program projects, Service Extension Request projects, and other cost-participation/developer-agreement projects.
2. Investigate subsurface materials and conditions according to these requirements, which represent the minimum acceptable level of care. Higher levels of care, which would involve more extensive sampling, testing, analyses, and reporting, may be required for certain projects.
3. Investigate subsurface materials and conditions on all pipeline projects except those involving "small" repairs, pipe replacement along the exact same alignment as the existing pipe, in-place lining of existing pipe, or pipe bursting where the proposed pipe will not be more than one to two standard pipe sizes larger than the existing pipe. The projects to which these requirements apply include tunneling, guided boring, directional drilling, pipe bursting, pipe jacking, and auger boring. These methods are defined herein as "tunneling and trenchless methods."
- 4. Tunneling, microtunneling, guided boring, directional drilling, pipe bursting, and auger boring are defined herein as "tunneling and trenchless methods." For a glossary of trenchless terms refer to the North American Society for Trenchless Technology (NASTT).**
- 5.** Perform investigations that are appropriate for the project. The requirements given herein address a broad category of projects. It is not possible in these requirements to identify all possible geotechnical issues that may arise or that may be unique to a particular project.

B. Planning the Investigation.

1. Tailor the investigation to the type of construction, the anticipated geology, the landforms and topography, and the project schedule and budget.
2. Involve professionals who are experts in the particular type of underground construction. For pipelines constructed by tunneling and trenchless methods, the site exploration, laboratory testing, geotechnical analyses, and reporting shall be planned and implemented in conjunction with engineers whose expertise is **planning, designing, cost estimating, constructing, operating, and maintaining pipelines installed by** tunneling and trenchless construction methods and with geologists or engineering geologists experienced in **construction of underground openings in soil and rock as part of civil works engineering projects** construction.

C. Site Exploration.

1. Locate geotechnical borings by taking into account topography and landforms, expected subsurface materials and conditions, and proposed type of construction. **The locations of borings for tunnels and trenchless methods for which a Geotechnical Baseline Report (See Section 2.9.5.F.4) will be prepared must be determined located in conjunction by with engineers, geologists and engineering geologists whose expertise is tunneling or trenchless who are experts in those types of construction of the type(s) anticipated for the project.**

2. Use typical borehole spacing of from 500' to 750' feet, except in urban areas and in areas of complex or changing geology where closer spacing may be needed (See Section 2.9.5.E.1.). Where truck-mounted drill rigs cannot access critical boring locations, obtain the necessary specialized drilling equipment.
- 3. Locate geotechnical borings at all proposed work and access shafts and pits for tunnels and trenchless methods unless authorized otherwise. Consider anticipated subsurface materials and conditions, excavation depth, construction method, and expected benefit when determining the need for geotechnical borings at shafts or pits that are spaced less than 200' apart.**
- 3.4** Locate geotechnical borings, including piezometers, that are part of investigations for tunnels and trenchless methods far enough off of the proposed pipe alignment so that they do not **negatively** impact construction, **groundwater regimes, or environmental features. When conditions allow, geotechnical borings may be located directly on the proposed alignment; however, in general those borings, and especially any piezometers or monitor wells, must be off the proposed alignment.**
- 4.5** Reference the location of each boring to the Texas State Plane Coordinate System and the ground surface elevation to USGS MSL. with **The** horizontal and vertical positional tolerances of +/- ~~one foot~~ **positions of borings for tunneling and trenchless construction methods shall be determined to within $\pm 0.5'$ by a Texas Registered Professional Land Surveyor using a method appropriate for that level of accuracy and precision. The horizontal positions of borings for open-cut construction projects may be determined using hand-held GPS units that are accurate to within $\pm 5'$. The vertical positions of borings for open-cut construction projects may be determined from topographic maps provided by the project design engineer and having a contour interval no greater than 2'. If that information is unavailable, the vertical and horizontal positions of the borings for open-cut construction shall be determined by a Texas RPLS to within $\pm 1.0'$.**
- 5.6** Extend borings a minimum of ~~five (5) feet~~ **10'** below the profile grade line of proposed utility lines and a sufficient depth below foundations for structures to characterize the affected materials.
- 6.7** Advance borings in soil or soil-like materials using continuous flight auger, hollow stem auger with drag bit, or thin-walled tube. Obtain samples using thin-walled tube or split spoon. In general, reserve split-spoon sampling for cohesionless materials.
- 7.8** Advance borings and obtain samples in rock or rock-like material using double-tube core barrel.
- 8.9** Conduct in situ tests, such as Standard Penetration Tests and packer tests, as needed to characterize the subsurface materials and conditions.
- 9.10** Conduct geophysical tests (**such as** resistivity, ground penetrating radar, seismic, and very low frequency, **etc.**) as needed **and requested**, to locate the soil/rock interface, cavities, porous rock, and faults.
- ~~10. Locate geotechnical borings at all proposed work and access shafts and pits for tunnels and trenchless methods.~~
11. Install and abandon piezometers and ~~ground water~~ **groundwater** monitor wells in compliance with ~~State law~~ **Title 16 Texas Administrative Code, Chapter 76.**
12. Backfill and plug boreholes in pavement according to Public Works Department requirements. **Backfill and plug boreholes in the Edwards Aquifer recharge**

zone and in contributing zones in the transition zone according to Title 30 TAC, Part 1, Chapter 213, Subchapter A, Rule §213.7. Elsewhere, backfill boreholes outside of pavement using non-shrink grout bentonite pellets, if in rock, or borehole cuttings, if in soil, from the bottom of the borehole to within three feet 3' of the ground surface. Plug the upper three feet 3' with cuttings from the borehole cuttings.

13. Obtain street cut permit and approved traffic control plan for work in public right of way.

D. Laboratory Testing

1. Conduct the following tests:
 - a. For soil and soft rock, including some shale, mudstone, clay shale, and claystone
 - i. Unconfined compressive strength
 - ii. Atterberg limits
 - iii. Moisture content
 - iv. Grain size analyses, as needed
 - v. Percent finer than 74 micron
 - vi. Special testing as required to characterize collapsible soils, soils susceptible to particle migration, etc.
 - b. For rock
Unconfined compressive strength
2. For projects involving tunneling and trenchless methods, conduct the following additional tests, as needed:
 - a. For soil and soft rock, including some shale, mudstone, clay shale, claystone
 - i. Slake durability
 - ii. Swell pressure
 - iii. Grain size analyses
 - b. For rock
 - i. Cerchar abrasivity
 - ii. Point load
 - iii. Brazilian tensile
 - iv. Punch penetration
3. Conduct tests for resistivity, pH, chlorides and sulfates, as needed, for that are a necessary part of pipe corrosion studies when authorized by Austin Water. (Corrosion studies are unwarranted when installing buried ductile iron pipe, fittings, or valves as these are all encased in polyethylene wrap.) Sample location, sample collection and preservation methods, test sample selection, and test methods shall be specified by an engineer whose expertise is pipeline corrosion.

E. Geotechnical and Geological Analyses

1. Check for, identify, and reconcile inconsistencies in subsurface information or subsurface materials and conditions that may impact design or construction. Compare the boring logs to one another, compare the logs to mapped stratigraphy as contained in publicly available geologic maps in Environmental Geology of the Austin Area: An Aid to Urban Planning (Garner and Young, 1976), Geologic Quadrangle Map No. 38, Austin West, Travis County, Texas (Rodda, Garner and Dawe, 1970), and Geologic Atlas of Texas, Austin Sheet (Barnes, 1974), and compare the logs to personal experience in the same area. Provide site-specific geologic mapping to aid in assessing the potential for "differing

site condition" claims. ~~based on these comparisons and~~ Undertake additional investigations, as needed, to resolve ~~such~~ inconsistencies. **The commonly available geologic maps are Environmental Geology of the Austin Area: An Aid to Urban Planning (Garner and Young, 1976); Geologic Quadrangle Map No. 38, Austin West, Travis County, Texas (Rodda, Garner and Dawe, 1970); and Geologic Atlas of Texas, Austin Sheet (Barnes, 1974), The map scales of the first two references are 1:62,500 and 1:24,000, respectively, making them useful for detailed, site-specific interpretations; however, the scale of the Geologic Atlas of Texas, Austin, Sheet is too small, at 1:250,000, for practical usage in those same applications. As a consequence, do not use this geologic map. Although the first two references provide greater detail, they have mapping inconsistencies that may hinder interpretation. Therefore, field-confirmed, site-specific geologic mapping is a necessary part of any investigation performed to meet the requirements of this Section.**

2. Provide geotechnical parameters and construction recommendations appropriate for the type of construction and covering **only** the **specific** topics requested **by the project design engineer**. In all cases, provide project-specific recommendations. Avoid generalized discussions and detailed explanations of theory or phenomena.

- a. Open Cut (Trench) Construction

- i. provide bearing capacity for thrust blocking
- ii. provide maximum lift thickness for backfill
- iii. identify need for and specify method of bedding / backfill particle migration mitigation
- iv. identify need for excavation retention system to protect surrounding utilities, pavement and property
- v. identify aspects of the behavior of the in situ subsurface materials that could affect design (for example, highly plastic soils and extremely flat pipeline grades are incompatible for gravity line construction if water can enter the trench during construction)
- vi. provide lateral earth pressures for underground structures (do not provide lateral earth pressures for excavation safety systems)
- vii. provide pavement thickness or repair recommendations, if requested

- b. Trenchless Construction

Provide soil and rock properties and characteristics and geotechnical parameters required by the tunneling and trenchless construction engineers.

F. Reports

1. General

- 1a.** Use only 8½" by 11" and 11" by 17" sheets. ~~Prepare black and white illustrations, maps, drawings, photographs, and other graphics. Use color prints only if necessary to adequately convey the information. Do not use tabbed dividers.~~
- 2b.** Submit **electronic copies of** preliminary reports **in pdf format** for review **and comment** with the 60 and 90 percent submittal of design documents or at the frequency specified for the design documents.

- ~~3~~c. Submit electronic copies of final reports in pdf format with the 100 percent submittal of design documents. Submit hard copies of the final report, when requested.
- ~~4~~. Submit one unbound copy of the final report for insertion in the master Project Manual. Bind all other copies.
- ~~5~~d. Characterize rock by reporting, at a minimum, the geologic material, color, degree of weathering, relative hardness, RQD, percent recovery, unconfined compressive strength, unit weight, and relative frequency and infilling of discontinuities. Where appropriate, report SPT results.
- ~~6~~e. Characterize soil by reporting, at a minimum, the engineering classification (group name and symbol), color, relative stiffness, shrink / swell potential, unconfined compressive strength, unit weight, moisture content, liquid limit, particle size distribution, and plasticity index. Where appropriate, report SPT results and collapse potential.
- ~~7~~f. Characterize groundwater by reporting observations and expected occurrence.

2. Geotechnical Data Report

a. Prepare a GDR for all projects.

b. Include the GDR in Section 00200 of the Project Manual.

c. Content

Prepare two separate reports for pipelines constructed by open cut excavation or by auger boring that is small diameter, short length, and not under major facilities such as multi-lane highways: Prepare a Geotechnical Data Report that the project design engineer / project manager will include in Section 00220 of the Project Manual, and prepare a Geotechnical Design Memorandum that will be included in the project files but not in the Project Manual.

a. Geotechnical Data Report

- i. Include the boring location map, boring logs, and text describing the investigation and the subsurface materials and conditions that were encountered, but no geotechnical recommendations. Do not include references to agronomic soil units or engineering parameters reported in County Soil Surveys. (If soil hydraulic conductivity, corrosivity, or other parameters commonly reported in the Soil Survey are of interest, perform the appropriate tests or investigations.) Do not tabulate data in the body of the report that can be tabulated in the Appendix and simply referenced in the body: Examples include existing pavement thicknesses, boring location coordinates, groundwater monitoring data, and field and laboratory test data.
- ii. In the text portion of the Geotechnical Data Report, describe the geologic setting, stratigraphy, and structure. Use commonly accepted geologic names such as Buda Formation, Georgetown Formation, and Capital Terrace Deposits as contained in Environmental Geology of the Austin Area: An Aid to Urban Planning (Garner and Young, 1976), Geologic Quadrangle Map No. 38, Austin West, Travis County, Texas (Rodda, Garner and Dawe, 1970), and Geologic Atlas of Texas, Austin Sheet (Barnes, 1974).
- iii. Include the State Plane coordinate and USGS ground surface elevation for each boring on the boring log and, if desired for clarity, include

this information in a table in an Appendix, but do not repeat it in the body of the report.

- iv. Identify geologic units on the boring logs, using commonly accepted geologic symbols such as Kbu, Kdr, **and** Qca as contained in Environmental Geology of the Austin Area: An Aid to Urban Planning (Garner and Young, 1976), Geologic Quadrangle Map No. 38, Austin West, Travis County, Texas (Rodda, Garner and Dawe, 1970), and Geologic Atlas of Texas, Austin Sheet (Barnes, 1974).

v. Provide tabulated summaries of laboratory test data in an Appendix. Do not repeat the summary in the body of the report.

3. Geotechnical Design Memoranda

a. Prepare a GDM when requested by the project design engineer.

b. The GDM will not be included in the Project Manual or elsewhere in the Contract Documents.

c. Content

b. Geotechnical Design Memorandum

- i. Reference the Geotechnical Data Report in the Geotechnical Design Memorandum; do not gratuitously repeat its contents.
- ii. Provide geotechnical recommendations specific to the project and only for items or issues requested **by the project design engineer.** For instance **As examples, do not only provide** make pavement thickness or repair recommendations, **thrust block design criteria, or lateral earth pressure coefficients** unless **when specifically** requested to do so. (See Section 2.9.5.E.2.). **Do not provide OSHA soil classifications or address any excavation safety issues pertaining directly to 29 CFR 1926 Subpart P, Excavations, since those are the responsibility of the construction contractor. Do not address pipe corrosion potential or corrosion mitigation measures as these will be covered in any pipe corrosion study performed for the project.**

9. Prepare three separate reports for pipelines constructed by tunneling and trenchless methods that are large diameter, long length, or under major facilities such as multi-lane highways: Prepare a Geotechnical Baseline Report that the project design engineer / project manager will include in Section 00220A of the Project Manual a Geotechnical Data Report that the project design engineer / project manager will include in Section 00220B of the Project Manual and a Geotechnical Design Memorandum that will be included in the project files but not in the Project Manual.

a. Geotechnical Data Report

See Section 2.9.5.F.8.a

4. Geotechnical Baseline Report

a. Prepare a GBR for the following types of construction:

- i. all tunneling and horizontal directional drilling projects, regardless of diameter, length, or depth**
- ii. auger boring projects where the nominal diameter of the encasement pipe exceeds 28" and the length of the encasement pipe exceeds 250'**

- iii. any type of trenchless installation under a settlement-sensitive facility such as a multi-lane highway, railroad track, building or other engineered structure
- iv. any type of trenchless installation crossing under buried lifeline facilities such as system-critical potable water transmission mains or wastewater trunk or outfall lines where the outer limits of the trenchless construction will be within 5' of the outside surface of that facility
- v. other installations as appropriate in order to exercise a reasonable standard of care in managing risk

b. The GBR will be included in Section 00200 of the Project Manual.

c. Content

b. Geotechnical Baseline Report

- i. Provide baseline geotechnical information to establish what constitutes "anticipated site conditions for the project." These include characterizing the ground, assessing feasible construction methods, predicting ground behavior, evaluating ground support systems, and addressing groundwater management practices. The experts in underground construction must author or co-author the GBR because it is a contractual document that allocates risk associated with construction. The experts must be knowledgeable of and experienced in all aspects of the design elements associated with the particular tunneling or trenchless method and the means and methods employed for that type of construction. The experts must have previously prepared detailed designs, construction cost estimates, technical specifications, and construction contract provisions covering the particular tunneling or trenchless method and any associated construction.
- ii. Use clear, concise prose organized in parallel structure. Provide specific, quantifiable, and measurable baselines, not subjective, vague descriptors. Reference the GDR in the GBR; do not gratuitously repeat its contents.
- iii. Follow ASCE's Geotechnical Baseline Reports for Construction, Suggested Guidelines (Essex, 2007). However, do not use the checklist in that publication as the outline for the GBR. Instead, describe baseline conditions reach by reach, sequentially along the project alignment. (A reach is defined as a segment having consistent ground conditions and excavation methods.) Address all baseline conditions and design and construction considerations for each reach in a single section of the GBR. Do not describe baseline conditions in terms of ranges of values. Instead, describe baselines as maximum, minimum, or average values. Alternative ways of describing baselines may be used when authorized. Write the GBR using parallel structure to present information reach by reach in the same repetitive manner. Discuss distinctly different elements of work separately. For instance, discuss tunnels separately from shafts. Minimize the presentation of information not related to baseline conditions. As an example, do not include lengthy discussions about geologic setting or project

background information, both of which should be adequately discussed in the GDR.

iv. If groundwater is expected to enter a tunneling or trenchless method construction excavation, the GBR must include a baseline inflow rate.

v. The GBR must include a geologic profile(s) showing the proposed trenchless excavation limits superposed on the geologic structure, stratigraphic features, and geologic units. The geologic profile shall only be shown in the GBR, not in the construction drawings. For HDD projects, a Geotechnical Characterization Profile may be substituted for a Geotechnical Baseline Report, provided the GCP meets the criteria in PRCI's Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide (Hair, 2015). The GCP shall be included in the construction drawings.

~~c. Geotechnical Design Memorandum~~

~~See Section 2.9.5.F.8.b.~~

105. Prepare reports as directed by **Austin Water** ~~the Water Utility~~ for projects that are a combination of open cut excavation and tunneling or trenchless methods.

G. References

Barnes, V. E., Geologic Atlas of Texas, Austin Sheet, The University of Texas at Austin, Bureau of Economic Geology, 1974.

Essex, R. J. ed., Geotechnical Baseline Reports for Construction, Suggested Guidelines, American Society of Civil Engineers, 2007.

Garner, L. E., and K. P. Young, Environmental Geology of the Austin Area: An Aid to Urban Planning, The University of Texas at Austin, Bureau of Economic Geology, 1976.

Hair, J.D. & Associates, Installation of Pipelines by Horizontal Directional Drilling, An Engineering Design Guide, Pipeline Research Council International (PRCI), Catalog No. PR-277-144507-R01, September 23, 2015.

North American Society for Trenchless Technology (NASTT), Glossary of Trenchless Terms, <https://www.nastt.org/resources/glossary/>

Rodda, P. U., L. E. Garner, and G. L. Dawe, Geologic Quadrangle Map No. 38, Austin West, Travis County, Texas, The University of Texas at Austin, Bureau of Economic Geology, 1970.