



CITY OF BISMARCK ENGINEERING DEPARTMENT

STANDARDS, PROCEDURES & REQUIREMENTS
FOR CAD DRAWINGS

EFFECTIVE DATE: JULY 1, 2014
REVISED JANUARY 1, 2024

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1. GENERAL REQUIREMENTS

The requirements listed in this document are used by the City of Bismarck Engineering Department to ensure uniformity of plans and ease of use of all cad files utilized by the department staff. Consultants doing design work for the Engineering Department or for a 3-way contract by a developer should adhere to these requirements unless specifically noted next to the item in this document or the requirement is waived by the City Design and Construction Engineer. These rules may not be able to accommodate every type of situation, they should be used as a guideline for which items should and should not be shown on a particular type of plan. Please see attached example plan sheets at the end of this document or contact the Engineering Department for other example plan sheets that may be needed to ensure conformity to Department standards. Consultant plans that are submitted for review and do not follow these general standards may be rejected. These plans are utilized by City maintenance personnel. The guidelines help ensure that those users will have the relevant information to locate and operate the proposed utilities. Any project that is NDDOT funded shall adhere to NDDOT plan requirements. Comments, questions or requests for exceptions to these standards should be directed to Aaron Renner at arenner@bismarcknd.gov.

2. DRAWING SETUP AND ORGANIZATION

SETUP, ORGANIZATION, TEMPLATES AND FILE NAMING

- Drawings shall utilize current versions of AutoCAD and/or Civil 3D.
- Based on the City of Bismarck monuments and adjusted to ground distance.
- Horizontal Datum shall be NAD 83 (2011 Adjustment), North Dakota South Zone.
- Vertical Datum shall be NAVD 88 Geoid 18.
- To better align with recent flood plain mapping that will become effective in 2024 and into the foreseeable future, City-wide all plans will now be in NAVD 88 datum.
- Drawing units shall be in international feet.
- Drawing files are to be created and stored in accordance with the Folder Contents Key handout and the Naming Conventions handouts. (This does not apply to consultants).
- New plan and profile drawings shall utilize the City of Bismarck standard template which will open by default when using Civil 3D. The location of the file is:
<W:\Drawings\CAD Standards\Bismarck Standard Template.dwt>.

Consultants should request the most recent copy of the .dwt file. The template contains customized styles which control the appearance of Civil 3D objects. Consultants should utilize styles that are equal in appearance to those in the standard template for Alignments, Profiles, Profiles Views and their associated labels. When creating Civil 3D objects, such as alignments, profiles, surfaces, etc., the template will have an object style and label style already associated with them by default. When creating certain objects such as pipe networks, the user will need to choose the appropriate object style and label style from the drop down list.

- A drawing file shall be organized so that all components of the project, including points, alignments, profiles, profile views, plan and profile sheets remain within the main drawing. Consultants who are submitting cad files to the Engineering Department, either for construction staking or preparation of paving plans, must include all externally referenced files.
- Drawings that are not directly associated with the main drawing such as detail sheets, cover sheets, etc. may be in separate drawing files.

DRAWING SCALES

- Layout Sheets shall be set up for printing on 11x17 paper.
- Typical plan and profile sheets for water, sewer, storm and paving shall be at 1" = 40' scale.
- Typical sheets for street lighting projects shall be at 1" = 100' scale. Street lighting sheets shall have a plan view and a schematic view. Both views may be on one sheet if space permits or on separate sheets if necessary. Schematic view does not need to be to scale. See attached street light example drawing. New street light drawings shall utilize the City of Bismarck Standard template.dwt
- Other miscellaneous drawings may be drawn at various standard scales as necessary to show required level of detail.

PLAN & PROFILE SHEET INFORMATION

- All plans shall include a cover sheet and a project overview sheet. See attached sample drawings for all information required on these sheets.
- Each layout in paper space shall contain only one sheet and shall be named appropriately.
- North arrow, bar scale, and vertical datum shall be shown on the upper portion of the sheet.
- Each plan sheet shall show a quantity begin and end station. Quantities and specification numbers shall be listed in the lower right portion of each sheet in the space provided. This is not required on 3-way projects, because the department does not track quantities on these projects.
- Construction notes, manhole details, typical sections, and service line information shall be shown on the upper right side of the sheet where space is available. Manhole/inlet details and other details may be shown on a separate sheet if there is not enough space on the plan and profile sheet.
- Individual sheets shall match the look and layout of the attached sample drawings as closely as possible.
- Plan and profile views shall show any public utilities which could cause conflicts.
- Individual curb profiles should be shown for left and right top of curb and based on centerline stationing.

- A profile line shall not end in a vertical curve. It shall always end at a vertical PI.
- Pipe profiles shall show both the top and bottom of the pipe.

3. BORDERS AND TITLEBLOCKS

- Consultants shall use borders and title blocks similar to those shown in the examples at the end of this document.
- Standard borders including title blocks are found in the W:\Drawings\CAD Standards folder.
- Descriptions for plan and profile sheet titleblocks should be described as "X" number of feet from the center of the nearest intersection.
 - Example:
BOULEVARD AVENUE
100' WEST OF 3RD STREET TO 300' EAST OF 4TH STREET

4. AERIAL PHOTOS

- Aerial photos may be used for drawing purposes. The photos are located in the X:\Orthos\ folders. They shall not be used on final plans unless authorized by the City Engineer.
- When aerial photos are inserted into the drawing they will not line up with the survey points as the photos are in state plane grid coordinates and the survey points are in ground coordinates. The photos will usually need to be scaled to match up with the survey points. The survey points shall not be moved. The scale factor to convert the aerial photos from grid to ground coordinates is 1.0001485221.

5. SURVEY DATA

- Under most circumstances the survey points shall not be moved, unless necessary to correct a survey error. The cad user should lock layer 0 to prevent accidentally moving or deleting any survey points.
- See attachments for a list of survey codes and descriptions.

6. LAYERS AND LINETYPES

- For most projects the majority of the necessary layers, linetypes, colors, etc. are set up in the Bismarck Standard Template. If new layers need to be created, common abbreviations or easily understandable names shall be used.
- Layer names shall be set up using the following relevant prefixes:

<u>Feature</u>	<u>Prefix/Suffix</u>
Existing	e-
Proposed	p-
Future	f-
Removals	r-

Profile	prof-
Cross Sections	x-
Survey points	pts-
Existing feature symbols	-sym

Consultants may use their own layer naming conventions, but linetypes and pen settings shall correspond to the settings in the Bismarck Standard Template.dwt file.

- Symbols shall be on a separate layer from the utility it is related to. Example: valves and hydrant should be on a separate layer from the watermain. Profile lines shall also be on a separate layer from the plan view layers.
- See the Bismarck Standard Template.dwt for layers, linetypes, line thickness, settings, etc.

7. BLOCKS, SYMBOLS AND DETAILS

- The standard symbol blocks are found in the [W:\Drawings\symbols](#) folder. See attachments for a list of blocks and symbols.
- Blocks for above ground features such as valves, manholes, hydrants, etc. shall be placed on the appropriate layer with the –sym (symbol) suffix. Blocks will automatically scale to the correct size.
- Standard details which are part the City of Bismarck construction specifications can be found in the [W:\Drawings\Standard Details](#) folder.
- Miscellaneous details which are not part the City of Bismarck construction specifications, but which may be used or modified for plan production can be found in the [W:\Drawings\CAD Standards](#) folder.

8. TEXT

- Text shall be all caps.
- Romans.shx font shall be used for all plan and profile sheet text.
- Labels for existing features should generally be in model space. Labels for proposed features may be in model space or paper space.
- Most labels should be 0.06 paper space height. Lot and block numbers, subdivision and street names should 0.09 paper space height.
- To convert paper space text heights to an equal height in model space, multiply the paper space text height by the viewport scale to equal the model space text height.

9. STATIONING

GENERAL PROJECT STATIONING, DIMENSIONING AND LABELING

- Stationing shall increase from left to right and from west to east and south to north. The north arrow shall generally be oriented up or to the right of the plan sheet. If

an alignment changes direction, the stationing can continue if following an east-bound to north-bound or north-bound to east-bound change. If the alignment changes from and east-bound to south-bound or from a north-bound to west-bound direction, a station equation will be required at the change. Continuation of an alignment stationing from a previous plan set is allowable, as long as it adheres the criteria above. Short deviations from the above may be reviewed on an individual basis.

- Choose a beginning alignment stationing such that negative stations are avoided.
- Plan view stationing based on the centerline shall be shown at block corners or property lines near the beginning and end of a sheet and also at any PC, PT, or transition point.
- Centerline stationing and curve information shall be shown.
- In the event that a proposed alignment does not follow the street stationing, such as a storm sewer pipe that begins at a street and outfalls through an easement, the stationing for the proposed outfall alignment shall also make use of a station equation that references the adjacent street centerline stationing. The stationing for the outfall alignment shall always begin at the lowest end of the pipe.

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CUL-DE-SAC STATIONING

- Stationing of cul-de-sacs shall utilize a station equation at the beginning of the curve of the cul-de-sac of $x+xx.xx=0+00$ CDS (where x = the main alignment stationing). The cul-de-sac stationing shall continue along the length of the curb. The end of the cul-de-sac shall also have a station equation of $y+yy.yy=x+xx.xx$ (where y = the total length of the cul-de-sac curb and x = the main alignment stationing). Points of curves and reverse curves shall be stationed. The stationing shall be located along the r/w line, but shall be based on the actual curb length of the cul-de-sac. The station and elevation at the high point of the cul-de-sac shall also be labeled.
- See attached water and sewer or paving example drawings.

10. DRAFTING, DIMENSIONING AND LABELING

- Storm and sanitary sewer pipes shall be drawn and measured from center of structure to center of structure.
- Water and sewer appurtenances shall be labeled as shown on the sample sheets with the water being directly below the plan view and the sewer being directly above the plan view. The sewer manhole and cleanouts shall utilize the street centerline stationing if applicable.
- Stationing of sewer service wyes shall be based on the length of each sewer run starting at the downstream manhole. Example: A sewer service wye that is located

40' from the downstream manhole, the station of that wye should be listed as 0+40. Service line information shall be shown in a chart on the sheet which it is located.

- Curbstops and sewer services shall be dimensioned to the nearest property line.
- Show, dimension and label all easements and non-access lines.
- All proposed and existing utilities and service lines shall have a dimension to the nearest property line or easement line.
- All streets shall be dimensioned from face of curb to face of curb along with the right-of-way width.
- Parcel/Lot lines and information, including front lot dimensions, lot and block numbers, subdivision and street names shall be shown. If part of the lot is in a curve, both the tangent length and the curve length shall be shown. References to a curve chart may be used to specify additional curve information, but the length of the curve shall be shown along the front property line. Rehabilitation projects in older areas of town shall utilize parcel lines and property addresses instead of lot lines and lot numbers as many of the original lot lines have since changed and are no longer relevant.
- The BC, MC & EC station and elevation and the size of the radius of any intersection shall be labeled in the plan view. This applies to any project that depicts proposed street grades.
- Vertical PI labels shall be linked to the profile line and labeled in model space. Vertical PI's shall begin and end at the BC or EC of the intersection radius, (not the property line).
- All percent grades shall be rounded to 3 decimal places.
- See attached water and sewer example drawing.

ADDITIONAL ITEMS & CLARIFICATIONS TO BE INCLUDED WITHIN NEW DEVELOPMENT WATER AND SEWER PLANS TO FACILITATE REVIEW:

- Show grayscale linework for the back, face, and gutter lip of the future curb and gutter. Indicate the type of curb to be installed, whether standard or mountable.
- Include a plan note or otherwise indicate the location of the proposed curb grade elevations.
 - If standard curb, the elevation is to the top of curb, or to a projected top of curb where there are driveways, curb ramps, etc.
 - If mountable curb, the elevations listed shall be to a projected elevation of top of a standard curb.
- Include a plan note to indicate location of proposed back of sidewalk from the property line. Generally:
 - All R5/R10 zoned areas will have a 4.5' wide sidewalk placed 0.5' off property line.
 - All areas zoned above R10 will have a min 6' sidewalk placed at the property line.

- In the plan view, label the station and elevation to all BC and EC curb locations at intersections. Label all MC elevations and curb radii at intersections. This will facilitate review of grades for ADA conformance at crosswalks, etc.
- With grayscale linework, indicate the locations of all future:
 - stormwater inlets, pipes, manholes, etc.
 - curb ramps
 - valley gutters
 - any other future improvement that could impact the water/sewer location or elevation
- See attached paving example drawing.

11. PRINTING AND PREPARING FINAL PLANS

- When printing drawings, one of the standard .ctb files should be used. The .ctb files are optimized for the HP5550 color printer. This printer shall be used for printing only the final drawings that will be stamped by the Engineer. When using other printers with these .ctb files, the line weights may appear different. The location of the files is <W:\Drawings\CAD Standards\Plot Styles>
- Water, sewer, storm sewer, paving and street light plan sheets shall use the 11x17 Standard.ctb file.
- The “Plot Stamp On” box should be checked. All sheets shall have a plot stamp positioned horizontally in the lower left corner of the sheet. It shall include the filename, date, time, user name and page size. The location of the file is W:\Drawings\CAD Standards\inches.pss
- Plan sheets should be saved to a .pdf file and then printed to the HP5550 color printer using 28 lb. color paper for the engineer’s signature. This is heavier paper designed to last longer than standard paper. The signing engineer’s electronic stamp shall then be applied to each .pdf sheet using Bluebeam. The file shall then be saved in the appropriate folder as specified in the “Folder Contents Key”.
- For projects that contain underground utilities such as water, sewer or storm sewer; once the project has been awarded, the cad user shall create a stripped version of the cad file to only include property lines and the proposed pipes, structures, and appurtenances that are being installed, (mainline only, no service lines). Save the stripped file to <L:\AcadDwgs\Utilities> in the current year folder. The cad user shall request via SYSAID to have the files added to GIS by the GIS department.

12. EASEMENT DRAWINGS

- Easements, right of way plats and irregular plat drawings shall utilize the Bismarck Easement Template.dwt located in the W:\Drawings\CAD Standards folder. Documents shall be printed on 8.5”x14” paper, and utilize the 11x17 Standard.ctb plot style table file located in the W:\Drawings\CAD Standards\Plot Styles folder. See attached easement example drawing.

13. ATTACHMENTS AND SAMPLE DRAWINGS

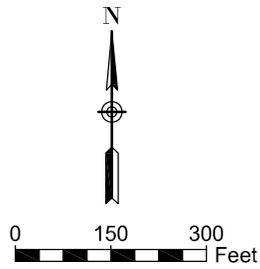
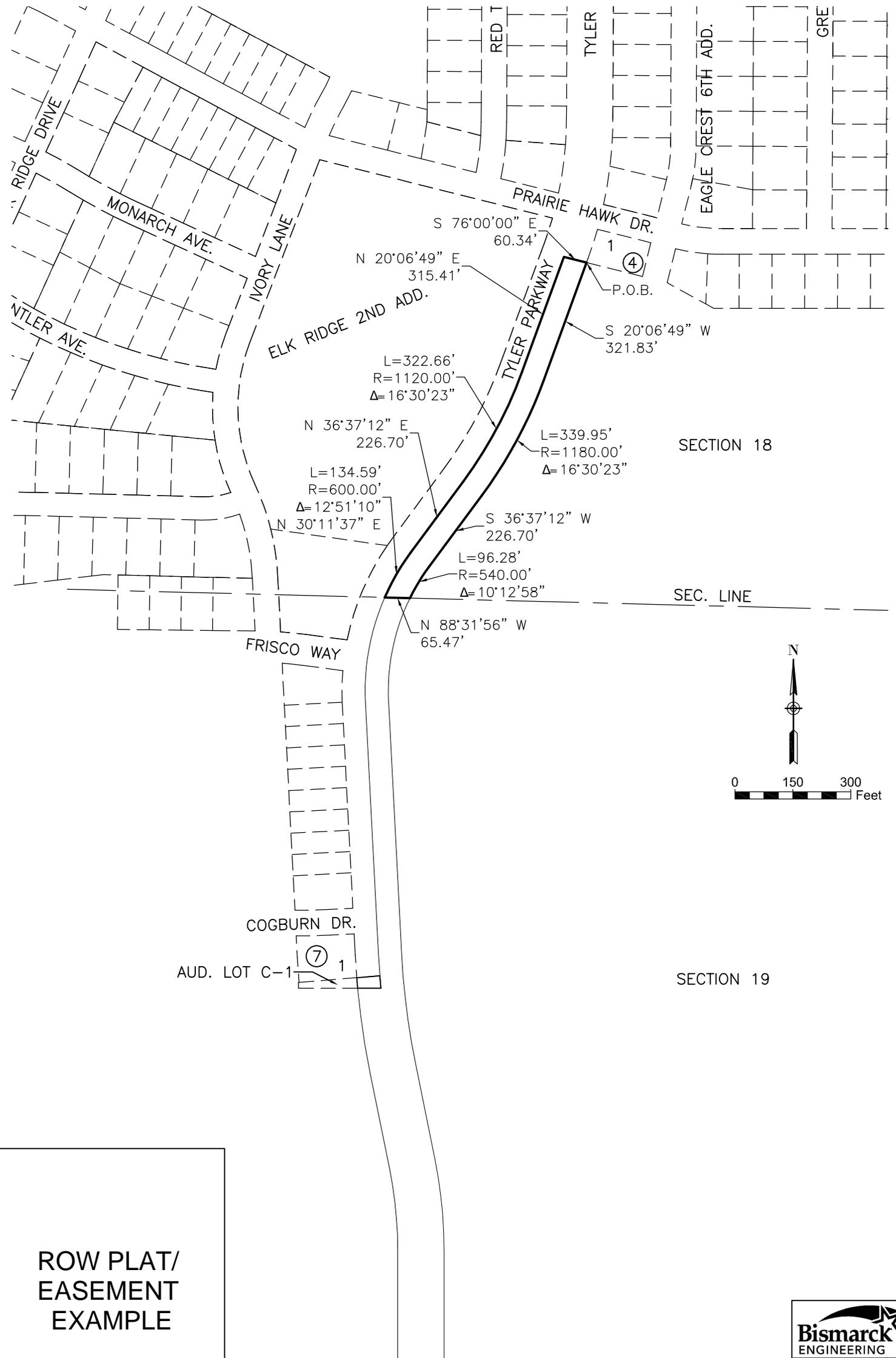
- See the following pages for survey codes, symbol legends, and sample drawings. For specific layer and other settings refer to the City of Bismarck Standard Template.



BISMARCK FIELD CODES-UPDATED 9-10-2021			
CODE	DESCRIPTION	CODE	DESCRIPTION
ALLIG	ALLIGATOR CRACK	LE***	UNDERGROUND ELECTRIC
APA***	APPROACH ASPHALT	LE***	UNDERGROUND ELECTRIC
APC***	APPROACH CONCRETE	LFO***	UNDERGROUND FIBER OPTIC
APCH	ASPHALT PAVEMENT CRACK HIGH	LFO-CL***	UNDERGROUND FIBER CENTURY LINK
APCL	ASPHALT PAVEMENT CRACK LOW	LFO-DCN***	UNDERGROUND FIBER DCN
APCM	ASPHALT PAVEMENT CRACK MEDIUM	LFO-MIDCO***	UNDERGROUND FIBER MIDCO
APD***	APPROACH DIRT	LG***	UNDERGROUND GAS
APG***	APPROACH GRAVEL	LP***	UNDERGROUND PHONE
ARP	ASPHALT REPAIR PATCH	LRW***	UNDERGROUND RURAL WATER
BC	BUILDING CORNER	MBG	MAILBOX GOVERNMENT
BFE	BUILDING FLOOR ELEV	MBS	MAILBOX SINGLE
BG	BRIDGE	MHAR	AIR RELEASE MANHOLE
BL	BUILDING LINE	MHG	MANHOLE GAS
BMHYD	BENCHMARK HYDRANT	MHP	MANHOLE PHONE
BPA***	BIKE PATH ASPHALT	MHSAN	MANHOLE SANITARY
BPC***	BIKE PATH CONCRETE	MHSANI	MANHOLE SANITARY INVERT
BPG***	BIKE PATH GRAVEL	MHST	MANHOLE STORM
BSCH	BACK SIGHT CHECK	MHSTI	MANHOLE STORM INVERT
BU	BUSH (SHRUB)	NAIL	NAIL
BURW***	BUSH ROW	PEDC	PEDESTAL CABLE
CATB	CATCH BASIN	PEDE	PEDESTAL ELECTRIC
CB	TOP OF CURB	PEDP	PEDESTAL PHONE
CBR	CURB REPAIR	PK NAIL	PK NAIL
CLSAN	CLEAN-OUT SANITARY	PLA***	ASPHALT PARKING LOT
CMP	CORRUGATED METAL PIPE	PLC***	CONCRETE PARKING LOT
CMPI	CORRUGATED METAL PIPE INV	PLG***	GRAVEL PARKING LOT
CPCL	CONCRETE PAVEMENT CRACK LOW	PM	PAVEMENT MARKING
CPCM	CONCRETE PAVEMENT CRACK MED	PP	POWER POLE
CPJ	CONCRETE PAVEMENT JOINT	PUSH	PED PUSH BUTTON
CPP	CONCRETE PAVEMENT PANEL	RCP	REINFORCED CONCRETE PIPE
CPR	CONCRETE PAVEMENT REPAIR	RCPI	REINFORCED CONCRETE PIPE INV
CPS	CONCRETE PAVEMENT SPALL	RDA***	ROAD ASPHALT (CENTERLINE)
CS	CURB STOP	RDC***	ROAD CONCRETE (CENTERLINE)
CW	CROSS WALK	RDG***	ROAD GRAVEL (CENTERLINE)
DC	DROP CURB	RIP	RIPRAP
DRA***	DRIVEWAY ASPHALT	RM	ROW MARKER
DRC***	DRIVEWAY CONCRETE	RR	RAIL ROAD
DRCR	DRIVEWAY CONCRETE REPAIR	RW***	RETAINING WALL
DRG***	DRIVEWAY GRAVEL	SANV	SANITARY FORCEMAIN VALVE
ELM	ELECTRIC METER	SB	SOIL BORING HOLE
EC***	EDGE OF CONCRETE	SD	SLOTTED DRAIN
ET***	EDGE OF TIMBER	SEED-MULCH	SEEDING-MULCHING
FC	FENCE CORNER	SEED	SEEDING
FLB***	FENCE BARBED WIRE	SHA***	SHOULDER ASPHALT
FLC***	FENCE CHAIN LINK	SHG***	SHOULDER GRAVEL
FLW***	FENCE LINE WOOD	SI	SIGN
FP	FEED POINT	SP	SPRINKLER
G	GROUND	STL	STREET LIGHT
GASV	GAS VALVE	STW***	STREET LIGHT WIRE
GD	GUTTER DRIVEWAY SPANDREL	SW	SIDEWALK
GP	GUARD POST	SWR	SIDEWALK REPAIR
GPS	GPS MONUMENT	TCB	TRAFFIC CONTROL BOX
GRL***	GUARD RAIL	TD	TREE DECIDUOUS
GT	GUTTER (FLOW LINE)	TE	TREE EVERGREEN
GV	GATE VALVE	TOE	TOE OF SLOPE
GW	GUY WIRE	TOP	TOP OF SLOPE
HYD	HYDRANT	TRAN	ELECTRICAL TRANSFORMER
IN108	INLET FLOWLINE 108"	TRD	TRENCH DRAIN
IN24	INLET FLOWLINE 24"	TRW***	TREE ROW
IN36	INLET FLOWLINE 36"	TOE***	TOE OF SLOPE
IN48	INLET FLOWLINE 48"	TOP***	TOP OF SLOPE
IN72	INLET FLOWLINE 72"	TSP	TRAFFIC SIGNAL POLE
IP	IRON PIN	TSW***	TRAFFIC SIGNAL WIRE
JBC	JUNCTION BOX CABLE TV	UD	UNDERDRAIN
JBE	JUNCTION BOX ELECTRIC	VG	VALLEY GUTTER
JBFO	JUNCTION BOX FIBER OPTIC	WE***	WATERS EDGE
JBSTL	JUNCTION BOX STREET LIGHT	WING WALL	WING WALL
JBP	JUNCTION BOX PHONE	X	X ON CONCRETE
JBT	JUNCTION BOX TRAFFIC SIGNAL	Z	NO CODE
LC***	UNDERGROUND CABLE TV	(CODES WITH *** CAN	INCLUDE LINework)

RIGHT-OF-WAY PLAT

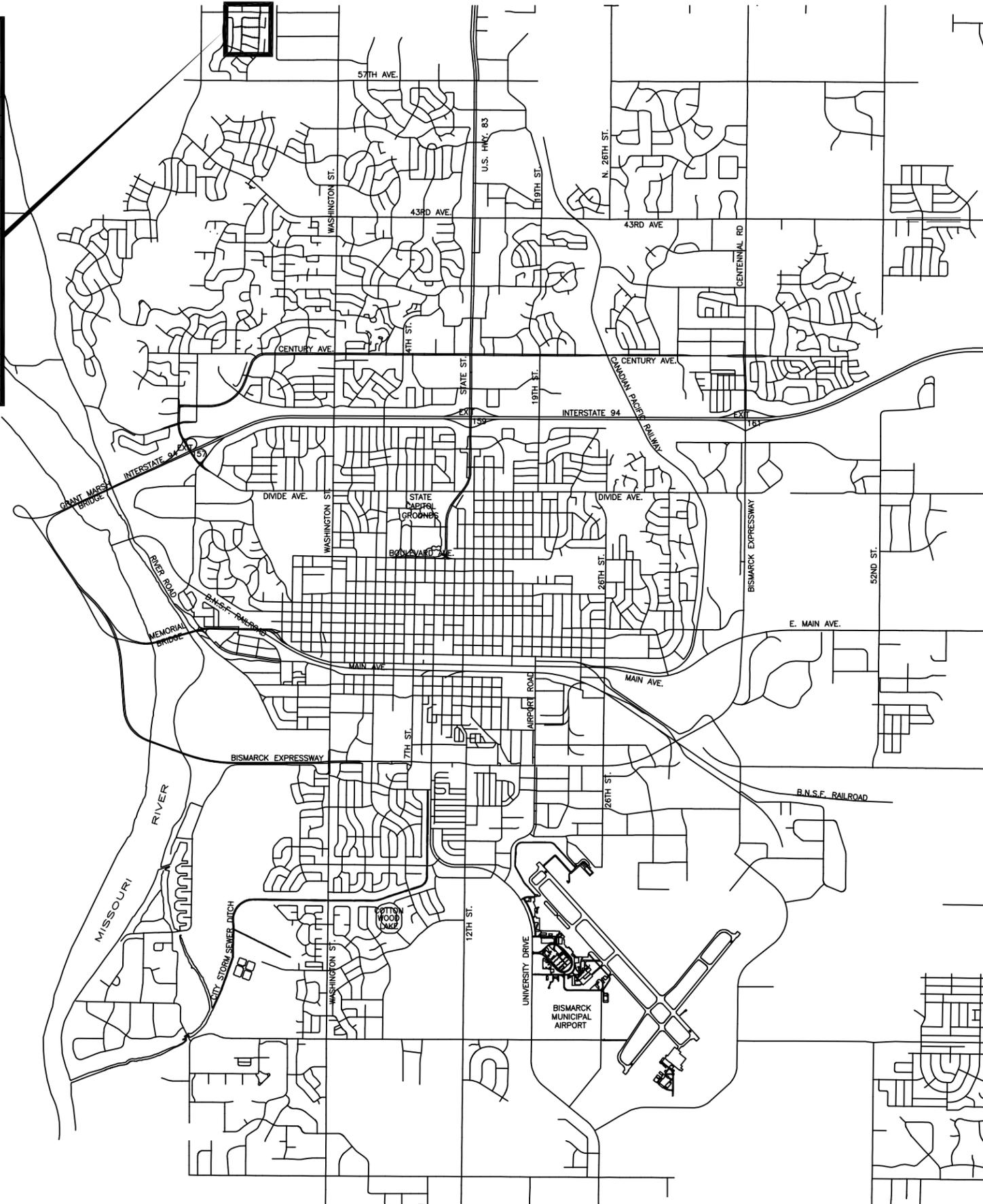
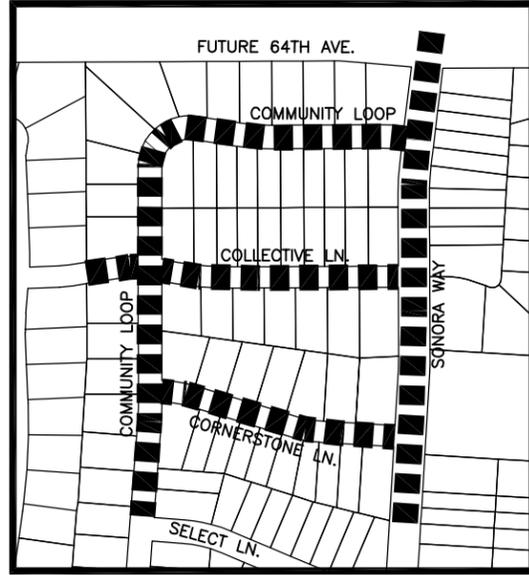
PART OF THE SE1/4, SECTION 18, T139N, R80W BURLEIGH COUNTY, NORTH DAKOTA



ROW PLAT/
EASEMENT
EXAMPLE

CITY OF BISMARCK

UNIT 1 & 2



SHEET INDEX

- 1 COVER SHEET
- 2 STORM SEWER – PROJECT OVERVIEW
- 3 SONORA WAY – 220' S. OF CORNERSTONE LN. TO 100' N. OF CORNERSTONE LN.
- 4 SONORA WAY – 100' N. OF CORNERSTONE LN. TO 100' N. OF COLLECTIVE LN.
- 5 SONORA WAY – 100' N. OF COLLECTIVE LN. TO 100' N. OF COMMUNITY LP.
- 6 SONORA WAY – 100' N. OF COMMUNITY LP. TO FUTURE 64TH AVE.
- 7 COMMUNITY LOOP – SONORA WAY TO 200' WEST
- 8 COLLECTIVE LANE – SONORA WAY TO 360' WEST
- 9 COLLECTIVE LANE – 360' WEST OF SONORA WAY TO COMMUNITY LP.
- 10 COLLECTIVE LANE – COMMUNITY LP. TO 175' WEST
- 11 STS EASEMENT – 100' EAST TO 400' EAST OF SONORA WAY
- 12 STS EASEMENT – SONORA WAY TO 80' EAST
- 13 LOT 14, BLOCK 8 POND
- 14 STORM SEWER DETAILS
- 15 PAVING OVERVIEW
- 16 215' S. TO 175' N. OF CORNERSTONE LN.
- 17 175' N. OF CORNERSTONE LN. TO 165' N. OF COLLECTIVE LN.
- 18 165' N. OF COLLECTIVE LN. TO FUTURE 64TH AVE.
- 19 COMMUNITY LOOP – 55' N. OF SELECT LN. TO 40' N. OF CORNERSTONE LN.
- 20 COMMUNITY LOOP – 40' N. OF CORNERSTONE LN. TO 110' N. OF COLLECTIVE LN.
- 21 COMMUNITY LOOP – 110' N. OF COLLECTIVE LN. TO 595' W. OF SONORA WAY
- 22 COMMUNITY LOOP – 595' W. TO 255' W. OF SONORA WAY
- 23 COMMUNITY LOOP – SONORA WAY TO 255' W.
- 24 CORNERSTONE LANE – SONORA WAY TO 360' W.
- 25 CORNERSTONE LANE – 360' W. OF SONORA WAY TO COMMUNITY LP.
- 26 COLLECTIVE LANE – SONORA WAY TO 420' W.
- 27 COLLECTIVE LANE – 420' W. OF SONORA WAY TO 170' W. OF COMMUNITY LP.

DATE: _____

I, GABRIEL J. SCHELL, CITY ENGINEER FOR THE CITY OF BISMARCK, NORTH DAKOTA, HEREBY APPROVE THESE PLANS.

COVER SHEET
EXAMPLE



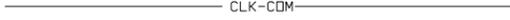
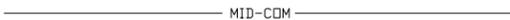
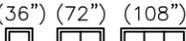
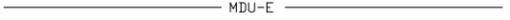
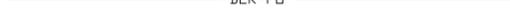
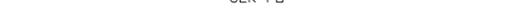
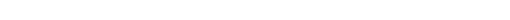
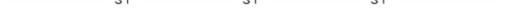
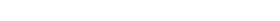
HORIZONTAL DATUM SHALL BE NAD 83 (86 ADJUSTMENT) BASED ON CITY OF BISMARCK MONUMENTS AND ADJUSTED TO GROUND DISTANCE. VERTICAL DATUM SHALL BE NGVD 29. DRAWING UNITS SHALL BE IN INTERNATIONAL FEET.

STREET IMPROVEMENT DISTRICT NO. 553
HERITAGE PARK 2ND ADDITION STORM
SEWER & PAVING

CITY OF BISMARCK – ENGINEERING DEPT.
Gabriel J. Schell, P.E., City Engineer
221 N. 5th St., P.O. Box 5503 Bismarck, ND 58506-5503
Phone: 701-355-1505 Fax: 701-222-6593

Sheet No.
1 of 27

LEGEND

<u>EXISTING</u>		<u>PROPOSED</u>		<u>EXISTING</u>		<u>PROPOSED</u>
	BOLLARD				COMMUNICATIONS – CENTURY LINK	
	BUSH				COMMUNICATIONS – MIDCO	
	CATCH BASIN				CURB & GUTTER	
	CLEANOUT				EASEMENT	
	CURB INLET				ELECTRIC – CAPITAL ELECTRIC	
	CURBSTOP				ELECTRIC – MDU	
	GAS VALVE				FENCE–BARBED WIRE	
	GATE VALVE				FENCE–CHAIN LINK	
	GUY WIRE				FENCE–WOOD	
	HYDRANT				FIBER OPTIC	
	MAILBOX–SINGLE				FIBER OPTIC – AT&T	
	MAILBOX–GOVT. (MULTIPLE)				FIBER OPTIC – BEK	
	MANHOLE				FIBER OPTIC – CENTURY LINK	
	POWER POLE				FIBER OPTIC – DCN	
	SIGN				FIBER OPTIC – MIDCO	
	STREET LIGHT				GAS	
	TRAFFIC CONTROL BOX				OVERHEAD POWER	
	TRAFFIC SIGNAL POLE				PROPERTY LINE	
	TREE–DECIDUOUS				STRAW WATTLE	
	TREE–EVERGREEN				SANITARY SEWER	
	UTILITY JUNCTION BOX UTILITY				STORM SEWER	
	PEDESTAL/FEEDPOINT				STREET LIGHTS	
					TRAFFIC SIGNAL WIRE	
					WATERMAIN	



STA. 2+80.05, 6.50' LT
MANHOLE NO. 12

STA. 0+06.00, 8.67' LT
MANHOLE NO. 2

CONSTRUCTION NOTES

- BACKFILL SHALL BE CLASS "A".
- GRADING SHALL BE BY OTHERS PRIOR TO CONSTRUCTION.

Lot	Block	4" Sewer Service	4" 45° Bend	8" x 4" Wye Branch	Sewer Service Invert @ Cap	1" Cu. Water Service Pipe	1" Water Service Invert @ Cap	1" Water Service Connection	1" Curb Stop & Box	Water Service Invert @ C.S.
11	3	35.2	1	1	07.4	---	---	---	---	---
12	3	34.7	1	1	07.6	---	---	---	---	---
13	3	34.2	1	1	07.9	---	---	---	---	---
14	3	33.8	1	1	08.1	---	---	---	---	---
15	3	33.6	1	1	09.0	---	---	---	---	---
7	4	18.9	1	1	07.2	---	---	---	---	---
6	4	19.6	1	1	07.6	40.5	1	1	10.5	---
5	4	20.3	1	1	07.9	40.5	1	1	10.8	---
4	4	20.3	1	1	10.1	40.5	1	1	14.1	---
TOTAL	251	9	9	---	122	3	3	---	---	---

SANITARY SEWER MANHOLE SCHEDULE

MANHOLE NUMBER	12
CASTING ELEV.	19.08
TOP P.C. SECTION	18.04
INVERT ELEV. (a)	07.60
INVERT ELEV. (b)	07.70
LENGTH P.C. SECTION	10.44
	8" $\frac{9}{16}$ - 8" 179'

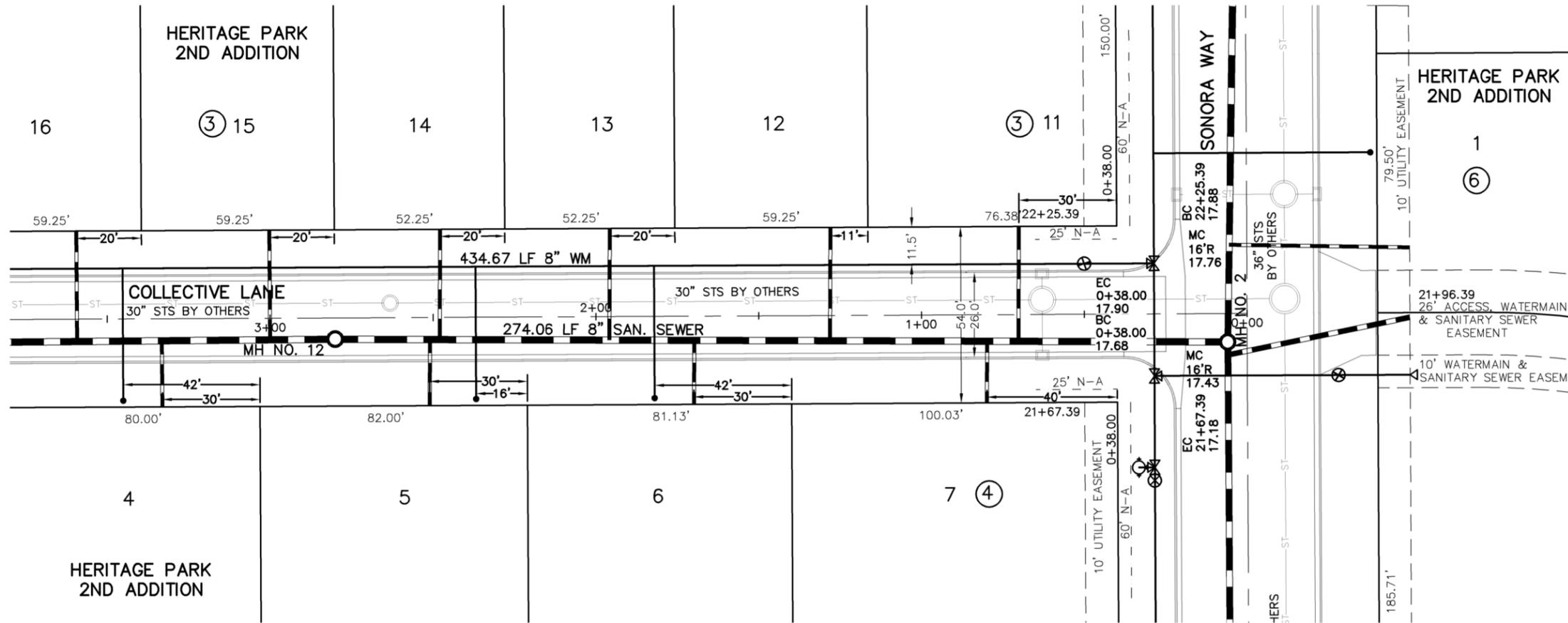
STATION	DIRECTION	LOT	BLOCK
FROM MANHOLE NO. 2 TO MANHOLE NO. 12			
0+64.3	N	11	3
0+73.9	S	7	4
1+22.1	N	12	3
1+63.9	S	6	4
1+89.9	N	13	3
2+42.0	N	14	3
2+45.0	S	5	4
FROM MANHOLE NO. 12 TO MANHOLE NO. 13			
0+19.9	N	15	3
0+53.2	S	4	4

CURVE	RADIUS	LENGTH	TANGENT	DELTA
H	200.00'	67.75'	34.21'	19°24'37"

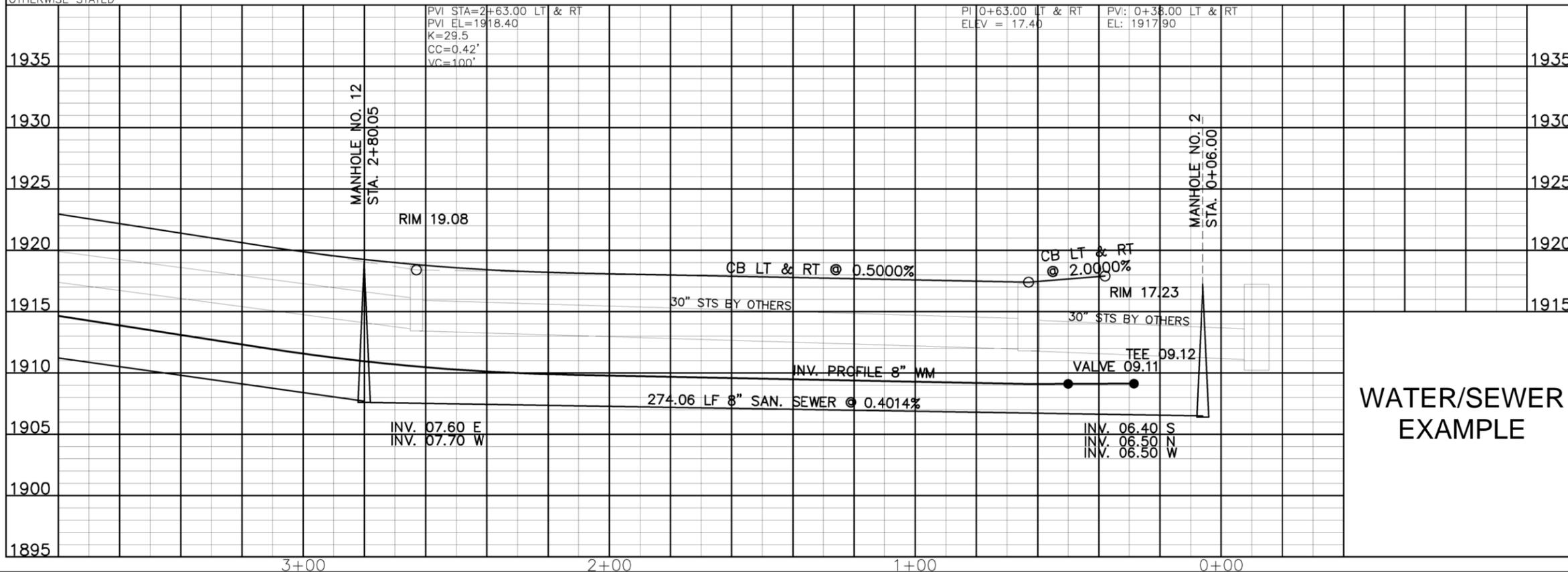


COLLECTIVE LANE
SONORA WAY TO
360' WEST OF SONORA WAY

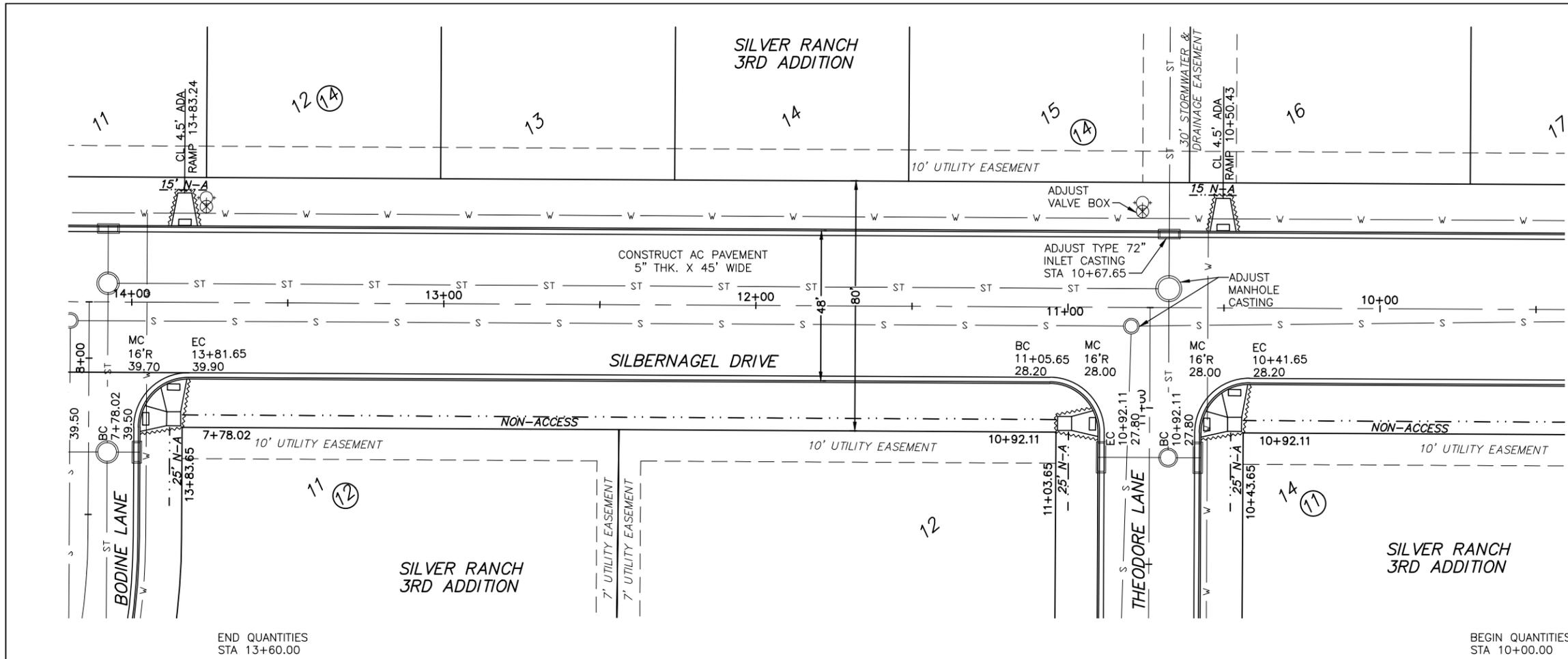
WATER AND SEWER IMP. PROJECT NO. 378
SHEET NO. 14 OF 25 SHEETS



NOTE:
ALL WATER MAIN IS 15.5' RIGHT
OF CENTERLINE UNLESS
OTHERWISE STATED

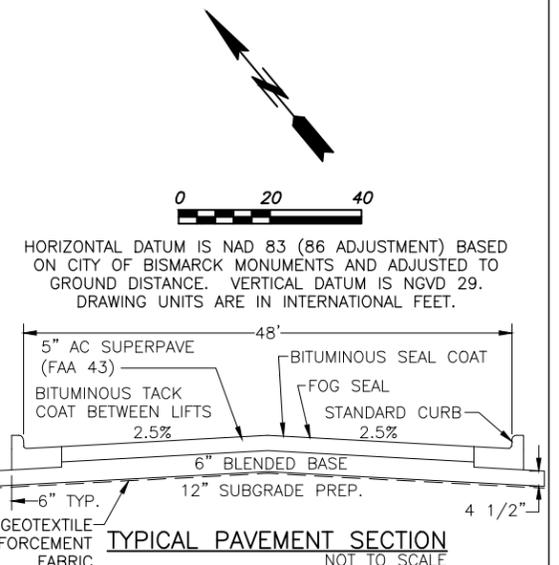


WATER/SEWER
EXAMPLE



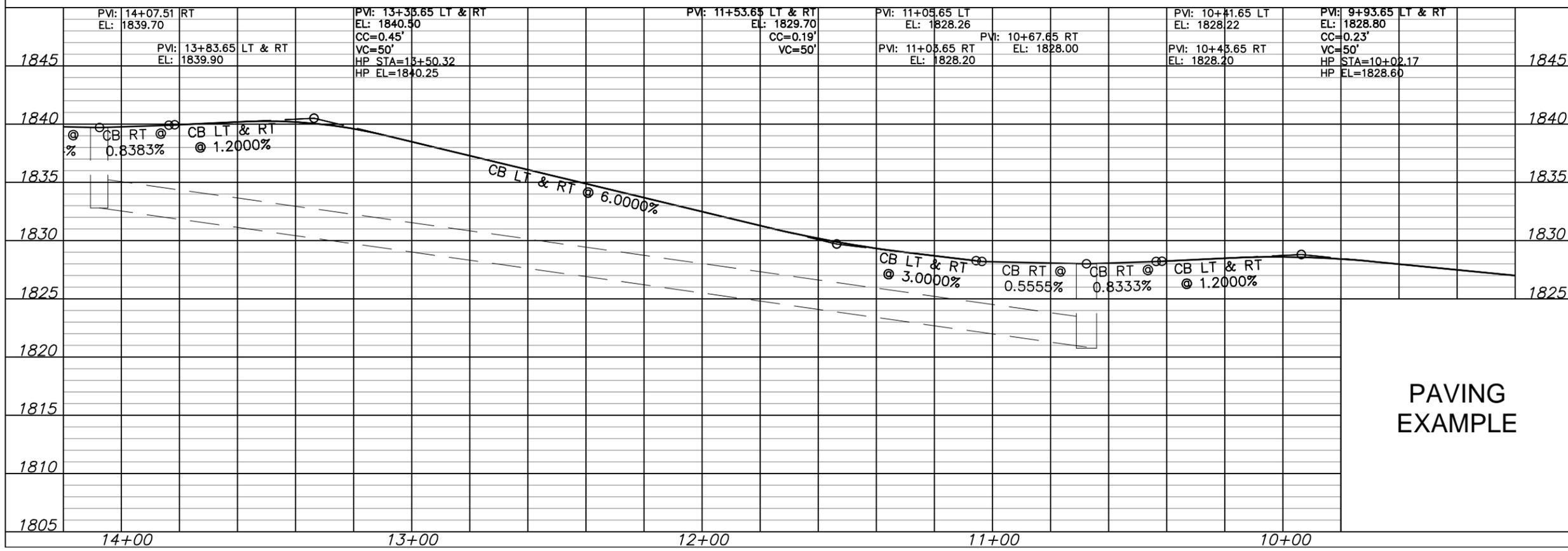
CONSTRUCTION NOTES
 WATER AND SANITARY SEWER ARE BY OTHERS.
 BACK OF 4.5' SIDEWALK SHALL BE 0.5' FROM PROPERTY LINE.
 ALL TOP OF CURB ELEVATIONS SHOWN ARE PROJECTED TO A STANDARD 6" CURB SECTION. CONTRACTOR SHALL MAKE ADJUSTMENTS IN THE FIELD TO ALLOW FOR CURB RAMPS & DRIVEWAYS.

CAUTION
 THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. NOT ALL EXISTING UTILITIES ARE SHOWN. CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND SHALL BE RESPONSIBLE FOR PROTECTING ALL UTILITIES OR REPAIRING ANY DAMAGE WHICH OCCURS DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES.



APPROXIMATE QUANTITIES

SPEC. NO.	PAVING ITEMS	QUANTITY
204-3.1A	SUBGRADE PREPARATION (1')	1982 SY
205-4.8	STRAW WATTLES 9" DIA.	29 LF
205-4.12	DRAINAGE STRUCT INLET FILTER	2 EA
302-4.3	BLENDED BASE	325 CY
401-6.23	AC SUPERPAVE (FAA 43)	500 TON
402-4.2	BITUMINOUS TACK COAT	180 GAL
403-4.1	BITUMINOUS SEAL COAT	1800 SY
403-4.2	BLOTTER SAND	3 TON
602-4.1	6" CONCRETE	67 SF
601-4.5	DETECTABLE WARNING PANELS	8 SF
603-5.3	STANDARD CURB & GUTTER	656 LF
1206-4.1	ADJ MH CASTING-ASPH PVMT	2 EA
1206-4.7	ADJ TYPE 72" INLET CASTING	1 EA
1206-4.19	ADJ VALVE BOX-UNPAVED AREA	1 EA
1207-4.2	GEOTEXTILE REINF FABRIC	2000 SY
SP NO. 7	TOPSOIL, SEEDING, MULCHING	1130 SY
SP NO. 8	FOG SEAL	180 GAL



PAVING EXAMPLE



SILBERNAGEL DRIVE

310' NORTH OF DAVIES DRIVE TO 55' SOUTH OF BODINE LANE
 STREET IMPROVEMENT DISTRICT NO. 545
 UNIT NO. 2
 SHEET NO. 21 OF 55 SHEETS

Sta. 14+07.65, 23.50' Rt.
Inlet No. 14
Type 72"/R-3295-2

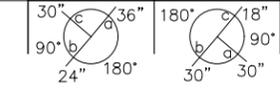
Sta. 10+67.65, 23.50' Rt.
Inlet No. 11
Type 72"/R-3295-2

CONSTRUCTION NOTES

1. Backfill shall be Class "A".
2. Grading shall be by others prior to construction.

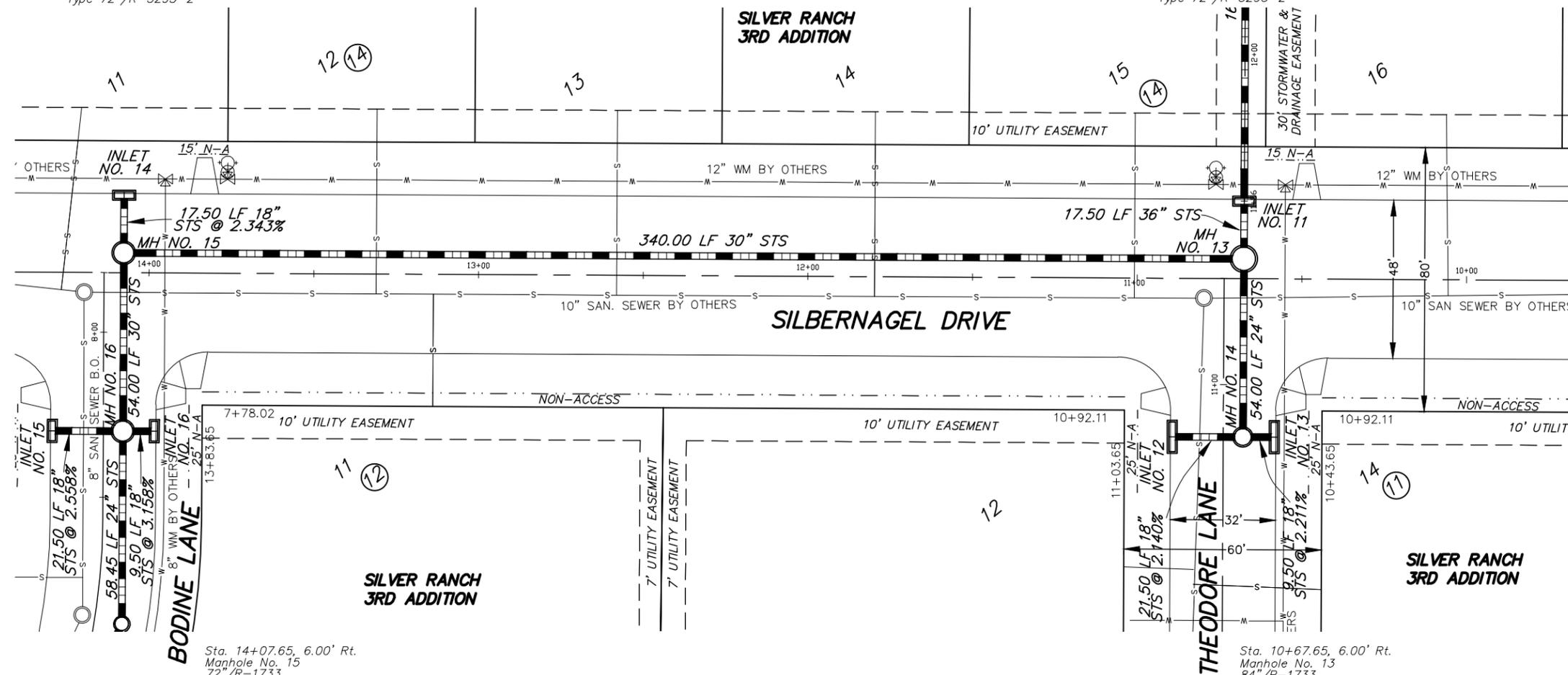
STORM SEWER MANHOLE SCHEDULES

INLET NUMBER	MH NO. 13	MH NO. 15
MANHOLE SIZE	84"	72"
CASTING TYPE	R-1733 SOLID COVER	R-1733 SOLID COVER
RIM/GUTTER ELEV.	1828.00	1839.69
TOP P.C. SECTION	26.29	37.98
INVERT (a)	20.75	32.80
INVERT (b)	20.85	32.90
INVERT (c)	20.85	34.00
INVERT (d)	--	--
LENGTH P.C. SECTION	5.54	5.18



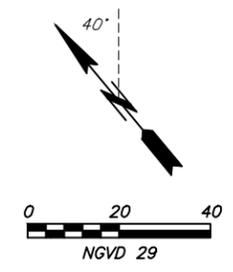
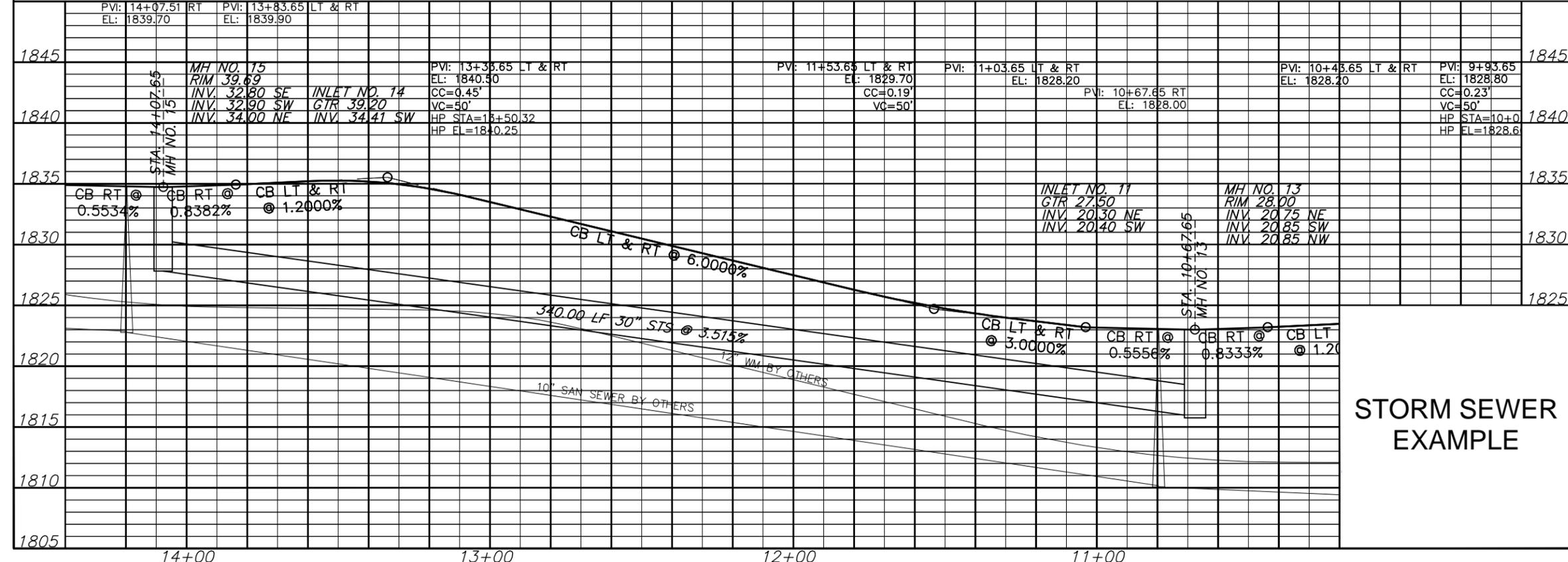
STORM SEWER INLET SCHEDULES

INLET NUMBER	INLET NO. 11	INLET NO. 14
MANHOLE SIZE	2' x 6'	2' x 6'
CASTING TYPE	R-3295-2 TYPE "V" GRATE	R-3295-2 TYPE "V" GRATE
RIM/GUTTER ELEV.	1827.50	1839.20
TOP P.C. SECTION	26.71	38.41
INVERT (a)	20.30	34.41
INVERT (b)	20.40	--
LENGTH P.C. SECTION	6.41	4.00



Sta. 14+07.65, 6.00' Rt.
Manhole No. 15
72"/R-1733

Sta. 10+67.65, 6.00' Rt.
Manhole No. 13
84"/R-1733



**STORM SEWER
EXAMPLE**



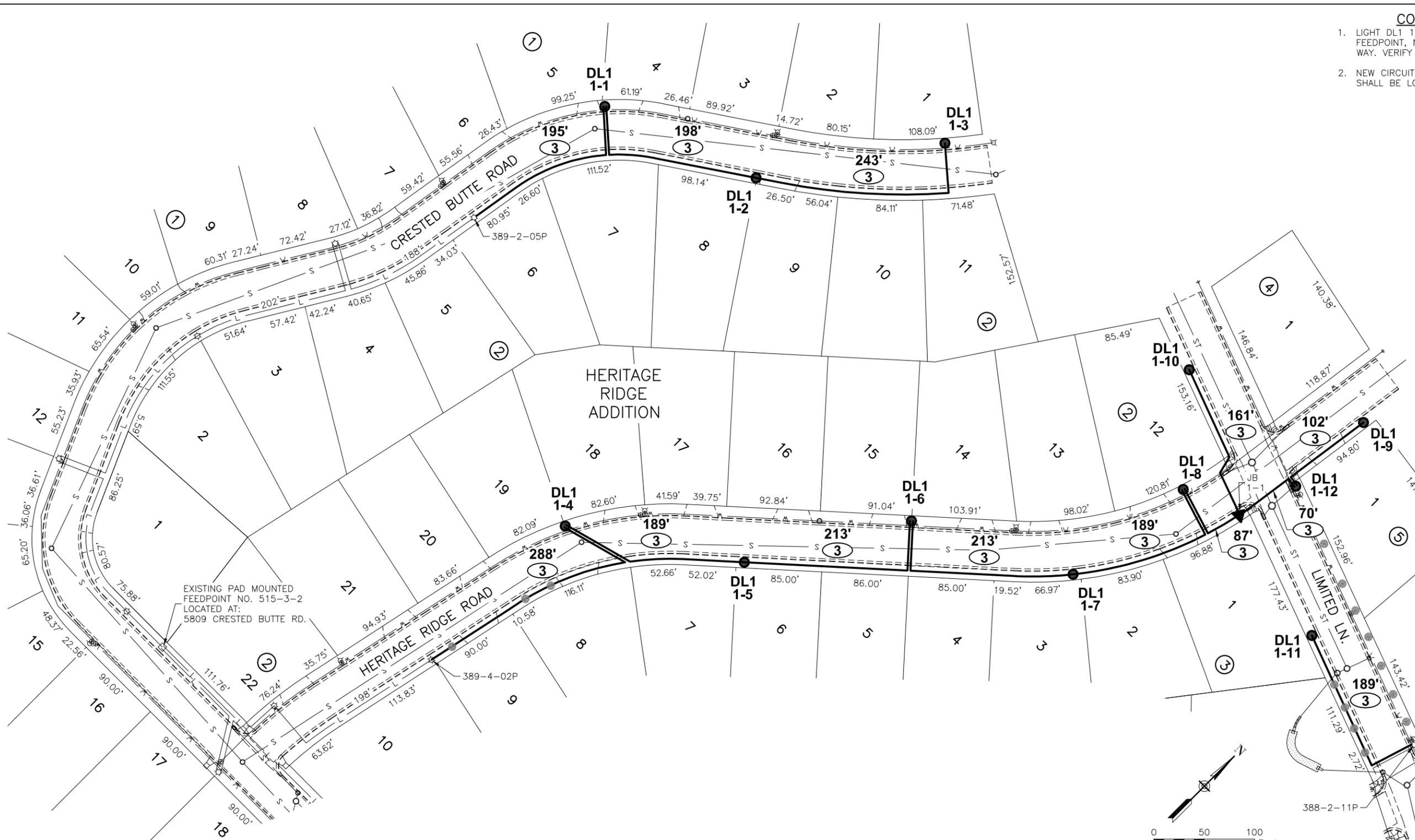
Bismarck Engineering Department

**SILBERNAGEL DRIVE
THEODORE LANE
TO BODINE LANE**

STREET IMP. DISTRICT NO. 545 - UNIT 1
SHEET NO. 10 OF 55 SHEETS
BISMARCK, NORTH DAKOTA

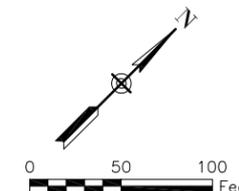
CONSTRUCTION NOTES

1. LIGHT DL1 1-11 IS FED FROM AN EXISTING FEEDPOINT, NO. 515-3-1 LOCATED AT 5807 SONORA WAY. VERIFY PRIOR TO STARTING WORK.
2. NEW CIRCUIT CONDUCTORS THROUGH JUNCTION BOXES SHALL BE LOOPED AND UNSPLICED, INCIDENTAL.



Unit No. 1

STREET LIGHT EXAMPLE



HORIZONTAL DATUM IS NAD 83 (86 ADJUSTMENT) BASED ON CITY OF BISMARCK MONUMENTS AND ADJUSTED TO GROUND DISTANCE. VERTICAL DATUM IS NGVD 29. DRAWING UNITS ARE IN INTERNATIONAL FEET.

CAUTION
 THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. NOT ALL EXISTING UTILITIES ARE SHOWN. CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND SHALL BE RESPONSIBLE FOR PROTECTING ALL UTILITIES OR REPAIRING ANY DAMAGE WHICH OCCURS DUE TO THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES.

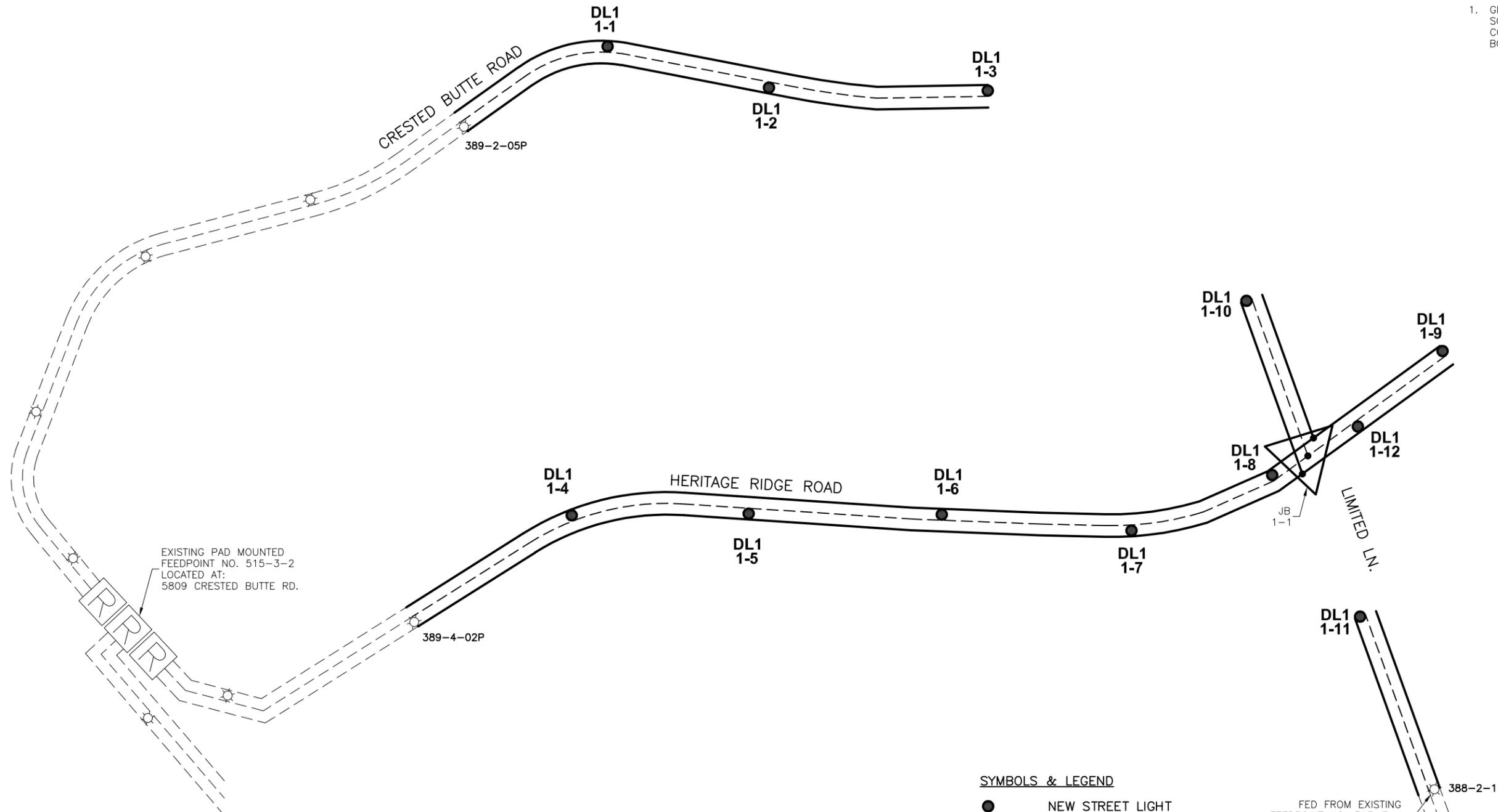


CRESTED BUTTE RD. & HERITAGE RIDGE RD. & LIMITED LN.

STREET IMPROVEMENT DISTRICT NO. 544
 UNIT NO. 1
 SHEET NO. 3 OF 11 SHEETS

CONSTRUCTION NOTES

1. GROUND CONDUCTOR IS NOT SHOWN ON THE WIRING SCHEMATIC FOR CLARITY. INSTALLATION OF GROUND CONDUCTOR IS REQUIRED FOR ALL NEW CIRCUITS. BOND AT FEEDPOINT WHEN POSSIBLE.



EXISTING PAD MOUNTED FEEDPOINT NO. 515-3-2 LOCATED AT: 5809 CRESTED BUTTE RD.

FED FROM EXISTING FEEDPOINT NO. 515-3-1 LOCATED AT: 5807 SONORA WAY

SYMBOLS & LEGEND

- NEW STREET LIGHT
- ⊙ EXISTING STREET LIGHT
- ⊠ EXISTING FEEDPOINT
- ⊠ (with 'R') NEW FEEDPOINT
- △ EXISTING JUNCTION BOX
- △ (with 'R') NEW JUNCTION BOX
- POWER CONDUCTOR
- - - NEUTRAL WIRE
- - - EXISTING POWER CONDUCTOR

Unit No. 1

STREET LIGHT SCHEMATIC EXAMPLE



FEEDPOINT NO. 389

STREET IMPROVEMENT DISTRICT NO. 544
 UNIT NO. 1
 SHEET NO. 4 OF 11 SHEETS