ENGINEERING DESIGN STANDARDS

VOLUME 2

DRAWING STANDARDS GUIDE

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CHAPTER 1
INTRODUCTION

1.1 PURPOSE

The purpose of these standards is to establish uniformity in the preparation of Contract Drawings and enhance consistency in drafting methods, symbology, and abbreviations. Design Engineers and Contractors are required to be familiar with these uniform standards.

1.2 SCOPE

This guide provides guidance and procedures for completion of engineering drawings for the Owner. The following sections of this guide address topics such as project folder setup and organization, sheet layout requirements, presentation graphics, layer-naming conventions, file naming conventions, and standard symbology. This guide addresses the production of design drawing sets using Computer Aided Design and Drafting (CADD).

The issuance of these standards does not relieve the Engineer from assuring that the standard details are correct and applicable to their specific project.

The latest revision of the Drawing Standards will be available at LVVWD.com and SNWA.com.

1.3 STANDARDS

The list below includes industry standards that may be referenced or used during design.

- American Institute of Architects (AIA) CAD Layer Guidelines
- National CAD Standards (NCS)

The list below includes local standards that may be referenced or used during design.

- Owner's Engineering Design Standards (EDS)
- Uniform Design & Construction Standards for Wastewater Collection Systems (DCSWCS)
- Uniform Standard Drawings for Public Works Construction, Offsite Improvements, Clark County Area (USD)
- Hydrologic Criteria & Drainage Design Manual, Clark County Regional Flood Control District
- State of Nevada, Department of Transportation, Standard Plans for Road and Bridge Construction
- State of Nevada, Occupational Safety and Health Administration Standards for General Industry

- State of Nevada, Occupational Safety and Health Administration Standards for Construction
- NV Energy Construction Standards

1.4 CLASSIFICATION OF DRAWINGS

The following are the various types of drawings used.

- Contract (Commitment) Documents (Drawings) - The drawings which show the scope, extent, and character of the Work to be furnished and performed by the Contractor.

- Conformed Set (Drawings) – Contract Documents modified to include addenda, request for clarifications, and bid questions during the bid process, prepared and stamped by the Design Engineer. Conformed drawings may not be required for small projects. Exceptions may be approved by the Engineering Division Manager.

- Shop Drawings - All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for the Contractor and submitted by the Contractor to illustrate some portion of the Work.

- As-Built Drawings (Red-Line Drawings) - Drawings marked up in the field to reflect changes to the design documents compiled by the Inspector / Contractor (modifications, field changes, shop drawing changes, design changes, extra work and every change that was approved and made during construction).

- Record Drawings – Drawings compiled from the as-built drawings submitted by the contractor, as a record of the work.

- Site (Living) Drawings – Drawings compiled from one or more contracts, or generated from field verification for maintenance purposes, which reflect the most current information about the facilities at a project site.

CHAPTER 2
ORGANIZATION

2.1 GENERAL

A Deliverable file is a drawing that contains information unique to specific drawing:

- Title block/information, such as: title, drawing number, sheet number, filename
- Specific notes, subtitles
- XREFs, Images
- Text, callouts, dimensions, scale bar, north arrow

Master files may contain background information, such as:

- Existing topographic features
- Proposed topographic features
- Proposed topographic features (contours or spot elevations)
- Roadways/sidewalks
- Yard piping
- Site electrical
- Facility grid/coordinate system
- Boring locations
- Existing facility outlines
- Proposed facility outlines at ground level
- Erosion and sedimentation control plan
- Project specific attribute file

XREF files are allowed within all AutoCAD deliverable files except for the Final Submittal. XREF files within the final AutoCAD deliverable files are to be incorporated using the XREF bind/insert function.

2.2 PRODUCTION SOFTWARE

Owner uses a current “production” version of AutoCAD software. Design Engineer may use other CADD systems, but it is their responsibility to provide all CADD file translation services. The deliverable AutoCAD format computer file and Bond plot must meet all the quality requirements of the CADD Guidelines.

2.3 FILE NAME

Each drawing file that represents a drawing sheet must be named in the following manner.

Project Number – Sheet Number - Discipline Code – Drawing Number

- Project Number – eBuilder generated Project Number.

- Sheet Number - A sequential number assigned to a sheet (within a set of sheets) for a drawing number. The Cover Sheet (Vicinity and Location Map) will be counted as the first sheet of the contract set. All sheets included in the contract set must be included in the sheet count. Alpha characters are not allowed as part of the sheet number.

    - For Contract Drawings, Sheet Number is a number of a sheet out of total number of sheets in the drawing set
    - For Site (Living) Drawings, Sheet Number is a number of a sheet out of total number of sheets in the specific discipline of a drawing set

- Discipline Code – An alphabet designated to discipline (C – Civil, E – Electrical, G - General etc.). See **Appendix A** for a sample list of Discipline codes.

- Drawing number - A sequential alpha numeric number assigned to a sheet (within a set of sheets) to indicate the sequence of drawings within a discipline.

Hyphens are to be used to delineate between fields (do not use underscores).

The following examples illustrate the standard for drawing file naming:

3223L-1-G-G1.dwg
3223L-1-G-G1.pdf

2.4 SHEET ORDER

Drawing sets shall be arranged in a logical manner to minimize confusion. When detailed sheets are needed, they always start with a specific discipline, followed by that discipline's details. See **Appendix A** for a general guideline of the drawing sheet order.

2.5 STANDARD TEMPLATES

Standard templates shall be provided by the Owner. This will create efficiency and uniformity through all projects. All drawings shall use standard title-block (Contract-shell.dwg). If the title-block is exploded or modified, the submittal will not be accepted.

When AutoCAD files are prepared for submittal, the paper copy and the electronic view on the screen must be the same. Drawings shall be assembled in a consistent manner throughout the contract.

AutoCAD drawing deliverable sheet files may contain multiple layout tabs at any submittal except for the Bid set Submittal. Bid Set submittal shall contain both a single ACAD and PDF file of each signed original individual sheet and an overall combined PDF of the signed set.

CHAPTER 3
CONTENT

3.1 LAYERS

Layers serve to organize information within the design file in both sheet deliverables and referenced files. The uniformity of the layer name is critical to the organization and the structure of the drawing. Layers are used to group information in a drawing by function and to enforce line type, color, and other standards.

Every drawing includes a layer named 0. This layer cannot be deleted or renamed.

Layer names consist of distinct data fields separated from one another by a dash.

Discipline– Category– Status – User Defined (optional)

Discipline (1 character) - see **Appendix A** for the Drawing/Layer Disciplines.

Category (3-characters) - See **Appendix B** for layer prefix grouping

Status (1-character) – This is a mandatory field that distinguishes the data contained on the layer according to the status of the work or the construction phase. The following are some of the characters used.

P = Proposed
F = Future
B = By Others
D = Demolition
R = Removed
A = Abandoned
T = Temporary Work
M = Items to be moved
X = Existing
1-9 = Phase Numbers

The following example illustrates the layer naming for Civil Roadways proposed East Road:

C-RDSP-EAST

Appendix B shows a master layer list used in a contract drawing. This list is not considered final or expected to have all the layers necessary for each individual contract. Any layers not found in the master list shall conform to the above standard convention for their naming. Any layer not consisting of a single color or line type is up to the discretion of the user while still in accordance with the Plot Styles (see **Appendix D**).

3.2 TEXT STYLES

All text shall follow these parameters:

- All text shall be upper case, unless approved otherwise by Owner
- Make every reasonable effort to place text horizontally and consistently use the justification left
- Text should never be scaled, stretched, or compressed to fit a specific situation
- Text width is always 1 or 100%. If the width needs to be modified to fit, a minimum of .8 or 80% is permitted
- Typical text font shall be ARIAL
- Typical title font shall be ARIAL
- Line spacing will be equivalent to the AutoCAD default
- Fractions should be written horizontally and have slanted midlines (i.e., 1/2, 1-1/2)
- Uniformity in text size as well as style will be maintained

Text Style examples are shown in **Appendix C**.

Text shall be placed to facilitate reading from the bottom or the right-hand edge of the drawing. The guide for reading is as follows:

- Horizontal lettering shall be read from left to right
- Vertical lettering shall be read from bottom to top
- Diagonals shall read from left to right, bottom to top for text oriented 0-90 degrees, and top to bottom or text oriented >90-180 degrees

Two types of notes appear in the drawing: general notes which apply to all the drawings and view notes which apply to specific features on a specific drawing.

General notes convey information common to the components of an entire drawing, process area, discipline, or to all the drawings in the package. General notes are presented either in the drawing which they apply (i.e., General Structural Notes), or on the General Sheet, titled “General and Project Notes”. General note sheets contain multiple columns of notes.

- General notes should be placed in a column with single-spaced lines within each note (1/16-inch apart) and double-spaced (1/4-inch apart) between notes.
- The general note columns should be no wider than 5-3/4 inches plus a 1/4-inch margin between the notes and the drawing border. These columns should be left justified whenever possible.

View notes convey information about a specific component of a specific drawing. The view notes should be located 1/4-inch between the lettering and the drawing and should

be left justified. The right-hand side of a drawing, if required, is designated for items other than plans, sections, elevations, and details (such as notes, legend, key map).

3.3 DIMENSION STYLES

A dimension style is a named collection of dimension settings that control the appearance of different elements, such as arrowhead style, text location, and lateral tolerances. Like Text Styles, Dimension Styles are annotative as well.

All the dimensions shall follow these parameters:

- If an object has dimensions that are too long to be shown on the scale being used, the object should be broken or jogged using the application functions and never exploded.
- The scattering of dimensions across the sheet should be avoided.
- Place text/callouts in an organized manner before placing leaders.
- The overall dimension and string dimensions should be located away from the object drawing as possible to ensure uniformity and clarity, in addition to providing space for any future notations.
- Where several closely spaced parallel lines occur (i.e., pavements, shoulders, curbs, medians), the dimensions are placed between the parallel lines without using arrows.
- Enlarged details shall be used where dimensioning would be congested or crowded.
- Leader or callout lines are drawn at an angle of 30 to 60 degrees, with an arrowhead at the drawing feature being annotated. Where straight-line leaders are used, leader lines should start at the note, with a short line (1/8-inch minimum) parallel to the note's base. When the note is to the right of the object, the leader line should start with the first word of the note. When the note is to the left of the object, the leader lines should start with the last word of the note. Leader lines in the same area should be parallel.
- Avoid leader lines that are:
    - Horizontal or vertical
    - At the same angle as cross hatching
    - At very small angles to the terminating surface
    - Parallel to extension or dimension lines
    - Crossed or cross design features
    - Too long

Acceptable practices for dimensioning and leader lines are as follows:

- Dimensions of 12 inches or more are shown as feet and inches (e.g., 1'-0", 36'-3", 16'-3 3/8"). See the exceptions below.
- Dimensions less than 12 inches are shown as inches only (for example, 1", 4", not 0'-4").

- Exceptions to the above are as follows: pipe diameters (e.g., 30"DIA), weld dimensions (e.g., 4-16), column sizes (e.g., 24-inch SQUARE), reinforcing spacing (e.g., #4 at 12 #5 at 16), and structural steel (e.g., L5x3x1/4x0'-6", PL 1/2x12, BAR 2x1).
- Civil drawing using engineering scales shall use dimensions in decimal feet (e.g., 1.75', 23.25', 16.00'). Road and street grades shall be shown in percentages (e.g., 4.50%).
- Sewer and waterline grades shall be shown in feet per foot (e.g., 0.0450). Minus signs shall precede grades with negative slopes, and plus signs shall precede grades with positive slopes.
- Every reasonable effort should be made to avoid double dimensioning. Do not repeat dimensions in additional views of an object, unless repetition is required for clarity.

Line terminators shall be used on dimension lines and leader lines. The type of line terminator used depends on the feature to be emphasized and available space. Line terminators can be used as follows:

- Arrowheads should be used to terminate the dimension and leader lines. If a dimension is required inside a space less than 3/8-inch, external dimension lines and arrowheads can be used.
- Slashes should be used to terminate dimension lines inside a space less than 3/8-inch. Slashes are approximately 1/8-inch long.
- Loops should be used to determine leader lines at reinforcing steel bars, electrical wires, single-line piping, and schematic lines. Their approximate radius is 1/16-inch, and they start and stop one radius from the line identified.
- Avoid crossing dimensions, extensions, or other leader lines. If crossing dimensions lines is unavoidable, always break the leader line using the available application features but never explode the dimension.
- A terminator shall always touch the item to which it is pointing.

3.4 PLOT STYLES

Plotting is achieved through defined layouts, page setups, and plot styles. A plot style controls how an object or layer is plotted by a set of overrides for color, dithering, gray scale, pen assignments, screening, lineweight, endstyles, joinstyles, and fillstyles. See **Appendix D** for plotter pen examples.

All drawings should produce acceptable prints when scanned and reprinted at original, enlarged and/or reduced scales from original records. Special attention should be given to avoid the following problems that cause poor reproduction quality:

- Lettering that is too small on scaled plots
- Smudges, dirt, stains, wrinkles, and creases resulting from careless handling
- Insufficient space between lines and lettering

- Overdrafting, such as excessive cross-hatching and shading

The Owner's template includes additional plot styles.

3.5 LINE TYPES

Line types represent drawing features. See **Appendices B & E** for line types examples and usage.

3.6 SHEET SIZE

Contract Drawings size shall be ARCH D standard size 24 inch (Width) x 36 inch (Length). Due to the Owner's printing requirements, Model Space and Paper/Layout Space drawings are only permitted. The drawing shell shall always be inserted into Paper/Layout Space at (1:1 scale) 24 inch x 36 inch and drawing "psltscale" to be set at "1".

Addendum, Change Order and other drawings prepared during construction shall be ANSI standard size A (8.5x11), B (11x17) or ARCH D (24x36).

3.7 SCALE

Use the smallest possible scale to show the view without obscuring vital details. Here are some typical drawing scales.

Table 3-1 Typical Drawing Scales

Discipline	Scales
General Plan Views, Site Civil, Yard Piping, etc.	1 inch = 10, 20, 30, 40, 50, 60, 100 feet
Enlarged Plan Views	1 inch = 2, 3, 4, 5, 6, 10 feet
Plan and Profile Views	Horizontal: 1 inch = 40 feet Vertical: 10:1 ratio of horizontal scale only
Architectural Plans, Structural Plans, Mechanical Plans, Sections, Details,	As commonly used and found on Engineer's or Architect's scale
Enlarged Sections, Details	As commonly used and found on Engineer's or Architect's scale

The rules listed below should be followed to show the scale of a drawing:

- On single or multiple plan views, a scale bar depicting the scale is required to be placed under or near the north arrow.
- On sections and details providing single or multiple views on a drawing, the appropriate scale should be noted below the title of each view.
- When the section or detail has no scale, "NTS" (not to scale) should be noted below the title of each view. The notation "NTS" (not to scale) should be minimized

and used only for specific dimensions or details that are not to scale within the drawing. NTS drawings shall still make every effort to maintain relative sizes and dimensions.

3.8 SYMBOLS / LEGEND

See **Appendix F** for examples.

Follow these standards.

- Uniform Design and Construction Standards for Water Distribution Systems, Latest Edition
- ANSI Y32.2.3-49 Graphics Symbols for Pipe Fittings, Valves, and Piping
- ANSI Y32.2.4-49 Graphics Symbols for Heating, Ventilation, and Air Conditioning
- ANSI Y32.4-77 Graphics Symbols for Plumbing Fixtures for Diagrams Used in Architecture and Building Construction
- ANSI Y32.9-72 Graphics Symbols for Electrical Wiring and Layout Diagrams Used in Architecture and Building Construction
- ANSI Y32.11-61 Graphical Symbols for Process Flow Diagrams
- ANSI Y32.18-72 Symbols for Mechanical and Acoustical Elements as Used in Schematic Diagrams

3.9 ABBREVIATIONS

See **Appendix G** and **Volume 1 General Design Guide Appendix A** for examples. If abbreviations other than those included in the Appendix are used, they must be added to the abbreviations list in the general sheets.

CHAPTER 4
DESIGN

4.1 BORDER (TITLE BLOCK)

All drawings shall use standard title block (contract-shell.dwg) provided by the Owner. All borders shall be inserted in the layout space/paper space at full scale and insertion point of 0, 0. See **Appendix H** for the title block example. The title block on the right side of the border includes:

1. Owner's Logo – Las Vegas Valley Water District, Big Bend Water District or Southern Nevada Water Authority logos and addresses. Owner's logos can be turned on/off using AutoCAD layers within the title block.

2. Design Engineer's Stamp – Design Engineer's electronic PE stamp

3. Project Name – Site Name, Facility Name, Project Title, Discipline, and Sheet Title. The Operations Department maintains a list of current site names and their IDs. The Owner will generate a new site name and ID for a site not listed during Scope of Work. Some projects touch multiple sites, so there will be multiple Site IDs per project. Site names shall not be shown on Legend sheets and sheets which have common details for multiple sites.

4. Consultant's Logo and Signatures – Consultant name, address, and phone number and names of drafters, design engineers, checkers, and approvers. The Owner's logo at the bottom right of the title block shall be replaced with Consultant's logo.

5. Project Numbering – Project Number / Commitment Number, Site ID, Drawing Number and Sheet Number. Refer to file naming requirements in Chapter 2. Commitment No. is expected to be generated by APTTUS and Project No. is expected to be generated by e-Builder and provided by the owner to the Design Engineer.

6. Revisions (changes made after the first approved version) shall be shown as text with Δ (delta) and number on the left side of title block, no box needed.

4.2 SIGNATURES AND STAMPS

Stamps, seals and signatures shall be per regulations NRS 625.610 and 625.611. Electronically locked files (PDF) with encrypted digital signatures may be accepted by these regulations for electronically submitted documents. All PDF files shall be flattened. The design engineer's PE stamp can be digitally placed as a project specific attribute. Final submittals must be hard copies with original signatures in blue ink. Digitally signed or locked files will not be accepted for the Final Submittal.

Signatures for all relevant agencies should be located on the appropriate general sheet and each sheet within the contract should be signed and sealed by the design engineer in responsible charge of that discipline.

4.3 KEY MAP

Key Map is a small plan view of the facility or pipeline alignment. Keymap shall be provided on the general index sheet for a project at a minimum. A keymap shall be provided for all partial plans and matchline sheets.

4.4 NORTH ARROW & STATIONS

A North arrow shall be included in all general plans, site plans, building floor plans, details or other appropriate drawings. The North arrow shall be in the upper right corner of the drawing, orient vertical or up or 90 degrees to the left or right. North arrow and all text are to be oriented to be read from the bottom and right. Any variation from this orientation must be approved by the Owner.

All Stationing is to be oriented from left to right. Stations are to be consistent at matchlines and station equations are not permitted. Pipeline stationing always increases from left to right across each plan and profile drawing. The stationing limit on each sheet shall be 1,000 feet max. for plan and profile sheets and 2,000 ft max. for sheets with no profiles (smaller diameter pipelines).

4.5 VIEWS, SECTIONS & DETAILS

The following guidelines should be followed in placing views.

- The main plan view should be placed in the upper left corner of the drawing such that sections or elevations can be projected directly below or across from the plan. If there is more than one plan view, views should be arranged at the top of the drawing in sequence from left to right.

- Sections (letter), details (numeral), elevations, and schematics (in that order) should be placed directly below the main plan view when space is available; otherwise, they should be placed to the right. Whenever possible, views that relate to one another should be grouped on the same drawing.

- The view notes should be located 1/4-inch between the lettering and the drawing and should be left justified. The right-hand side of a drawing, if required, is designated for items other than plans, sections, elevations, and details (such as notes, legend, key map).

- All views, sections and details shall be orderly and separated by lines.

- For projects with multiple sites, details should be shown for each site even if the details are similar.

- Details, sections and elevations shall be cross referenced to the plan.

- Refer to **Appendix H** for proper section cut direction, arrows, and call out graphic symbology.

4.6 EQUIPMENT NUMBERING SYSTEM TAGS

Numbering system shall be provided for components such as pumping equipment, piping valves, motors, controls, instruments, and other devices necessary to make up a completed facility that can be functionally tested and operated. This component numbering is maintained throughout the drawing lifecycle and is required to be shown even on record drawings.

SCADA tags shall be used for equipment numbering. Please refer to the **Volume 11 Instrumentation and Control Design Guide** for equipment numbering.

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CHAPTER 5
DRAWING REVISIONS

5.1 GENERAL

This chapter provides guidelines for Contract Drawings. All revisions to the drawings are to be clouded in AutoCAD. Numbered or lettered revision triangles will be placed with clouded areas and in the revision area to the left of the drawing title block. A detailed description of the changes shall also be provided in the revision area to the left of the title block.

Revision clouds are not required for any changes during the percentage submittal of the design drawings. Clouding should be utilized for revisions during the bid and construction process (addendum, Change Order, & Updates). Clouding will be saved for permitting set as the permitting agencies require it. Clouding shall be removed for any major version of the contract drawings (Design, Conformed, and Record). Clouding and revision designations will be set up on a separate CADD layer to permit future removal.

Provide AutoCAD drawing files with all the changes. These changes shall not be made to the files in the final design archive. Instead, the final design files shall be restored to a new directory created for services during construction. If necessary, create additional drawing files, and the index to drawings shall be revised accordingly.

5.1.1 Addenda

Addenda are written or illustrated instructions issued to all people on the plan holders (the prospective bidders) list prior to the opening of construction bids. Addenda are used to clarify, review, add to, or delete from the original contract documents package or previous addenda. The primary purpose of an addendum is to correct discrepancies in the drawings and specifications and to clarify questions raised by bidders during the bid process. Example of Revisions is shown in **Appendix I.**

5.1.2 Conformed Set

The conformed set is defined as Contract Documents modified to include addenda, request for clarifications and bid questions during the bid process. The conformed set will be prepared and stamped by the Design Engineer. Clouding, revision deltas (within drawing area only) and the engineer seals shall be removed. Conformed Stamp block to be added (see **Appendix I**).

5.1.3 Change Order

Change orders are written or illustrated changes to the contract documents that are signed by all responsible parties and issued after the execution of the contract. A change order authorizes an addition, deletion, or revision in the work. The purpose of a change

order is to add or delete work, correct discrepancies, or account for changes required by unexpected field conditions encountered during construction. Change order revisions are shown like Addenda revisions. Change order revisions will remain on the record drawing to provide a history of revisions.

5.1.4 As-Built (Red-Line) Drawings

Red-Line Markup Drawings are created during construction. These are drawings marked up in the field to reflect changes to the design documents compiled by the Inspector / Contractor (modifications, field changes, shop drawing changes, design changes, extra work and every change that was approved during construction).

Field redline markups, which are scanned paper copies or Red-Lines created in Redeye are forwarded for As-Built drawings creation in-house or by Design Consultant. After Substantial Completion, the Contractor submits all the Red-Lines for CM review. After approval, the Red-Lines are transmitted either to the Design Consultant or In-house for As-Built/Record Drawing creation.

As-Built drawing stamp shall be as shown in **Appendix I**.

5.1.5 Record Drawings

Record drawings are the Conformed drawings revised to show final construction according to the best records available. The information is typically furnished by the Construction Team in various forms including As-Built (Red-Line) drawings, filed notes, and GPS location records. Record drawings include data from all addenda and change orders, along with any other drawing changes made in response to special conditions encountered during construction. There shouldn't be any clouding on a record drawing.

Signatures for all relevant agencies, located on the general sheet, shall be replaced electronically in the record drawing set with the signers' name and date signed or agency name and date, if name cannot be read. A signature note shall be added to the general sheet explaining the addition (see **Appendix I**).

On each sheet the Design Engineers stamp, and signature shall be replaced with a standard Engineer's Seal note populated with the engineers' name, license number, and date the original sheet was stamped (see **Appendix I**).

Original signed drawings are stored at the Owner's site.

5.2 DRAWINGS WORKFLOW

Drawings are created and managed in-house or by a Design Consultant. The workflow chart published on Hydroweb (Owner's internal website) describes the teams overseeing drawings in various phases of drawing creation.

CHAPTER 6
DELIVERABLES

6.1 GENERAL

Deliverables shall be in accordance with Chapter 2 General Administrative Guidelines of **Volume 1 General Design Guide**.

Project deliverables shall be PDF, AutoCAD files and hard copies as required accompanied by a transmittal. All PDF files shall be unlocked, named, bookmarked, and flattened correctly. In general, the following are deliverables:

- 60% Review submittal – PDF, AutoCAD files, hard copies as required
- 100% Review submittal – PDF, AutoCAD files, hard copies as required
- Bid set – PDF, AutoCAD files, hard copies as required
- Conformed set – PDF, AutoCAD files, hard copies as required
- As-Builts – PDF, hard copies as required (typically prepared by the Owner)
- Record set – AutoCAD files prepared by the Owner only

6.1.1 Hard Copy Sheets

Hard copies shall be of white, Bond paper, 24-lb minimum weight. Mylar plots as required for agency permitting.

6.1.2 Digital Files

All drawings shall be delivered in AutoDesk software (Civil 3D) drawing files and as individual and full set combined PDFs. Verify the AutoCAD version to be used with the Owner prior to the start of the project. File naming conventions shall be per **Chapter 2 Organization**.

6.2 PLOTTING AND REPRODUCTION

All drawings should produce acceptable prints when scanned and reprinted at original, enlarged and/or reduced scales from original records. Special attention should be given to avoid the following problems that cause poor reproduction quality:

- Appropriate layers are set correctly in the deliverable file and in all reference files
- Correct reference files are displayed, and screened colors are used where required

- Lettering that is too small on scaled plots
- Smudges, dirt, stains, wrinkles, and creases resulting from careless handling
- Insufficient space between lines and lettering
- Over drafting, such as excessive cross-hatching and shading
- All mylar plots should be plotted with mirroring option on

APPENDIX A
Discipline Codes and Sheet Order

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Discipline Codes and Sheet Order

Sheet Order	Code	Discipline	Sub Discipline
1	G	General	Cover Sheet, Location Map, List of Drawings
			General Notes
			Abbreviation List
			Legend, Utility Signatures
			Hydraulic Profile, Flow Diagram
2	SV	Survey	Symbols, Legends, Notes
			Horizontal Control Plans
			Topographical Plans
3	D	Demolition	Symbols, Legends and Notes
			Plans
4	C	Civil	Symbols, Legends and Notes
			Site Plans
			Piping Plan and Profiles
			Grading and Paving Plans
5	CD	Civil Details	Piping Sections and Details
			Miscellaneous Civil Details, Standard Plates
6	L	Landscaping and Irrigation	Symbols, Legends and Notes
			Landscaping Plans
			Irrigation Plans
7	LD	Landscaping and Irrigation Details	Details
8	A	Architectural	Symbols, Legends and Notes
			Plans
			Schedules
9	AD	Architectural Details	Elevations
			Sections and Details
10	S	Structural	Symbols, Legends and Notes
			Plans
			Miscellaneous Plans
11	SD	Structural Details	Details
			Sections
12	P	Plumbing	Symbols, Legends and Notes
			Site Plans
13	PD	Plumbing Details	Sections and Details
14	F	Fire Protection	Symbols, Legends and Notes
			Site Plans
15	FD	Fire Protection Details	Details
16	M	Mechanical	Symbols, Legends and Notes
			Piping Plans and Equipment Schedules
			Process Flow Diagrams
			Equipment Arrangement Plans

			HVAC Plans and Schedules
			Cathodic Protection
			Demolition Plans
17	MD	Mechanical Details	Sections and Details
18	E	Electrical	Symbols, Legends and Notes
			Site Plans
			Single Line Diagrams and Switchgear, MCC Elevations
			Pump Schematic, Wiring Diagrams and Logic Diagrams
			Power and Grounding Plans
			Lighting and Heat Trace Plans
			Power and Lighting Panel Schedules
			Power and Control Conduit Schedules
			Miscellaneous Schematic and Wiring Diagrams
			PLC Schematic and Wiring Diagrams
19	ED	Electrical Details	Details
			Panel Layouts
20	I	Instrumentation	Symbols, Legends and Notes
			Process and Instrumentation Diagrams
			Instrument Loop Diagrams
			RTU Wiring Diagrams
			Miscellaneous Schematic and Wiring Diagrams
			Instrument Plans
21	ID	Instrumentation Details	Details
			Miscellaneous Panel Layouts
22	T	Traffic	Symbols, Legends and Notes
			Plans and Elevations
23	TD	Traffic Details	Details
24	H	Hydrology	Symbols, Legends and Notes
			Well Construction Completion
			Well Traffic Barricade and Flush Route
			Well Startup Valving and Yard Piping
25	MU	Multi Discipline	Multi Discipline
26	X	Exhibit/Interpretive	Symbols, Legends and Notes
			Plans
27	XD	Exhibit/Interpretive Details	Details

APPENDIX B
Layers

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MASTER LAYER LIST

LAYER PREFIX GROUPING	STATUS SUFFIX BY PEN COLOR								LINETYPE BY STATUS (● INDICATES ONE LINETYPE FOR ALL STATUS SUFFIXES)																														DESCRIPTION
	DEFAULT COLOR (FOR ALL)	P PROPOSED	X EXISTING	F FUTURE	B BY OTHERS	R REMOVED	A ABANDONED		CENTER			CONTINUOUS			DASHED			DASHEDX2			HIDDEN			HIDDEN2			PHANTOM			PHANTOM2			DOT2						CREATED - SEE LEGEND	
0	7												●																											MISCELLANEOUS LAYER
C-WAL	2																																						●	BLOCKWALL OR FENCE
* CITYVIEW																																								CITY LOCATION MAP MVIEW FOR DISTRICT USE
* CORNERS																																								INTERIOR BORDER OF TITLE BLOCK
C-BLD		2	1	–	–	–	–						P								X																			BUILDING
C-CEN	1									●																															CENTERLINES
C-CON		3	252	–	–	–	–						P								X																			CONTOURS, PROFILE GRADES
C-DIT	2																	●																					●	DITCHES, WASHES AND TRENCHES
C-EAS	3																			●																				EASEMENTS
C-GRID-1	4																																		●					INTERMEDIATE PROFILE LINES PER EXAMPLE
C-GRID-2	3												●																											PROFILE BORDER LINES PER EXAMPLE
C-PRL	2												●																											PROPERTY LINES
C-RDS	2										P,F		B		X		R,A																							ALL SIDEWALK, CURB & GUTTER,
																																								DRIVEWAYS, AND ROADS
C-ROW	4																										●													RIGHT-OF-WAY
C-SEC	3																													●									SECTION LINES
C-SGN	1												●																											SIGNS
C-SLT	2																																						●	STREET LIGHT
C-UTL	1																	●																						UTILITIES
C-WTR		3,6	3	1	3	1	1				P		B		X		R,A				F																			16" AND SMALLER (6), SIZES ABOVE 16" (3)
E-AGO		3	2	1	2	2	2						●																											ABOVE GROUND ONSITE
E-DET		3	2	1	1	2	2						●																											DETAILS
E-EQP		3	1	1	1	1	1				P		X										F,R	A,B															EQUIPMENT
E-SIT		3	1	1	1	1	1						●																											SITE PLANS
E-GND		3	1	2	–	1	1						●																											GROUNDING
E-UGO		3	1	2	1	1	1						●																											UNDERGROUND ONSITE
HATCH	1												●																											ALL HATCHING
L-LAN	2												●																											ALL LANDSCAPING
* MTOOLS																																								MODEL SPACE

* – REFERENCE LAYER

MASTER LAYER LIST

LAYER PREFIX GROUPING	STATUS SUFFIX BY PEN COLOR								LINETYPE BY STATUS (● INDICATES ONE LINETYPE FOR ALL STATUS SUFFIXES)																										DESCRIPTION
	DEFAULT COLOR (FOR ALL)	P PROPOSED	X EXISTING	F FUTURE	B BY OTHERS	R REMOVED	A ABANDONED		CENTER		CONTINUOUS		DASHED		DASHEDX2		HIDDEN		HIDDEN2		PHANTOM		PHANTOM2		DOT2								CREATED - SEE LEGEND	
* MVIEW																																					MVIEW
* PLOTDATE																																					AUTO FILE NAME, PLOT DATE AND TIME UPDATED
* PTOOLS																																					PAPER SPACE
* SHELL																																					TITLEBLOCK
* SITE1																																					JOB SITE 1 MVIEW FOR DISTRICT USE
* SITE2																																					JOB SITE 2 MVIEW FOR DISTRICT USE
TEXT1-X	2																																				TEXT, DIMENSIONING, LEADER ARROWS AND NOTES
TEXT2-X	3																																				STREET NAMES
TEXT3-X	3																																				DETAIL AND DRAWING TITLES (INCLUDING THE DETAIL TITLE UNDERLINE)
TEXT4-X	3																																				PROFILE GRID STATIONS, ELEVATIONS AND ALL
																																					INTERMEDIATE DETAIL AND TITLEBLOCK TITLES
* WD-BLK																																					FOR USE IN LVVWD TITLE BLOCK
* WD-BLU																																					FOR USE IN LVVWD TITLE BLOCK
* WD-TEXT																																					FOR USE IN LVVWD TITLE BLOCK
* WD-YEL																																					FOR USE IN LVVWD TITLE BLOCK

* – REFERENCE LAYER

MASTER LAYER LIST (DETAILS ONLY)

LAYER PREFIX GROUPING	STATUS SUFFIX BY PEN COLOR								LINETYPE BY STATUS (● INDICATES ONE LINETYPE FOR ALL STATUS SUFFIXES)																										DESCRIPTION
	DEFAULT COLOR (FOR ALL)	P PROPOSED	X EXISTING	F FUTURE	B BY OTHERS	R REMOVED	A ABANDONED		CENTER		CONTINUOUS		DASHED		DASHEDX2		HIDDEN		HIDDEN2		PHANTOM		PHANTOM2		DOT2		FENCELINE1					CREATED - SEE LEGEND	
D-CEN		1								●																									ALL CENTER LINES
D-CYN		4										●																							PROPOSED PIPE LINES
D-GRN		3										●																							PROPOSED DETAIL PERTAINING TO TITLE
D-YEL		2																	●																PROPOSED HIDDEN LINES OF DETAIL
D-YEL		2										●																							PROPOSED DETAIL
D-YEL			2											●																					ALL EXISTING
D-RED	1											●																							ALL HARD TO SEE SMALL PARTS SUCH AS BOLTS
D-VLT		3	1	–	–	–	–					●																							VAULT
I-EQP		2	1	1								●																							FIELD INSTR (w/ PWR)/CONTROL DEVICES
I-SIG		3	2	1										●																					SIGNAL LINES
I-COM		2	1	1																														●	SOFTWARE LINK LINES
I-PWR		2	1	1								●																							SUPPLY POWER
I-SYMP		2	1	1								●																							INSTRUMENT SYMBOLS (RTU, SCADA, PLC, ETC)
M-EQP		3	2	1								●																							FIELD INSTR (w/o PWR)/PUMPS, ETC
I-ENC		3	2	1																	●														ENCLOSURE (VFD, LCP, ETC)
E-COMP	3											●																							COMPONENTS & SYMBOLS FOR SCHEMATICS
E-EXTW	1																		●																EXTERNAL WIRING FOR SCHEMATICS
E-OUTLN	1																						●												DEVICE OUTLINE FOR SCHEMATICS
E-WIRE	1											●																							INTERNAL WIRING FOR SCHEMATICS

✳ – REFERENCE LAYER

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APPENDIX C
Text Styles

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AUTOCAD TEXT FORMAT FOR PROJECTS

STYLE: TEXT1
FONT: ARIAL
SIZE: 0.10 x DRAWING SCALE
SCALE: 1
OBLIQUING ANGLE: 0
LAYER: TEXT1
USAGE: ALL OTHER TEXT, DIMENSIONING, LEADERS, ARROWS AND NOTES.
EXAMPLE: 10'-0", (TYP), STA. 10+00.00

ALL TEXT IS TO BE UPPER CASE, UNLESS APPROVED OTHERWISE BY DISTRICT ENGINEER.

STYLE: TEXT2
FONT: ARIAL
SIZE: 0.24 x DRAWING SCALE
SCALE: 1
OBLIQUING ANGLE: 0
LAYER: TEXT2
USAGE: STREET NAMES
EXAMPLE: RANCHO DRIVE

ALL TEXT IS TO BE UPPER CASE, UNLESS APPROVED OTHERWISE BY DISTRICT ENGINEER.

STYLE: TEXT3
FONT: ARIAL
SIZE: 0.20 x DRAWING SCALE
SCALE: 1
OBLIQUING ANGLE: 0
LAYER: TEXT3
USAGE: GENERAL NOTES TITLE, OTHER NOTE TITLES, DETAIL AND DRAWING TITLES
EXAMPLE: SITE PLAN, BLOW-OFF DETAIL

ALL TEXT IS TO BE UPPER CASE, UNLESS APPROVED OTHERWISE BY DISTRICT ENGINEER.

STYLE: TEXT4
FONT: ARIAL
SIZE: 0.15 x DRAWING SCALE
SCALE: 1
OBLIQUING ANGLE: 0
LAYER: TEXT4
USAGE: MATCHLINES, PROFILE GRID STA. AND ELEV., INTERMEDIATE DETAIL TITLES
EXAMPLE: DETAIL "C", TRENCH SECTIONS

ALL TEXT IS TO BE UPPER CASE, UNLESS APPROVED OTHERWISE BY DISTRICT ENGINEER.

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APPENDIX D
Plot Styles

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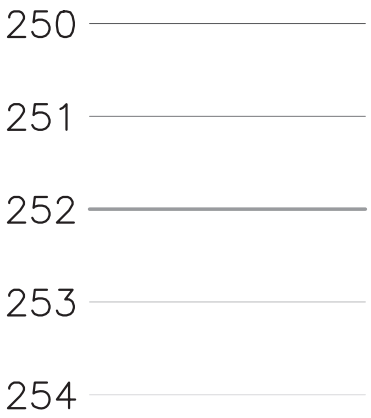
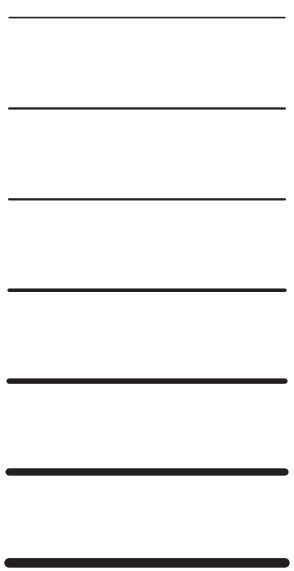
BLACK AND WHITE
PLOTTER PEN EXAMPLES

PEN NUMBER	COLOR	INCHES
1	RED	0.005
2	YELLOW	0.008
3	GREEN	0.012
4	CYAN	0.018
5	BLUE	0.028
6	MAGENTA	0.038
7	WHITE	0.050
252	GREY	0.010





NOTE: COLOR #252 IS TO BE USED FOR CONTOURS AND EXIST. PROFILE GRADES ONLY. OTHER USES AND PEN WIDTHS OF COLOR #252 SHALL BE DETERMINED AND APPROVED BY DISTRICT ENGINEER.

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APPENDIX E
Line Types

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LINETYPES

DESCRIPTION	LINETYPE
CENTER	
CONTINUOUS	
DASHED	
DASHEDX2	
HIDDEN	
HIDDEN2	
PHANTOM	
PHANTOM2	
DOT2	

NOTE: WHEN IN MODEL SPACE LTSCALE WILL ALWAYS BE 0.5 x DRAWING SCALE.

WHEN IN PAPER/LAYOUT SPACE THE PSLTSCALE IS TO BE TOGGLED TO 1.

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APPENDIX F
Legend

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LEGEND

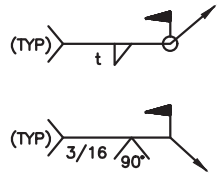
GRAPHIC REPRESENTATION		DESCRIPTION	SYMBOL		NOTES
PROPOSED	EXISTING		PROPOSED	EXISTING	
–		CABLE TV		4" CTV	
*	*	FENCE			
–	*	FIBER OPTICS		12" FO	
–	*	GAS		4" G	
–	*	HIGH PRESSURE GAS		12" HPG	
–	*	OVERHEAD POWERLINES		OHP	
–	*	OVERHEAD TELEPHONE LINES		OHT	
*	*	CONTOURS		2640	
*	*	DITCH			SHOW THE DIRECTION OF FLOW
*	*	DRIVEWAY			
*	*	DROP INLET IN CURB AND GUTTER		DI	
*	*	CATCH BASIN IN SIDEWALK		CB	
–	*	RAILROAD			
–	*	SANITARY SEWER		12" SS	
–	*	STORM DRAIN		24" SD	
–	*	UNDERGROUND POWER		UGP	
–	*	UNDERGROUND TELEPHONE		UGT	
*	*	WATER (16" AND SMALLER)	16" DIP	16" DIP	16" AND SMALLER WIDTH TO COLOR (MAGENTA)
		WATER (LARGER THAN 16")	36" MLCP	36" MLCP	LARGER THAN 16" OFFSET TO WIDTH OF PIPE (PIPE – COLOR GREEN W/CENTERLINE SHOWN)
*	*	CURB, GUTTER AND SIDEWALK			
*	*	PROPERTY LINE	PL	PL	
*	*	CENTER LINE	℄	℄	
*	*	BLOCK WALL			PROPOSED: 2 CONTINUOUS LINES, DASHED PLINE W/WIDTH BETWEEN THE 2 CONTINUOUS LINES. EXISTING: 2 CONTINUOUS LINES WITH DOT LINETYPE IN CENTER BETWEEN THE CONTINUOUS LINES, POLYLINE WIDTH OF 0.05.

NOTES:

* THIS IS NOT A FILE NOR DOES IT HAVE A FILENAME, LEGEND SHEET ONLY.

1. FOR LAYERING CONVENTIONS, SEE MASTER LAYER LIST.
2. SCALE LINETYPES APPROPRIATELY PER DRAWING.

LEGEND

GRAPHIC REPRESENTATION		DESCRIPTION	SYMBOL		NOTES
PROPOSED	EXISTING		PROPOSED	EXISTING	
*	*	WELD SYMBOLS			SEE AMERICAN WELDING SOCIETY CHART FOR SYMBOLS AND EXPLANATION.
*	*	RELOCATION OF WATER METER			
*	*	REPLACEMENT OF WATER SERVICE ASSEMBLY			
*	*	POTHOLE SYMBOL			

NOTES:

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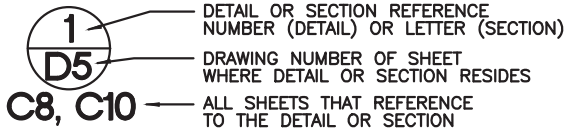
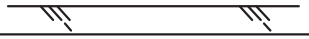
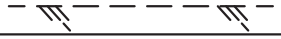
1. FOR LAYERING CONVENTIONS, SEE MASTER LAYER LIST.
2. SCALE LINETYPES APPROPRIATELY PER DRAWING.

LEGEND

FILENAME		DESCRIPTION	SYMBOL		NOTES
PROPOSED	EXISTING		PROPOSED	EXISTING	
ARROW	*	STANDARD LEADER OR DIMENSION ARROW.			ARROWHEADS FOR LEADERS OR DIMENSIONING SHALL BE THE SAME SIZE AS LAYER "TEXT1" (HEIGHT = 0.10) OR PROPORTIONAL TO DRAWING SCALE.
BLOWOFF	*	BLOW-OFF			
CAP	*	CAP/STUBOUT			
COMBAIR	*	COMBINATION AIR VALVE			
DETARROW	*	DIRECTIONAL ARROW SHELL			PLACE THIS AROUND BLOCK "DETBUBL" AT INTERSECTION POINT SHOWN. USE FOR ALL SECTION CUTS AND ROTATE PER DRAWING.
DETARRW2	*	SECTION ARROW			PLACE THIS IN LINE WITH THE DETAIL BUBBLE AND ROTATE PER SECTION CUT.
DETBUBL	*	REFERENCE BUBBLE			
*	EB	ELECTRIC BOX			
EOPP	EOPX	EDGE OF PAVING			
*	EPB	ELECTRICAL PANEL BOX			
*	FAB	FIRE ALARM BOX			
FHP	FHX	FIRE HYDRANT (ASSEMBLY)			
FISHEYE	*	IDENTIFICATION HEXAGON			IDENTIFY ITEMS SUCH AS PIPELINES, FITTINGS, ELECTRICAL EQUIPMENT, ETC. IN HARD TO LABEL AREAS. CREATE A SCHEDULE TO REFER TO.

NOTES:

* THIS IS NOT A FILE NOR DOES IT HAVE A FILENAME, LEGEND SHEET ONLY.

1. FOR LAYERING CONVENTIONS, SEE MASTER LAYER LIST.
2. SCALE LINETYPES APPROPRIATELY PER DRAWING.

LEGEND

FILENAME		DESCRIPTION	SYMBOL		NOTES
PROPOSED	EXISTING		PROPOSED	EXISTING	
–	MH	MANHOLE	ACCESS MH 66" MLCP		
N–ARROW	*	STANDARD NORTH ARROW	N		ROTATE AND SCALE PER DRAWING.
PIPEBRKP	PIPEBRKX	PIPE BREAK ELLIPSE			SCALE TO FIT PIPELINE.
PIPETERM	*	CONTINUANCE MARKER			MARKER FOR USE ON SITE PLANS AND DETAILS.
*	PP	POWER POLE W/GUY WIRE			
REDP	REDX	REDUCER			REDUCERS FOR PIPELINES LARGER THAN 16" ARE TO BE DRAWN TO ACTUAL SIZE
*	SCO	SEWER CLEAN OUT BOX		SC	
SHRUB	*	SHRUBS			
STDOT		STANDARD DOT			
*	STLTBX	STREET LIGHT BOX			
STLTP	STLTX	STREET LIGHT			
STRBRK	*	BREAK SYMBOL IN PLAN VIEW OR FOR STRUCTURES.			ROTATE PER DETAIL OR STRUCTURE.

NOTES:

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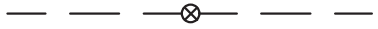
1. FOR LAYERING CONVENTIONS, SEE MASTER LAYER LIST.
2. SCALE LINETYPES APPROPRIATELY PER DRAWING.

LEGEND

FILENAME		DESCRIPTION	SYMBOL		NOTES
PROPOSED	EXISTING		PROPOSED	EXISTING	
*	SURMON	SURVEY MONUMENT			
TESTSTA	*	TEST STATION			
*	TRANPOLE	TRANSMISSION POLE			
TREE	*	TREES			
*	TSBX	TRAFFIC SIGNAL BOX			
*	TSPOLE	TRAFFIC SIGNAL POLE			
TXTBUBL		TEXT BUBBLE			TEXT BUBBLE TO BE USED TO REFERENCE TO ANOTHER DETAIL OR SECTION LOCATION WITHIN THE PLAN OR DETAIL SHEETS. EXAMPLE: BLOW OFF, SEE 
VAULTP	VAULTX	VAULT			
WMP	WMX	WATER METER			
WVP	WVX	WATER VALVE			
—	—	WATER SAMPLING STATION			

NOTES: * THIS IS NOT A FILE NOR DOES IT HAVE A FILENAME, LEGEND SHEET ONLY.

1. FOR LAYERING CONVENTIONS, SEE MASTER LAYER LIST.
2. SCALE LINETYPES APPROPRIATELY PER DRAWING.

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APPENDIX G
Abbreviations

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– A –	
A/C	AIR CONDITIONING
AB	ANCHOR BOLT
ABAN	ABANDON
ABC	AGGREGATE BASE COURSE
ABS	ABSOLUTE
ABUT	ABUTMENT
ABV	ABOVE
AC	ASPHALTIC CONCRETE
ACKV	AUTOMATIC CHECK VALVE
ACP	ASBESTOS CEMENT PIPE
ACS	ACCESS
ADA	AMERICAN DISABILITY ACT
AD	AREA DRAIN
ADDL	ADDITIONAL
ADDM	ADDENDUM
ADJ	ADJUSTABLE
AGGR	AGGREGATE
AHD	AHEAD
AL	ALUMINUM
ALT	ALTERNATE
AMS	ANGLE METER STOP
AMT	AMOUNT
&	AND
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ANT	ANTENNA
AP	ACCESS PANEL
APN, A.P.N.	ASSESSOR PARCEL NUMBER
APPROX	APPROXIMATE
APPVD	APPROVED
ASPH	ASPHALT
ASSN	ASSOCIATION
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS
AUX	AUXILIARY
AV	AIR VENT/AIR VALVE
AVAR	AIR VACUUM AIR RELEASE VALVE
AVE	AVENUE
AWG	AMERICAN WIRE GAUGE
AWWA	AMERICAN WATER WORKS ASSOCIATION
– B –	
B/H	BUMPED HEAD
B&S	BELL & SPIGOT
BAL	BALANCE
BC	BOLT CIRCLE/BACK OF CURB
BCV	BUTTERFLY CHECK VALVE
BE	BELL END
BETW	BETWEEN
BFP	BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BK	BOOK/BACK
BL–FLG	BLIND FLANGE
BLDG	BUILDING
BLK	BLOCK
BLM	BUREAU OF LAND MANAGEMENT
BLVD	BOULEVARD
BM	BENCHMARK
BO	BLOW OFF ASSEMBLY
BOC	BACK OF CURB
BOT	BOTTOM
BOW	BACK OF WALK
BPV	BACK PRESSURE VALVE
BRG	BEARING
BS	BACK SIGHT
BUR	BURIED
BV	BALL VALVE
BW	BOTH WAYS/BACK OF SIDEWALK
– C –	
C/C	CENTER TO CENTER
C	CONDUIT
C&G	CURB & GUTTER
CAL	CALIBRATE
CAP	CAPACITY
CAV	COMBINATION AIR VALVE
CB	CATCH BASIN
CCO	CLARK COUNTY
CCWRD	CLARK COUNTY WATER RECLAIMATION DISTRICT
CEM	CEMENT
CI	CAST IRON
CIP	CAST IRON PIPE/CAST IN PLACE
CIR	CIRCLE
CIRCUM	CIRCUMFERENCE
CJP	COMPLETE JOINT PENETRATION
CL OR ℄	CENTERLINE
CL2	CHLORINE
CLG	CEILING
CLO	CLEANOUT
CLP	CLAMP
CLR	CLEAR
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CLV	CITY OF LAS VEGAS
CM	CENTIMETER
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNLV	CITY OF NORTH LAS VEGAS
CO	COUNTY/COMPANY/CONTRACT
COH	CITY OF HENDERSON
COL	COLUMN
COMB	COMBINATION
COMM	COMMUNICATION
COMPL	COMPLETE
– C – (CONT.)	
CON	CONCENTRIC
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUE OR CONTINUOUS
CONTR	CONTRACTOR
COORD	COORDINATE
COR	CORNER
CORP STOP	CORPORATION STOP
COV PL	COVER PLATE
CPLG	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE PIPE
CT	COURT
CTR	CENTER
CTV	CABLE TELEVISION
CU	CUBIC/COPPER
CUST	CUSTOMER
CV	CONTROL VALVE
CW	CLOCKWISE
CY	CUBIC YARD
CYL	CYLINDER
– D –	
D OR △	DELTA ANGLE
D/W	DRIVEWAY
DCSWCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS
DEC	DECIMETER
DEG, °	DEGREE
DEMO	DEMOLITION
DEPT	DEPARTMENT
DET	DETAIL
DEV	DEVELOPMENT
DI	DROP INLET OR DUCTILE IRON
DIA OR Ø	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DIR	DIRECTION
DISCH	DISCHARGE
DIST	DISTANCE
DISTR	DISTRIBUTION
DIV	DIVISION
DL	DEAD LOAD
DMH	DROP MANHOLE
DN	DOWN
DR	DRIVE
DRW	DRY WELL
DUPL	DUPLICATE
DWG	DRAWING
– E –	
E	EAST OR EDGE
EA	EACH
EC	EPOXY COATED/END OF CURB
ECC	ECCENTRIC
EF	EACH FACE
EL	EPOXY LINED
ELEC	ELECTRICAL
ELEV	ELEVATION
ELL	ELBOW
ENG	ENGINE/ENGINEERING
ENGR	ENGINEER
EOP	EDGE OF PAVEMENT
EOS	EDGE OF SHOULDER
EQ	EQUAL OR EQUATION
EQ SP	EQUALLY SPACED
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
ESMT	EASEMENT
EST	ESTIMATE
ETC	ETCETERA
EW	EACH WAY
EXC	EXCAVATE
EXIST	EXISTING
EXP JT	EXPANSION JOINT
EXT	EXTENSION
– F –	
F/F	FACE TO FACE
FABR	FABRICATION/FABRICATED
FC	FACE OF CURB
FD	FLOOR DRAIN
FDN	FOUNDATION
FEXT	FIRE EXTINGUISHER
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FIG	FIGURE
FL OR ℄	FLOW LINE
FLG	FLANGE
FLR	FLOOR
FMCT	FLOW METER COMPOUND TORRENT
FMH	FLEXIBLE METAL HOSE
FN	FENCE
FND	FOUND
FO	FIBER OPTIC
FOC	FACE OF CURB
FOW	FACE OF WALL
FPC	FLEXIBLE PIPE COUPLING
FPM	FEET PER MINUTE
– F – (CONT.)	
FPS	FEET PER SECOND
FPT	FEMALE PIPE THREAD
FREQ	FREQUENCY
FRP	FIRE RETARDANT POLYESTER RESIN/ FIBERGLASS REINFORCED POLYMER
FSTNR	FASTENER
FT, '	FOOT OR FEET
FTG	FOOTING
FUT	FUTURE
– G –	
G/B	GRADE BREAK
G	GAS
GA	GAGE
GAL(S)	GALLON(S)
GALV	GALVANIZED
GENL	GENERAL
GIS	GEOGRAPHIC INFORMATION SYSTEM
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRD	GRADE
GRT	GRATE
GV	GATE VALVE
– H –	
H	HOUSE
H&V	HEATING & VENTILATION
HARN	HIGH ACCURACY FREQUENCY NETWORK
HB	HOSE BIBB
HD	HEAD
HDR	HEADER
HEX	HEXAGONAL
HMWPE	HIGH MOLECULAR WEIGHT POLYETHYLENE
HORIZ	HORIZONTAL
HP	HORSEPOWER
HPI	HORIZONTAL POINT OF INTERSECTION
HPG	HIGH PRESSURE GAS
HR	HOUR
HT	HEIGHT
HV	HOSE VALVE
HWY	HIGHWAY
– I –	
ID	INSIDE DIAMETER
IN, "	INCH
INST	INSTALL
INSTR	INSTRUMENT
INSUL	INSULATION
INT	INTERIOR
INV	INVERT
IPS	IRON PIPE SIZE
IRR	IRRIGATION
– J –	
JT	JOINT
– K –	
kg	KILOGRAM
km	KILOMETER
– L –	
LAD	LADDER
LB OR #	POUND
LDR	LEADER
LEN OR L	LENGTH OF CURVATURE
LF	LINEAR FOOT
LG	LONG
LN	LANE
LT	LEFT/LIGHT
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
LWR	LOWER
– M –	
M	METER
MATL	MATERIAL
MAX	MAXIMUM
MC	MORTAR COATED
MEAS	MEASUREMENT
MECH	MECHANICAL
MFR	MANUFACTURER
MG	MILLION GALLONS
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIL	MILLIMETER
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MKR	MARKER
ML	MORTAR LINED
MLC	MORTAR LINED & COATED
– M – (CONT.)	
MLCP	MORTAR LINED & COATED PIPE
MLTCP	MORTAR LINED TAPED & COATED PIPE
MON	MONUMENT
MOV	MOTOR OPERATED VALVE
MPT	MALE PIPE THREAD
MSD	MAIN SERVICE DISTRIBUTION
MSDS	MATERIAL SAFETY DATA SHEET
MTD	MOUNTED
– N –	
N	NORTH
N/A	NOT APPLICABLE
NaOCL	SODIUM HYPOCHLORITE
NAVD	NORTH AMERICAN VERTICAL DATUM
NAP	NOT–A–PART
NBS	NATIONAL BUREAU OF STANDARDS
NC	NATIONAL COARSE
NCS	NEVADA COORDINATE SYSTEM
NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
NE	NORTHEAST
NF	NORTH FACE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NG	NATURAL GROUND
NIC	NOT IN CONTRACT
NIP	NOT IN PROJECT
NO. #	NUMBER
NOM	NOMINAL
NOSHA	NEVADA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
NPC	NEVADA POWER COMPANY
NPS	NOMINAL PIPE SIZE
NPT	NATIONAL TAPER PIPE THREAD
NRS	NEVADA REVISED STATUTES/ NON–RISING STEM
NTS	NOT TO SCALE
NW	NORTHWEST
– O –	
O/O	OUT TO OUT
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OFC	OFFICE
OH	OVER HEAD
OHP	OVER HEAD POWER
OHTEL	OVER HEAD TELEPHONE
OPER	OPERATOR
OPNG	OPENING
OPP	OPPOSITE
ORF	ORIFICE
ORIG	ORIGINAL
OS&Y	OUTSIDE SCREW & YOKE
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OVFL	OVERFLOW
oz	OUNCE
– P –	
P	POLE/PRESSURE/PIPE/POWER
P/L / ℙ	PROPERTY LINE
PAT	PATENT
PAVMT	PAVEMENT
PB	PULL BOX
PC	PRESSURE CLASS
PCC	PORTLAND CEMENT CONCRETE
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PDL	PUMP DISCHARGE LINE
PE	PLAIN END/POLYETHYLENE PIPE
PED	PEDESTAL
PERM	PERMANENT
PERP	PERPENDICULAR
PG	PRESSURE GAGE
PH	PHASE
PI	POINT OF INTERSECTION
PHYD	POST HYDRANT
PKG	PACKAGE
PKWY	PARKWAY
PL	PLACE/PLATE/PARCEL LINE
PLS	PROFESSIONAL LAND SURVEYOR
PLT	PLATE (DRAWING)
PO	PUSH–ON
POLY	POLYETHYLENE
PP	POWER POLE
PPM	PARTS PER MILLION
PR	PAIR
P/R	PATENT RESERVATION
PRC	PRECAST REINFORCED CONCRETE
PRELIM	PRELIMINARY
PRIM	PRIMARY
PROP	PROPOSED
PRV	PRESSURE REGULATING VALVE
PS	PRESSURE SWITCH/PUMP STATION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT/POINT OF TANGENCY
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE PIPE
– Q –	
QCV	QUICK COUPLER VALVE
QDC	QUICK DISCONNECT COUPLING
– Q – (CONT.)	
QS	QUAD SHEET
QTR	QUARTER
QTY	QUANTITY
– R –	
R	RADIUS
(R)	RADIAL
R/W	RIGHT–OF–WAY
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
REC	RECESSED
RECT	RECTANGULAR
RED	REDUCER
REF	REFERENCE (DIMENSION)
REG	REGULATING (REGULATOR)
REINF	REINFORCED (REBAR)
REQD	REQUIRED
RES	RESIDENTIAL OR RESERVOIR
RET	RETURN
REV	REVISION OR REVERSE
RF	RAISED FACE
RM	ROOM
RME	RESIDENTIAL MAIN EXTENSION
RPM	REVOLUTIONS PER MINUTE
RPS	REVOLUTIONS PER SECOND
RPPA	REDUCED PRESSURE PRINCIPLE ASSEMBLY
RR	RAILROAD
RSGV	RESILIENT SEATED GATE VALVE
RT	RIGHT/RING TITE
RV	RELIEF VALVE
– S –	
S	SOUTH/SLOPE
SA	SAMPLE LINE
S/C	SAW CUT
SCCP	STEEL CYLINDER CONCRETE PIPE
SCH	SCHEDULE
SD	STORM DRAIN
SDWK	SIDEWALK
SE	SOUTHEAST
SEC	SECTION/SECOND(ARY)
SEG	SEGMENT
SHLDR	SHOULDER
SHT	SHEET
SID	SPECIAL IMPROVEMENT DISTRICT
SIG	SIGNAL
SIM	SIMILAR
SL	SLOPE
SLV	SLEEVE
SNWA	SOUTHERN NEVADA WATER AUTHORITY
SNWS	SOUTHERN NEVADA WATER SYSTEM
SO	STUBOUT
SPC	STATE PLANE COORDINATES
SPEC(S)	SPECIFICATION(S)
SQ	SQUARE
SQ FT	SQUARE FOOT (FEET)
SQ YD	SQUARE YARD
SR	SAMPLE RETURN
SRM	SINGLE RESIDENTIAL MAIN
SS	SANITARY SEWER
SSTL	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STIR	STIRRUP
STL	STEEL
STLT	STREET LIGHT
SUPPL	SUPPLEMENT
SUR	SURVEY
SV	SOLENOID VALVE
SW	SIDEWALK OR SOUTHWEST
SY	SQUARE YARD
SYM	SYMBOL
SYMM	SYMMETRICAL
SYS	SYSTEM
– T –	
t	THICKNESS OF WELD
T	TELEPHONE/TANGENT
T&B	TOP & BOTTOM
T&G	TONGUE AND GROOVE
TAN	TANGENT
TBE	THREAD BOTH ENDS
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TD	TRENCH DRAIN
TDH	TOTAL DYNAMIC HEAD
TEMP	TEMPORARY
THK	THICK(NESS)
THR BLK	THRUST BLOCK
THRD	THREADED
TK	TANK
TMH	TOP OF MANHOLE
TOE	THREAD ONE END
TOF	TOP OF FOOTING
TOG	TOGETHER
TOGR	TOP OF GRATE
TOP	TOP OF PIPE
– T – (CONT.)	
TOR	TOP OF RIM
TOS	TOP OF SLAB
TOSTL	TOP OF STEEL
TOSW	TOP OF SIDEWALK
TOT	TOTAL
TOW	TOP OF WALL
TP	TELEPHONE POLE/TOP OF PIPE
TR	TRAIL OR TRACK/TOP OF RIM
TRANS	TRANSITION/TRANSMISSION
(TYP)	TYPICAL
– U –	
UDS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS, CLARK COUNTY, NV
UE	UNDERGROUND ELECTRIC
UFC	UNIFORM FIRE CODE
UG	UNDERGROUND
UGC	UNDERGROUND CONDUIT
UGP	UNDERGROUND POWER
UGT	UNDERGROUND TELEPHONE
UL	UNDERWRITERS LABORATORIES
UNC	AMERICAN STANDARD UNIFIED COARSE THREAD
UNF	AMERICAN STANDARD UNIFIED FINE THREAD
UNIV	UNIVERSAL
UNO	UNLESS NOTED OTHERWISE
UPC	UNIFORM PLUMBING CODE
UPRR	UNION PACIFIC RAILROAD
USGS	UNITED STATES GEODETIC SURVEY
UTIL	UTILITIES
– V –	
V	VOLT OR VALVE
VAC	VACUUM
VAR	VARIES
VB	VALVE BOX
VCP	VITRIFIED CLAY PIPE
VEL	VELOCITY
VENT	VENTILATOR
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VG	VALLEY GUTTER
VHF	VERY HIGH FREQUENCY
VIB	VIBRATION
VIN	VINYL
VISC	VISCOSITY
VOL	VOLUME
VPI	VERTICAL POINT OF INTERSECTION
VS	VALVE SHEET
VT	VENT
– W –	
W/	WITH
W	WEST/WATER
W/O	WITHOUT
WD	WIDTH
WDN	WASTE DRAIN
WF	WIDE FLANGE
WH	WALL HYDRANT
WI	WROUGHT IRON
WL	WASTE LINE
WLD	WELDED
WM	WATER METER
WP	WORK POINT/WEATHER PROOF
WS	WATER SURFACE
WSP	WELDED STEEL PIPE
WSTP	WATER STOP
WT	WEIGHT
WTR	WATER
WV	WATER VALVE
WWF	WELDED WIRE FABRIC
WWM	WELDED WIRE MESH
– X –	
XARM	CROSS ARM
XFMR	TRANSFORMER
XFR	TRANSFER
XSEC	CROSS SECTION
– Y –	
YD	YARD
YH	YARD HYDRANT
YLD	YIELD

NOTE:
THIS IS A STANDARD ABBREVIATION SHEET. SOME ABBREVIATIONS MAY APPEAR ON THIS SHEET BUT NOT USED IN THE PLANS. ALL ABBREVIATIONS USED ON THE PLANS MUST APPEAR ON THIS SHEET.

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APPENDIX H
Title Block

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LAS VEGAS VALLEY WATER DISTRICT

Owner Name & Logo

PROJECT NO. 3223L

eBuilder Project No.

COMMITMENT NO. 009702

Commitment No.

MISCELLANEOUS PIPELINE REPLACEMENTS, PHASE V

LIST OF DRAWINGS

SHEET NO	DRAWING NO	DESCRIPTION
1	G1	COVER SHEET
2	G2	LVVWD GENERAL NOTES AND LEGEND
3	G3	CLARK COUNTY GENERAL NOTES
4	G4	CITY OF LAS VEGAS GENERAL NOTES I
5	G5	CITY OF LAS VEGAS GENERAL NOTES II
6	G6	ABBREVIATIONS LIST
7	C1	MARYLAND PARKWAY
8	C2	ST LOUIS AVENUE – 6TH STREET TO 10TH STREET
9	C3	ST LOUIS AVENUE – 10TH STREET TO MARYLAND PARKWAY
10	C4	REEDER CIRCLE
11	CD1	STANDARD DETAILS I
12	CD2	STANDARD DETAILS II
13	CD3	STANDARD DETAILS III
14	CD4	STANDARD DEATILS IV

LOCATION MAP

NOT TO SCALE

CAUTION TO CONTRACTOR:

THE CONTRACTOR SHALL BE RESPONSIBLE TO INVESTIGATE AND VERIFY THE ACTUAL LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND FACILITIES AT LEAST 48 HOURS IN ADVANCE OF THE PERFORMANCE OF ANY WORK.

PROJECT LOCATIONS	
1	MARYLAND PARKWAY
2	ST LOUIS AVENUE
3	REEDER CIRCLE

Consultant Name & Logo

ACCEPTED BY:

TAHMINEH N. PENNINGTON, PE, SENIOR CIVIL ENGINEER — DATE

RYAN C. PEARSON, PE, ENGINEERING DESIGN MANAGER — DATE

PETER J. JAUCH, PE, DIRECTOR OF ENGINEERING — DATE

eBuilder Project No.

Commitment No.

Avoid overhead power line contact. It's costly. Call before you OVERHEAD 1-702-227-2929

Call before you Dig. Avoid cutting underground utility lines. It's costly. Call 811

CLV DWG # L20-00443 565-546

LAS VEGAS VALLEY WATER DISTRICT

VERIFY SCALE
1/2 0 1/2 1
BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL

MISCELLANEOUS PIPELINE REPLACEMENTS, PHASE V

COVER SHEET

SCALE NONE

LAS VEGAS VALLEY WATER DISTRICT
1001 S. VALLEY VIEW BLVD, LAS VEGAS, NV 89153

DRAWN BY: STEVE MILLER

CHECKED BY: ROSS W. MAXWELL

ENGINEER STAMP AREA

PROJECT: 3223L
COMMIT: 009702

DRAWING/NUMBER
G1

SHEET 1 OF 14

REVISIONS:

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APPENDIX I
Drawing Stamps

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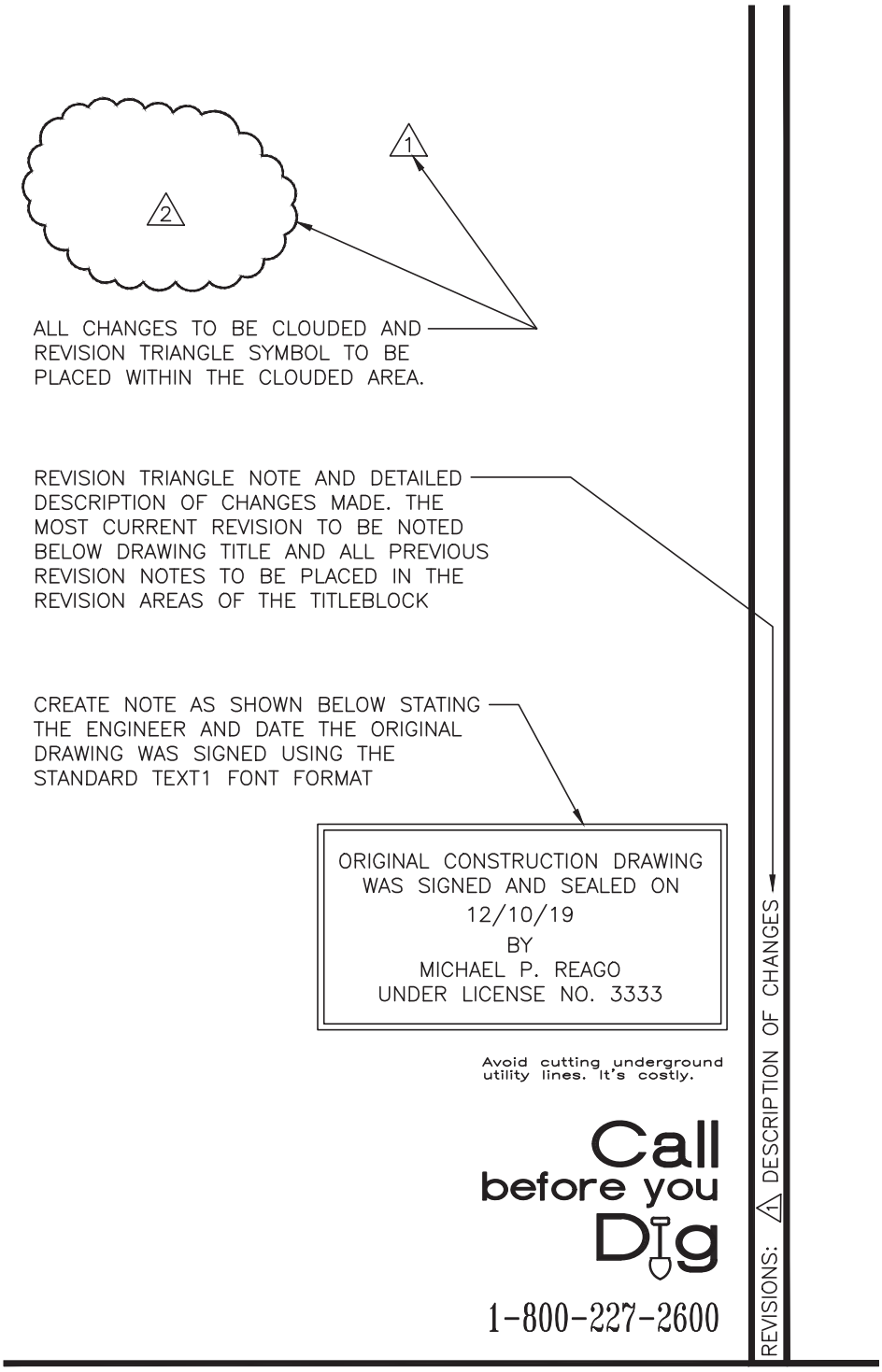
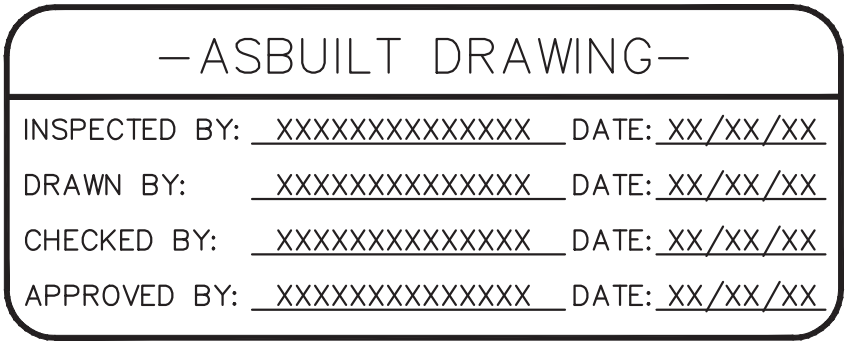

1
2
ALL CHANGES TO BE CLOUDED AND REVISION TRIANGLE SYMBOL TO BE PLACED WITHIN THE CLOUDED AREA.
REVISION TRIANGLE NOTE AND DETAILED DESCRIPTION OF CHANGES MADE. THE MOST CURRENT REVISION TO BE NOTED BELOW DRAWING TITLE AND ALL PREVIOUS REVISION NOTES TO BE PLACED IN THE REVISION AREAS OF THE TITLEBLOCK
CREATE NOTE AS SHOWN BELOW STATING THE ENGINEER AND DATE THE ORIGINAL DRAWING WAS SIGNED USING THE STANDARD TEXT1 FONT FORMAT
ORIGINAL CONSTRUCTION DRAWING WAS SIGNED AND SEALED ON
12/10/19
BY
MICHAEL P. REAGO
UNDER LICENSE NO. 3333
Avoid cutting underground utility lines. It's costly.
Call before you Dig
1-800-227-2600
REVISIONS: 1 DESCRIPTION OF CHANGES


-ASBUILT DRAWING-
INSPECTED BY: XXXXXXXXXXXXXX DATE: XX/XX/XX
DRAWN BY: XXXXXXXXXXXXXX DATE: XX/XX/XX
CHECKED BY: XXXXXXXXXXXXXX DATE: XX/XX/XX
APPROVED BY: XXXXXXXXXXXXXX DATE: XX/XX/XX

ORIGINAL CONTRACT DOCUMENTS ARE ON FILE WITH THE OWNER. THE DOCUMENTS WERE SIGNED ON THE DATES SHOWN ABOVE BY AUTHORIZED REPRESENTATIVES OF THE IDENTIFIED ENTITIES.

ORIGINAL CONSTRUCTION DRAWING
WAS SIGNED AND SEALED ON
XX/XX/XX
BY
XXXXXXXXXXXXXXXXX
UNDER LICENSE NO. XXXXX

CONFORMED DOCUMENTS:
DELETE ALL REVISION CLOUDS, DELTA IDENTIFICATION FROM WITHIN SHEET PLAN AREAS. KEEP ALL DELTA IDENTIFICATIONS AND REVISION DESCRIPTIONS WITHIN THE BORDER. INSERT CONFORMED DOCUMENTS STAMP AND NOTE SHOWN BELOW AS REQUIRED.

CREATE NOTE AS SHOWN BELOW STATING THE ENGINEER'S NAME AND DATE THE ORIGINAL DRAWING WAS SIGNED USING THE STANDARD TEXT1 FONT FORMAT. DELETE ENGINEER'S STAMP FROM THE BORDER.

THE FOLLOWING NOTE IS REQUIRED ON THE COVER SHEET ONLY. PLACE BENEATH THE CONFORMED DOCUMENTS STAMP

CONFORMED DOCUMENTS

ORIGINAL CONTRACT DOCUMENTS ARE ON FILE WITH THE OWNER. THIS DRAWING WAS SIGNED AND SEALED ON
XX/XX/20XX
BY
XXXXXX X. XXXXX
UNDER LICENSE NO. XXXXX

ISSUED FOR CONSTRUCTION

ORIGINAL DRAWINGS WITH UTILITY AND ENTITY APPROVALS ARE ON FILE WITH THE OWNER

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