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Section 2
DRAFTING STANDARDS

Section 2.1

DRAFTING STANDARDS

2.1.1 General - The purpose of this section is to establish uniform procedures for preparation of plan sheets, regardless of the method of producing the sheet, computer aided drafting (CAD) or manually. The finished sheets shall adhere to the following standards.

The type of sheets necessary for a set of plans will vary with the type of project. The following sections will present information concerning: 1) in what manner information should be shown on a sheet, 2) which sheets are necessary for a given type of project, and 3) what information shall be shown on the different sheets.

2.1.1.1 Sheet Presentation - When a sheet is ready for inclusion in the final set of plans, all lettering and linework will be in ink, or CAD process, or a combination of the two.

All sheets will be on paper, 24 pound bond, or plastic, 3 mil mylar with a matte finish on both sides.

A standard plan sheet shall be trimmed to 22 inches wide by 36 inches long. A border defining a 21 inch by 33 1/2 inch working area shall be placed 1/2 inch from the top, bottom, and right edge, and 2 inches from the left edge. A standard City of Topeka title block shall be placed in the lower right corner of the sheet. Use of obtrusive company logos and titles will not be permitted.

Existing features on plan-profile sheets will be shown in a subdued manner. Topography, utilities, property lines and existing right-of-way lines are to be done with lighter line weights. Proposed features, such as new construction, project centerline, structures and construction notes are to be done in heavier line weights, and shall be easily distinguishable from existing features. Cross-hatching and dot pattern may be used to indicate pavement removal and geologic features. (See Section 2.1.1.5.4 for line weights).

2.1.1.2 Lettering - The minimum size of any text lettering shall be 0.125 inches on the standard 22"x36" sheet. The size of lettering on construction notes should be a minimum of 0.1335 inches. The weight of the text should increase with the text size.

Manually drafted lettering shall be by lettering guide, Leroy or equivalent. CAD text style shall be Romans or Arial.

2.1.1.3 Sheet Order - Sheet Order will vary slightly with the type of project, but the general order shall be:

1. Title Sheet
2. Estimate of Quantities (if not shown on the Title Sheet)
3. Drainage Plan

4. Typical Sections
5. Plan-Profile, Site Plan or Construction Layout
6. Contour Map
7. Pavement Geometry
8. Intersection Contours
9. Return Elevations
10. Standard Details
11. Special Details
12. Geology
13. Traffic Control
14. Cross Sections

2.1.1.4 **Required Sheets by Project Type** - The following table indicates which sheets are required, or may be required as circumstances dictate, for specific types of projects:

	Street	Storm	Sanitary	Water	Bridge	Other *
Title/Cover	1	1	1	1	1	1
Drainage Plan	1	1			2	2
Typical Sections	1	2			2	2
Plan-Profile	1	1	1	1	1	2
Construction Layout					1	
Contour Map					2	2
Pavement Geometry	1				2	
Intersection Contours	1				2	
Return Elevations	1				2	
Standard Details	1	1	1	1	1	1
Special Details	2	2	2	2	1	2
Geology	2	2	2	2	1	
Traffic Control	2	2	2	2	2	2
Cross Sections	1				2	2

1 - Required

2 - May be required as circumstances dictate.

* Other Projects include Sidewalk, Parking Lots, etc.

Other sheets may be required by the Design Engineer to effectively communicate the design intentions.

2.1.1.5 Standard Symbols -

2.1.1.5.1 **Abbreviations** - Abbreviations shall be kept to a minimum and used only where clarity and standard usage will prevent confusion or misinterpretation. Standard abbreviations for use on plans are as follows:

AADT	Average Annual Daily Traffic
Ahd.	Ahead
Appr.	Approach
Bk.	Back
b/b	Back to Back of Curbs
b/c	Back of Curb
Ⓡ	Baseline
Bldg.	Building
B.M.	Benchmark
Brg.	Bearing
C & G	Curb and Gutter
Ⓢ	Centerline
Cl.	Class
CIP	Cast Iron Pipe
C.J.	Contraction Joint
Const. Jt.	Construction Joint
Conc.	Concrete
CMP	Corrugated Metal Pipe
CSP	Corrugated Steel Pipe
Const.	Construct
Cr. Gr.	Crown Grade
Culv.	Culvert
Cu. Yds.	Cubic Yards
D	Degree of Curvature or Directional Percentage of DHV
D.A.	Drainage Area
DHV	Design Hourly Volume
Dia.	Diameter
Dr.	Drive
DIP	Ductile Iron Pipe
Ea.	Each
ECR	End of Curb Return
Elev.	Elevation
Ent.	Entrance
E.P.	Edge of Pavement
Esmt.	Easement
E.W.S.	End of Wearing Surface
Exc.	Excavation
Exist. or Ex.	Existing
F.A.S.	Federal Aid Secondary
Ⓣ	Flow Line
Fc.	Fence
F.H.	Fire Hydrant
Ftg.	Footing

2.1.1.5.1. Abbreviations Cont.

Ga.	Gauge
Grd.	Ground
Grd. Rail	Guard Rail
Gdr.	Girder
G.M.	Gas Meter
G.P.	Guy Pole
G.V.	Gas Valve
Hdwl.	Headwall
Ho.	House
Horiz.	Horizontal
H.W.	High Water
Hub. Gd.	Hub Guard
Hyd.	Hydrant
Inv.	Structure Invert Elevation
Jct.	Junction
L	Curve Length
L.F.	Linear Feet
L.J.	Longitudinal Joint
L.P.	Light Pole
L.S.	Lump Sum
Lt.	Left
M.B.	Mailbox
Med.	Median
M.H.	Manhole
Min.	Minimum
M.J.	Mechanical Joint
N.	North
N. Az.	North Azimuth
Pavt.	Pavement
Perm.	Permanent
P.C.	Point of Horizontal Curvature
P.C.C.	Point of Horizontal Compound Curvature
P.I.	Point of Horizontal Intersection
PL	Property Line
P.O.C.	Point on Curve
P.O.T.	Point on Tangent
P.P.	Power Pole
P.R.C.	Point of Horizontal Reverse Curvature
Pr. Gr.	Profile Grade
Proj.	Project
P/S	Prestressed
P.T.	Point of Horizontal Tangency
P.V.C.	Point of Vertical Curvature or Polyvinyl Chloride Pipe
P.V.C.C.	Point of Vertical Compound Curvature
P.V.I.	Point of Vertical Intersection
P.V.R.C.	Point of Vertical Reverse Curvature
P.V.T.	Point of Vertical Tangency
R	Radius
RCB	Reinforced Concrete Box

2.1.1.5.1. Abbreviations Cont.

RCP	Reinforced Concrete Pipe
Rd.	Road
Rdbd.	Roadbed
Rdwy.	Roadway
Reinf.	Reinforcing
Rem.	Remove
Ret. Wall	Retaining Wall
R.R.	Railroad
Rt.	Right
R/W	Right of way
S.	South
San. Sew.	Sanitary Sewer
Sec.	Section
Shld.	Shoulder
Sk.	Skew
Spa.	Space
Sp. Dt.	Special Ditch
Sq. Ft.	Square Feet
Sq. Yds.	Square Yards
St.	Street
St. Sew.	Storm Sewer
Sta.	Station
Std. Dt.	Standard Ditch
Surf.	Surface
Subgr.	Subgrade
S.W.	Sidewalk
Symm.	Symmetrical
T	Tangent (Curve Data) or Truck Percentage of DHV
Tan.	Tangent
Tel.	Telephone
Temp.	Temporary
T/C	Top of Curb
T/R	Top of Rail
Tr. Sig.	Traffic Signal
T/S	Top of Slab
T/S.W.	Top of Sidewalk
T/W	Top of Wall
T.W.	Traveled Way
typ.	Typical
Undg.	Underground
V.	Design Speed
Var.	Variable
V.C.P.	Vitrified Clay Pipe
V.C.	Vertical Curve
Vert.	Vertical
W.	West
W.M.	Water Meter
W.V.	Water Valve
X-Sect.	Cross Section

2.1.1.5.2 Standard Plan Symbols - Plan symbols shall conform to those shown below:

Construction Limits-----	-----
Traffic Signal Line-----	-----TS-----TS-----
Overhead Telephone Line-----	-----OHT-----
Underground Telephone Line-----	-----UT-----
Overhead Cable-----	-----OHC-----
Underground Cable-----	-----UC-----UC-----
Overhead Electric Line-----	-----OHE-----
Underground Electric Line-----	-----UE-----UE-----
Water Line-----	-----W-----W-----
Gas Line-----	-----G-----G-----
Sanitary Sewer-----	-----SS-----SS-----
Storm Sewer-----	-----STM-----STM-----
Fiber Optic Line-----	-----FO-----
Centerline-----	-----
Right-of-Way Line-----	-----R/W-----
Property Line-----	-----R-----
Lot Line-----	-----
Chain link Fence-----	-----o-----o-----o-----o-----o-----o-----o-----o-----
Wood Fence-----	-----□-----□-----□-----□-----□-----□-----□-----□-----
Wire Fence-----	-----x-----x-----
RailRoad Tracks-----	----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- -----
Section Corner-----	△
Control Point-----	⊕
Property Pin-----	•
Power Pole-----	■
Telephone Pole-----	⊙
Street Light-----	☀
Guy Pole-----	□
Guy Wire-----	→
Fire Hydrant-----	⊕
Water Meter-----	⊕
Water Valve-----	⊕
Gas Meter-----	⊕
Gas Valve-----	⊕
Mail Box-----	⊕
Existing Storm Inlet-----	⊕
Existing Manhole-----	⊕
Existing Traffic Manhole-----	⊕
Sign-----	+
Tree-----	☁
Stump-----	⊕
Shrub-----	✱

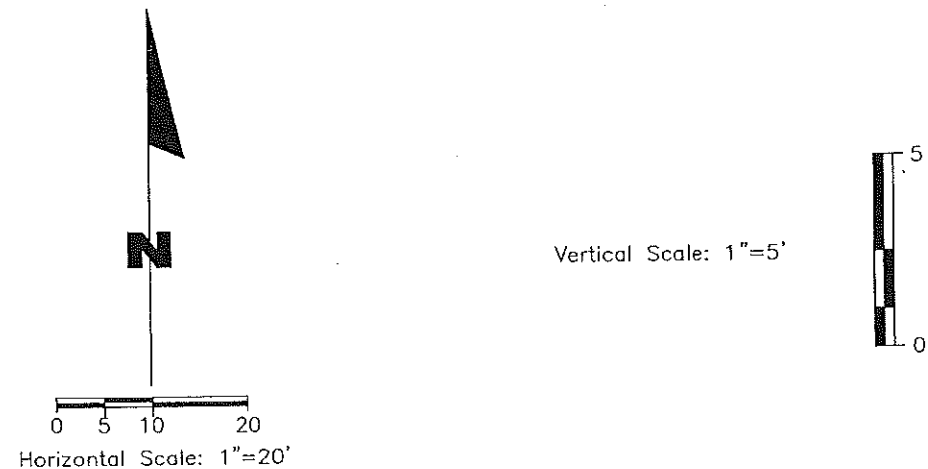
2.1.1.5.3 **Standard Note Forms** - Informational and non-pay item notes shall be enclosed in a two sided box. Pay items shall be enclosed in a three sided box.

2.1.1.5.4 **Line Weights** - Except where noted otherwise in these drafting standards or as special conditions dictate, the following line weights shall be used.

Description	Line Weight (mm)
Hatching, background lines	0.18
Detail Primary Lines	0.40
Detail Secondary Lines	0.15
City of Topeka / Shawnee County Logo	0.25
Border - Heavy Lineweight	1.20
Border - Light Lineweight	0.30
Border - Medium Lineweight	0.90
Border Text, Detail Dimensions	0.25
Border Title	0.15
Profile Grid - Heavy Lineweight	0.15 @ Black 60% Plot Style
Profile Grid - Light Lineweight	0.09 @ Black 30% Plot Style

2.1.1.5.5 **Graphic Scales and North Arrow.** - Graphic scales shall be shown on the Title, Plan-Profile, Site Plan, Construction Layout, Contour Map, Pavement Geometry, Intersection Contour and Intersection Curb Return Profile sheets. Plan-Profile sheets shall have a horizontal scale of 1" = 20', unless otherwise approved by the City Engineer. All vertical scales will be 1" = 5'.

The North arrow shall generally be in the upper right hand corner of the sheet.



2.1.2 Specific Sheets -

2.1.2.1 Title Sheet - The Title Sheet shall show the following:

1. Type of project and project number
2. Brief description of location of project
3. Location map
4. Legend - use standard plan symbols
5. Index of Sheets
6. Estimate of Quantities - list or tabular (if fits on Title Sheet)
7. Approval Blocks for City Engineer and City Clerk - located in lower right hand corner
8. Engineer's Seal
9. General Notes: the following general note shall appear on all projects, "All construction methods and materials used in the construction of the improvements covered by these plans shall be in accordance with the Standard Technical Specifications and current revisions on file in the Office of the City Engineer, City of Topeka, Kansas." Other notes particular to this project shall also be included.

Lettering used for titles, headings, subtitles and signature blocks shall be mechanically drawn.

Size of Lettering on 22" x 36" Sheet:

Titles - .35 to .50 inches in height

Description and location - .30 inches in height

Subtitles and headings - .20 inches in height and underlined

The Location Map shall consist of a plan view of the project area. The map shall show all major topographic features; railroads; streets and highways; rivers, creeks and streams; city limits; and other major cultural features.

If more than one plan/profile sheet is used, overlapping outlines of the areas included on each sheet shall be shown along with the sheet numbers on the Location Map. A graphical scale and a North arrow shall be shown.

Sanitary sewer extension projects shall show the sewer extension design data.

See example "Title Sheet" on page 2 - 9.

2.1.2.1.1 Developer Project Plans - The title sheet shall include all pertinent information requested in 2.1.2.1 plus the following:

- 1) Name of Developer
- 2) Address of Developer
- 3) Name and Telephone Number of Contact Person

TRAFFICWAY IMPROVEMENT PROJECT T-70XXXX-XX

SW SCENIC PARKWAY



**KANSAS ONE-CALL:
1-800-DIG-SAFE**
(1-800-344-7233)

Protect yourselves and your property against underground utility damage and liability.



Find out where the underground utility lines might be buried before you dig.

Anyone digging in Kansas must call before digging. The person who is doing the work is responsible for calling KOC. If the owner contracts with a professional excavator to do the excavation then the professional excavator is responsible for calling KOC.

You (the digger) will need to provide information about the work site when you call. This is a FREE service.

CALL BEFORE YOU DIG
IT'S THE LAW.

[Chapter 66.--PUBLIC UTILITIES
Article 18.--UTILITY DAMAGE PREVENTION]

UTILITY OWNERS
(2/16/05)

Water Pollution Control
City of Topeka, WPC Div.
1115 NE Poplar St.
Topeka, KS 66616
Kelly Haller
(785)368-4241

Water
City of Topeka, Eng. Div.
620 SE Madison, 2nd Floor
Topeka, KS 66607
Ken Bass, P.E.
(785)368-3024

City of Topeka
Information Technology
215 SE 7th St.
Topeka, KS 66603
Mark Biswell
(785)368-3718

Gas
Kansas Gas Service
P.O. Box 3538
200 E 1st St.
Topeka, KS 66601
Dawn Hecker
(785)431-4251

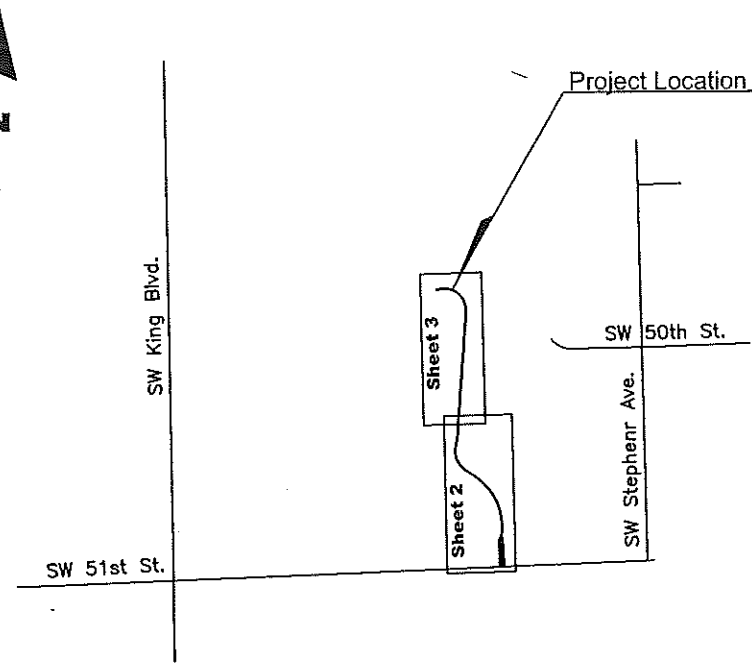
KMC Telecom, Inc.
Program Management
1755 N Brown Rd.
Lawrenceville, GA 30043
Kyle Heltemes
(612)860-9548

Cable TV
Cox Communications
931 SW Henderson Rd.
Topeka, KS 66615
Lyndon Henry
(785)368-1080

Telephone
SBC
823 SE Quincy St., Rm 1050
Topeka, KS 66612
Janice Bowers
(785)276-6146

Traffic Signal
City of Topeka, Traffic Ops.
927 NW Harrison St.
Topeka, KS 66612
Dave Petefish
(785)368-3913

Electric
Western Resources
4001 NW 14th St.
Topeka, KS 66618
Daryl Stewart
(785)575-1244



LOCATION MAP
No Scale

INDEX to SHEETS

Sheet	Title	Item
1	Title Sheet	1
2-3	Plan/Profile	2
4	Asph. Conc. Pvmt. Details	3
5	Conc. Pvmt. Details	4
6	Curb & Gutter and Approach Details	4
7	Typical Traffic Control	5
8-10	Cross Sections	6
		7
		8

ESTIMATE of QUANTITIES

Description	Totals	Unit
Unclassified Excavation	206	CY
Remove Large Tree	1	EA
6" Subgrade Treatment	2319	SY
Combined Curb & Gutter, Type II	268	LF
8" Rein. Conc. Pvmt.	33	SY
6" Asph. Conc. Pvmt.	2018	SY
Traffic Control	1	LS
Seed, Fertilize, & Mulch	0.2	ACRE

LEGEND

Construction Limits	-----	-----
Traffic Signal Line	-----TS-----TS-----	
Overhead Telephone Line	-----DHT-----	
Underground Telephone Line	-----UT-----	
Overhead Cable	-----DHC-----	
Underground Cable	-----UC-----UC-----	
Overhead Electric Line	-----DHE-----	
Underground Electric Line	-----UE-----UE-----	
Water Line	-----W-----W-----	
Gas Line	-----G-----G-----	
Sanitary Sewer	-----SS-----SS-----	
Storm Sewer	-----STM-----STM-----	
Fiber Optic Line	-----FO-----	
Centerline	-----	
Right-of-Way Line	-----R/W-----	
Property Line	-----PL-----	
Lot Line	-----	
Chain link Fence	-----	
Wood Fence	-----	
Wire Fence	-----X-----X-----	
RailRoad Tracks	-----	
Section Corner	-----△-----	
Control Point	-----◆-----	
Property Pin	-----•-----	
Power Pole	-----⊕-----	
Telephone Pole	-----⊙-----	
Street Light	-----☼-----	
Guy Pole	-----⊞-----	
Guy Wire	-----→-----	
Fire Hydrant	-----⊕-----	
Water Meter	-----⊞-----	
Water Valve	-----⊞-----	
Gas Meter	-----⊞-----	
Gas Valve	-----⊞-----	
Mail Box	-----⊞-----	
Existing Storm Inlet	-----⊞-----	
Existing Manhole	-----⊞-----	
Existing Traffic Manhole	-----⊞-----	
Sign	-----⊞-----	
Tree	-----⊞-----	
Stump	-----⊞-----	
Shrub	-----⊞-----	

NOTE: This example sheet is not intended to address all drafting problems encountered in civil engineering design.

GENERAL NOTE:

All construction methods and materials used in the construction of the improvements covered by these plans shall be in accordance with the Standard Technical Specifications and addendum's to the (STS) on file in the office of the City Engineer, City of Topeka, Kansas.

CITY OF TOPEKA, KANSAS
DEPARTMENT OF PUBLIC WORKS - ENGINEERING DIVISION



RELEASED FOR CONSTRUCTION

CITY ENGINEER _____ DATE _____

ATTEST:

CITY CLERK _____ DATE _____

**UTILITY OWNERS
LOCATION MAP
SHEET INDEX
QUANTITIES
LEGEND**

DATE: Month Year
SHEET: 1 of 10
PROJ.: T-70XXXX-XX

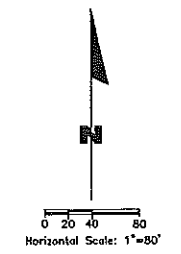
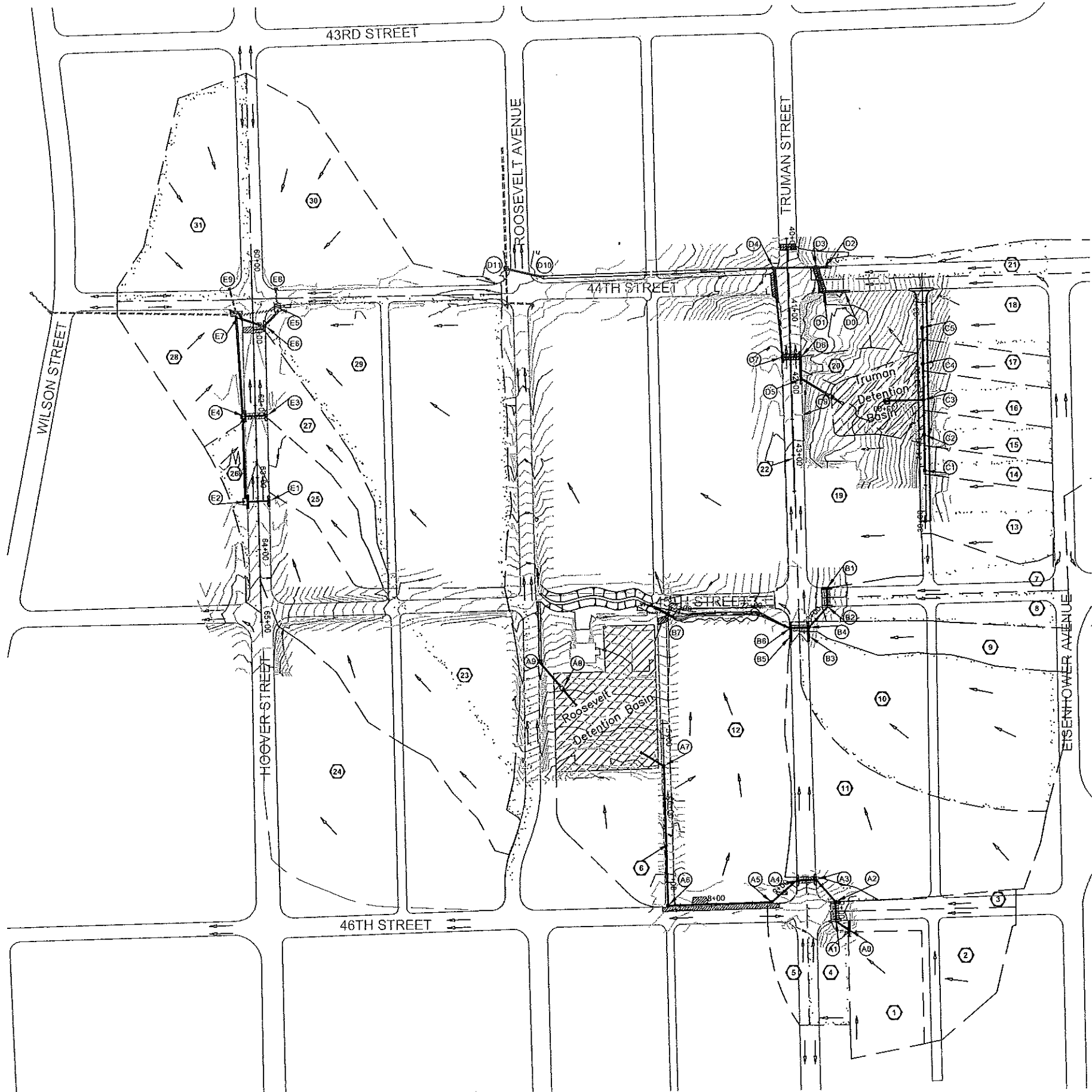
2.1.2.2 Drainage Plan - The drainage plan shall show all data pertaining to the design of the storm drainage system. The following information is to be shown:

1. Drainage Area Map (with Contours)
 - a. Centerline of project and stationing
 - b. Outline of each contributing drainage area
 - c. Drainage arrows showing direction of flow
 - d. Line diagram of proposed storm drainage systems showing all pipes, inlets, culverts and other structures
 - e. Location of overflow swales
2. Inlet or Structure Data - tabular
 - a. Area contributing to each inlet
 - b. Coefficient of Runoff (C) for each area
 - c. Runoff at each inlet from its drainage area (Q_{10})
 - d. Total quantity of water approaching inlet: $Q_{TOTAL} = Q_{10} + Q_{BY}$
 - e. Quantity of water intercepted (Q_{IN}) and bypassed (Q_{BY}) at each inlet
 - f. Width of spread
 - f. Inlet type and size
 - g. What happens to Q_{100} at sump locations (depth at centerline of street checked, routing of overflow)
3. Pipe Data - tabular
 - a. Design flow (Q_{10}), may also need to show Q_{100}
 - b. Percent of slope
 - c. Pipe size and type
 - d. Velocity (V)
 - e. Pipe capacity for size, slope and type of material

Channel design data shall be formulated similar to that for pipe design.

General notes shall be used as necessary to define abbreviations used or to provide explanations of design assumptions made.

See examples on pages 2 - 11 and 2 - 12.



LEGEND	
	Direction of Flow
	Drainage Area Number
	Drainage Area Boundary
	Proposed Inlets and Storm Sewer
	Structure Number

NOTE: This example sheet is not intended to address all drafting problems encountered in civil engineering design.

NO.	DATE	REVISION	BY	APP'D

DRAWN BY: D. SPAAR
 APP'D BY: S. BRUNS

CONSULTANT LOGO



STORM DRAINAGE IMPROVEMENT
 PROJECT T-50XXXXX.XX
 KENNEDY HEIGHTS AREA

DRAINAGE PLAN

DATE: Month_Year
 SHEET: 4 of 38
 PROJ.: T-50XXXXX.XX

DRAINAGE AREA AND STRUCTURE DATA

Drainage Area	Structure	Area (ac)	C	Tc (min)	I ₀ (in/hr)	Q ₁₀ (cfs)	Q ₁₀ Total	Q ₁₀₀ (cfs)	Intercept ₁₀ Q ₁₀ /Q	Q ₁₀ IN (cfs)	Q ₁₀ By (cfs)	Width of Spread (ft)	Inlet Type
1	A0	0.40	0.90	5	7.26	2.6	2.6	4.1	1.00	2.6	--	--	Type II-P Area Inlet (3'x3')
2	A1	0.50	0.60	5	7.26	2.2	2.2	3.8	0.90	2.0	0.2	5.0	Type II-P Inlet MH
3	A2	0.10	0.80	5	7.26	0.6	0.6	1.0	1.00	0.6	--	3.0	Type II-P Inlet MH
4	A3	0.25	0.60	5.2	7.20	1.1	1.3	3.0	1.00	1.3	--	4.0	Type II-P Inlet
5	A4	0.18	0.60	5	7.26	0.8	0.8	1.4	1.00	0.8	--	3.5	Type II-P Inlet
6	A7	0.06	0.80	5	7.26	0.3	0.3	0.6	1.00	0.3	--	--	Type II-P Area Inlet
7	B1	0.32	0.60	5	7.26	1.4	1.4	2.4	1.00	1.4	--	4.0	Type II-P Inlet
8	B2	0.30	0.60	5	7.26	1.3	1.3	2.3	1.00	1.3	--	3.5	Type II-P Inlet
9	B4	0.36	0.50	5	7.26	1.3	3.4	7.5	0.75	2.5	0.9	6.0	Type II-P Inlet
10	B3	1.44	0.50	5	7.26	5.2	5.2	9.2	0.60	3.1	2.1	7.0	Type II-P Inlet
11	B5	1.32	0.50	5	7.26	4.7	4.7	8.4	0.65	3.1	1.6	7.0	Type II-P Inlet
11A	B6	-	-	5	7.26	-	1.6	4.6	1.00	1.6	--	4.0	Type II-P Inlet
13	C1	0.33	0.50	5	7.26	1.2	1.2	2.1	1.00	1.2	--	6.0	Type II-P Area Inlet MH
14	C2	0.21	0.50	5	7.26	0.8	0.8	1.3	1.00	0.8	--	4.0	Type II-P Area Inlet MH
15	C3	0.21	0.50	5	7.26	0.8	0.8	1.3	1.00	0.8	--	4.0	Type II-P Area Inlet MH
16	C4	0.21	0.50	5	7.26	0.8	0.8	1.3	1.00	0.8	--	4.0	Type II-P Area Inlet MH
17	C5	0.21	0.50	5	7.26	0.8	0.8	1.3	1.00	0.8	--	4.0	Type II-P Area Inlet MH
18	D0	1.66	0.50	5	7.26	6.0	6.0	10.6	0.55	3.2	2.8	6.5	Type II-P Inlet
-	D1	-	-	5	7.26	-	2.8	6.6	0.90	2.5	0.3	6.0	Type II-P Inlet
19	D5	1.05	0.50	5	7.26	3.8	4.7	10.7	0.70	3.0	1.7	7.5	Type II-P Inlet
20	D6	0.13	0.50	5	7.26	0.5	2.2	7.5	1.00	2.2	--	4.5	Type II-P Inlet
21	D2	0.50	0.70	5	7.26	2.5	2.5	4.5	0.90	2.2	0.3	5.0	Type II-P Inlet
-	D3	-	-	5	7.26	-	0.3	1.5	1.00	0.3	--	2.5	Type II-P Inlet
22	D7	0.20	0.80	5	7.26	1.2	1.2	2.0	1.00	1.2	--	4.0	Type II-P Inlet
23	E1	1.73	0.50	5	7.26	6.3	6.3	11.0	0.55	3.5	2.8	8.0	Type II-P Inlet
24	E2	2.12	0.50	5	7.26	7.7	7.7	13.5	0.50	3.7	4.0	8.5	Type I-P Inlet (L=9')
25	E3	0.33	0.50	5	7.26	1.2	4.0	8.7	0.70	2.8	1.2	8.0	Type II-P Inlet
26	E4	0.13	0.50	5	7.26	0.5	4.5	10.3	0.65	3.0	1.5	9.0	Type I-P Inlet (L=6')
27	E6	0.36	0.50	5	7.26	1.3	2.5	7.0	0.90	2.2	0.3	8.0	Type II-P Inlet
28	E7	0.60	0.50	5	7.26	2.2	3.7	9.6	1.00	3.7	-	9.0	Type I-P Inlet (L=6')
29	E5	2.40	0.50	5	7.26	8.7	9.0	18.5	1.00	9.0	-	11.5	Type I-P Inlet (L=9')
30	E8	1.15	0.50	5	7.26	4.2	4.2	7.3	1.00	4.2	-	9.5	Ex. Inlet
31	E9	0.92	0.50	5	7.26	3.3	3.3	5.9	1.00	3.3	-	9.0	Ex. Inlet

NOTE:
Drainage Plan designed for a 10 year storm.

- Q = CIA
 Q = Peak rate of runoff in cubic feet per second
 C = Runoff coefficient (or Runoff Ratio).
 I = Intensity of Rainfall in inches per hour for each time of concentration.
 A = Drainage Area in Acres
 T = Time required for longest runoff to flow over the surface to nearest inlet in minutes.

PIPE DATA

Pipe Segment	Area (ac)	C	CxA	Sum of CxA	Tc (min)	I ₀ (in/hr)	Q ₁₀ (cfs)	I ₀₀ (in/hr)	Q ₁₀₀ (cfs)	Pipe Length (ft)	Slope (%)	RCP (n = 0.012)			Travel Time (min)	
												Dia (in)	Q _{cap} (cfs)	Vel (ft/sec)		
A0-A1	0.40	0.90	0.36	0.36	5	7.26	2.6	10.20	4.1	20	6.0	15"	17	10	--	
A1-A2	0.50	0.60	0.30	0.66	5	7.26	4.8	10.20	7.9	21	4.5	15"	15	11	0.1	
A2-A3	0.10	0.80	0.08	0.74	5.1	7.23	5.4	10.16	8.9	40	5.0	15"	15	11	0.1	
A3-A4	0.25	0.60	0.15	0.89	5.2	7.20	6.4	10.12	10.8	23	3.5	15"	13	11	--	
A4-A5	0.18	0.60	0.11	1.00	5.2	7.20	7.2	10.12	12.1	45	2.0	18"	16	9	0.1	
A5-A6	--	--	--	1.00	5.3	7.17	7.2	10.08	12.1	140	2.0	18"	16	9	0.2	
A6-A7	--	--	--	1.00	5.5	7.12	7.1	10.01	12.0	255	5.7	18"	27	13	0.3	
A7-Outlet	0.06	0.80	0.05	1.05	5.7	7.04	7.4	9.90	12.5	24	2.8	18"	19	10	--	
A8-A9							5.8	Detention Outlet	11.4	Detention Outlet	30		15"			--
B1-B2	0.32	0.60	0.19	0.19	5	7.26	1.4	10.20	2.4	23	1.0	15"	7	5	0.1	
B2-B4	0.30	0.60	0.18	0.37	5.1	7.23	2.7	10.16	4.7	37	2.0	15"	10	7	0.1	
B3-B4	1.44	0.50	0.72	0.72	5	7.26	5.2	10.20	9.2	9	2.0	15"	10	8	--	
B4-B6	0.36	0.50	0.18	1.27	5.2	7.20	9.1	10.12	16.1	23	1.0	21"	17	7	--	
B5-B6	1.32	0.50	0.66	0.66	5	7.26	4.8	10.20	8.4	9	2.0	15"	10	8	--	
B6-Outlet	--	--	--	1.93	5.2	7.20	13.9	10.12	24.4	40	2.4	24"	38	12	0.1	
B7	1.58	0.50	0.79	2.72	6.0	6.98	18.9	9.82	33.4	43	1.4	24"x36"	53	11	0.1	
C1-C2	0.33	0.50	0.17	0.17	5	7.26	1.2	10.20	2.1	46	5.0	15"	16	8	0.1	
C2-C3	0.21	0.50	0.11	0.28	5.1	7.23	2.0	10.16	3.6	44	7.0	15"	18	10	0.1	
C5-C4	0.21	0.50	0.11	0.11	5	7.26	0.8	10.20	1.4	46	0.5	15"	5	3	0.2	
C4-C3	0.21	0.50	0.11	0.22	5.2	7.20	1.6	10.12	2.8	46	0.5	15"	5	4	0.2	
C3-Outlet	0.21	0.50	0.11	0.61	5.4	7.15	4.4	10.05	7.7	37	2.4	15"	11	9	0.1	
D0-D1	1.66	0.50	0.83	0.83	5	7.26	6.0	10.20	10.6	27	4.0	15"	14	11	--	
D1-D3	--	--	--	0.83	5	7.26	6.0	10.20	10.6	33	5.0	15"	16	12	0.1	
D2-D3	0.50	0.70	0.35	0.35	5	7.26	2.5	10.20	4.5	11	4.0	15"	14	9	--	
D3-D4	--	--	--	1.18	5.1	7.23	8.5	10.16	15.0	56	5.0	15"	16	13	0.1	
D5-D6	1.05	0.50	0.53	0.53	6	6.98	9.4	9.82	14.4	27	4.0	15"	14	10	0.1	
D6-D7	0.13	0.50	0.07	0.60	6.1	6.95	9.9	9.79	15.2	22	4.0	15"	14	10	0.1	
D7-D4	0.20	0.80	0.16	0.76	6.2	6.92	10.0	9.76	17.1	121	5.0	15"	16	12	0.2	
D4-Outlet	--	--	--	1.94	6.4	6.87	19.0	9.70	31.4	42	1.0	24"	24	8	0.1	
D9-D5	--	--	--	--	--	--	5.7	Detention Outlet	7.9	Detention Outlet	52		15"			--
D10-D11							19.0		31.4	61	4.6	24"				--
E1-E2	1.73	0.50	0.87	0.87	5	7.26	6.3	10.20	11.1	29	2.0	15"	10	8	--	
E2-E4	2.12	0.50	1.06	1.93	5	7.26	14.0	10.20	24.6	112	2.0	21"	24	10	0.2	
E3-E4	0.32	0.50	0.16	0.16	5	7.26	1.2	10.20	2.0	29	1.0	15"	7	4	0.1	
E4-E7	0.13	0.50	0.07	2.16	5.2	7.20	15.6	10.12	27.4	135	1.2	24"	27	9	0.2	
E5-E6	2.40	0.50	1.20	1.78	5.1	7.23	12.9	10.16	22.6	27	0.5	24"	24	8	0.1	
E6-E7	0.36	0.50	0.18	1.96	5.2	7.20	14.1	10.12	24.8	35	0.5	24"	24	8	0.1	
E9-E7	0.92	0.50	0.46	0.46	5	7.26	3.3	10.20	5.9			Ex.12"			--	
E8-E5	1.15	0.50	0.58	0.58	5	7.26	4.2	10.20	7.3			Ex.12"			--	
E7-Ex.Pipe	0.60	0.50	0.30	4.88	5.4	7.15	34.9	10.05	61.3			Ex.36"			--	

NOTE: This example sheet is not intended to address all drafting problems encountered in civil engineering design.

NO.	DATE:	REVISION	BY:	APP'D	DRAWN BY: D. SPAAR APP'D BY: S. BRUNS	CONSULTANT LOGO		STORM DRAINAGE IMPROVEMENT PROJECT T-50XXXXXX KENNEDY HEIGHTS AREA	SUMMARY OF DRAINAGE DATA	DATE: Month Year	
										SHEET: 5 of 36	
										PROJ.: I-50XXXXXX	

2.1.2.3 **Typical Sections** - The typical sections sheet shall show the following:

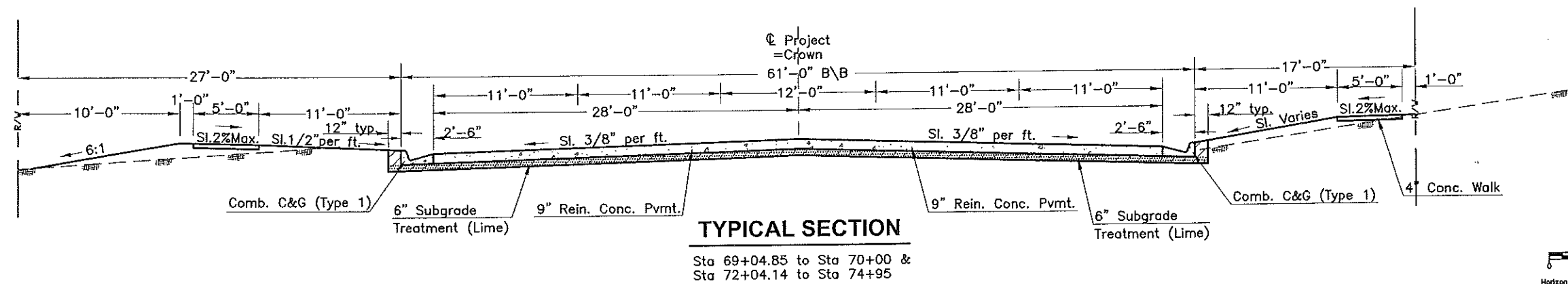
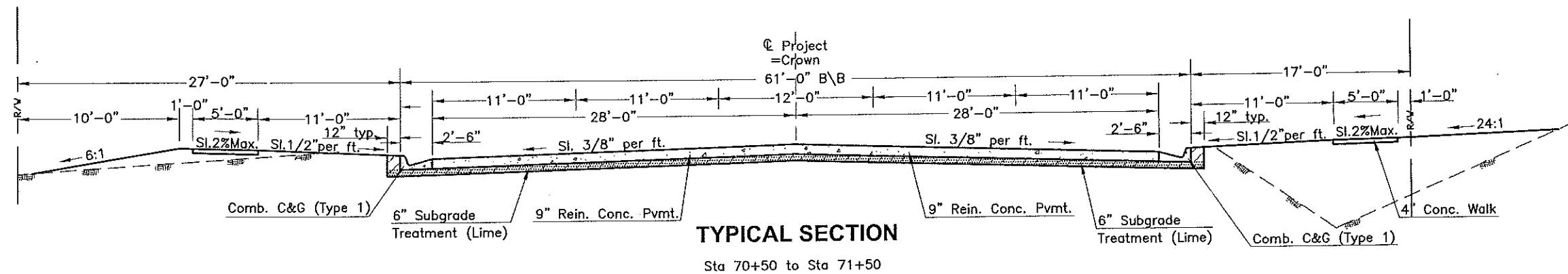
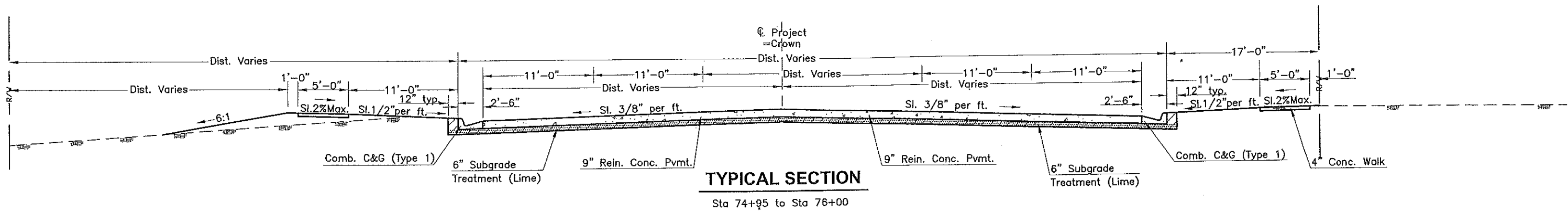
1. Pavement widths, thickness and type
2. Subgrade preparation
3. Lane widths
4. Pavement cross slopes
5. Project centerline
6. Shoulder slopes, backslopes, and sideslopes
7. Sidewalk widths and slopes
8. Median
 - a. Paving thickness and type
 - b. Median island treatment - plantings, stone, etc.
9. Typical right-of-way line

Sections shall account for the entire length of the project, including side street entrances. All sections shall be drawn as if looking ahead along the centerline.

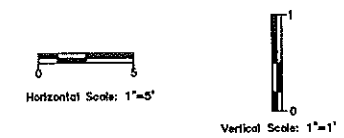
The first typical section shall be a "Typical Section" showing an in-cut situation left of the centerline and an in-fill situation right of the centerline. Successive typical sections shall be shown with the ending station of one typical section becoming the beginning station of the next. Side street entrance sections shall follow the ending typical section of the main project. Side street entrance sections shall be shown in order of increasing stationing intersection with the main project.

All typical sections shown shall be subtitled
Typical Section
Sta. _____ to Sta. _____

See example "TYPICAL SECTIONS" on page 2 - 14.



NOTE: This example sheet is not intended to address all drafting problems encountered in civil engineering design.



NO.	DATE	REVISION	BY	APP'D

DRAWN BY: D. SPAAR
APP'D BY: S. BRUNS

CONSULTANT LOGO



TRAFFICWAY IMPROVEMENT
PROJECT T-70XXXX.XX
NE Johnson Rd. - 63rd St. to 68th St.

TYPICAL SECTIONS
Sta 69+04.85 to Sta 76+00

DATE: Month Year
SHEET: 7 of 83
PROJ.: T-70XXXX.XX

2.1.2.4 Plan-Profile - Each Plan-Profile sheet shall show a graphic scale and a North arrow. Street improvements and bridges shall use a horizontal scale of 1" = 20'. In special situations, a different horizontal scale may be used if approved by the Project Engineer. The horizontal scale in the profile block shall be the same as that used in the plan block. Vertical scale shall be 1" = 5' on all projects.

See example "Plan-Profile" on pages 2 - 19.

2.1.2.4.1 Plan Block - All alignment notes shall be located at the extreme top and bottom of the plan block. Horizontal alignment, including curve data, shall be shown at the top of the plan block. Benchmarks shall be shown at the bottom of the plan block.

Each monumented horizontal control point shall be listed by type, station, departure from centerline or baseline and North and East coordinate pairs. Each monumented horizontal control point shall be witnessed by a minimum of 4 references. The first reference shall be a description of the physical point, e.g. Found 1" round iron bar in monument box at the N.E. corner of Section 4-12-16, or Set nail and tab. The additional three references shall include a distance, in a certain direction, to a described physical object, e.g. 39.29' E.N.E. to nail and bottle cap in S. face of power pole. A typical horizontal control point monument might read:

P.I. Sta. 15+00.00, centerline defl. (Δ) = 30° 10' 18" Rt. N. 1500.23,
E. -240.21

1. Fnd. 5/8" round iron pin at the N.W. cor. of Lot 8.
2. 39.29' E.N.E. to set nail e b.c. in S. face of P.P.
3. 44.17' S. to fnd. P.K. nail in top of fence post.
4. 17.67 N.W. to fnd. R.R. spike in N.E. face of 60" ash tree.

Reference measurements shall be shown with sufficient accuracy to reset lost points.

Each vertical control point (benchmark) shall be listed by a number consisting of the project number and benchmark number (see example below), description, station, departure from centerline or baseline, and elevation. A typical vertical control point (benchmark) might read:

B.M. 70172 - 15, City of Topeka Engineering Division std. benchmark
monument No. 78, Sta.101+35.92, 28.95' Lt. Elevation = 928.95.

The first Plan-Profile sheet shall show the vertical datum used. The City of Topeka Engineering Division vertical control (benchmark) system is based on N.A.V.D. 1929. Assumed vertical datum shall not be used; however, some site improvement work may warrant usage.

Horizontal curve data shall show the following information:

1. P.I. Station, back and ahead
2. Δ (delta)
3. R (radius)
4. D (degree of curvature)
5. T (tangent length)
6. L (arc length)
7. Super elev. ____/ft. (if used)

Unless otherwise noted, arc definition shall be used for all horizontal curves.

The centerline or baseline shall be shown in the center of the plan block. Stationing shall increase from left to right across the sheet. Stations shall be shown with a perpendicular tick from the centerline and the station number to the right. Curve points such as P.C., P.I., P.T. shall be shown as such on the centerline, along with their stationing. Angles at points of intersection shall be shown by angle measurement and extension lines, or by direction on the centerline with a North Azimuth (N. Az.). North Azimuths shall be measured clockwise. All plans showing coordinates for alignment control or proposed improvements shall use the North Azimuth method. P.I.'s in alignment notes shall show a deflection angle left or right of an extension line, as shown in the example for a P.I. at Sta. 15+00.00. On street improvement projects, the stationing shall increase from South to North and from West to East on the main improvement and on side streets. On drainage and sewer projects, the stationing shall increase in the upstream direction.

If a project is so extensive as to require several plan sheets, perpendicular match lines shall be shown at a station on the project centerline, at the extreme left or right edges of the sheet. Existing topography shall be shown beyond the match line, but should not overlap excessively with respect to the next sheet. Side street entrances shall use either a match line or a break line.

If an office relocation is made, the survey line becomes the baseline and is so designated. The relocated centerline is designated as the "Office Relocation Centerline". When an office relocation is made, an equation will be needed for baseline stationing. In such cases the baseline stationing shall remain the same until it rejoins the centerline where the baseline station back shall equal the centerline station ahead.

Side street entrances that cannot be drawn on the main project plan profile sheet shall be drawn on separate plan-profile sheets following the main project, in order of increasing stationing intersection.

All existing topography shall be shown according to general drafting standards and using appropriate line weights and standard plan symbols. This includes physical objects and abstract features such as lot lines, property lines and section lines. Physical objects not shown by a standard plan symbol shall

have adjacent explanatory notes.

Buildings shall be shown as to structural type and usage. Porches or open covered spaces shall be shown as different from a main structure.

Ornamental trees and pay trees shall be identified with circumferential dimension measured one foot above ground and by species, if known. If the circumference is less than 30", except for ornamentals, the tree will be marked as to specie and "sapling". Ornamental bushes will be identified by species, if known, and diameter. Bushes used as hedging shall be identified by width.

Water, gas and sewer lines shall be shown as to diameter and type of material. Underground telephone lines shall be shown as to number of pairs, except when encased or in conduits, in which case size and material type shall be shown. Utility owners having involvement in the project shall be noted on the first plan-profile sheet by name, addresses, telephone number and contact person, if known.

Adjacent property owners shall be listed by name, along with the property's address.

Legal descriptions of all lots, blocks, subdivisions and tracts, except metes and bounds descriptions, shall be shown.

Minor ditches and drainage ways shall be shown by a series of drainage arrows pointing down hill along the centerline of the ditch.

Proposed improvements including pavement, sidewalks, ADA ramps, sewer lines, structures, and special grading shall be shown in heavy black using appropriate line weights. Construction notes shall show beginning and ending stations, type of material, type of structure, type of work, and all other information needed for complete, concise instructions. Structure locations must reflect coordinates located horizontally into the state plane coordinate system, NAD83, Kansas North Zone.

Permanent easements, temporary easements, construction limits and existing right-of-way shall be shown on all projects.

Departures in alignment on proposed improvements, other than centerline, shall be shown on the plan sheet, denoting the station and type of departure (P.C., P.T. and P.I.). Curve data for pavements and deflections, other than centerline, shall be shown on a pavement geometry sheet.

2.1.2.4.2 Profile Block - The profile block shall show existing and proposed grade profiles for all projects. Street improvement projects require an existing centerline profile or proposed top of curb profiles. Standard retaining wall with sidewalk shall be shown in profile along with elevations for top of wall and top of sidewalk at wall, at stations, at 25 feet intervals and at grade break points. Retaining walls requiring special design shall be shown on a special detail sheet.

**PLAN CHECKLIST FOR
PROJECT NO.**

PROJECT TYPE: CIP **DEVELOPER** **BENEFIT DISTRICT**

COVER SHEET:

- Project Number
- Project Description
- Location Map
- Legend
- Index to Drawings
- Estimate of Quantities
- Name, Address, and Phone # for Developer (Developer Projects and Benefit District Projects)
- Approval Blocks for City Engineer and City Clerk
- Engineer's Seal
- General Note on City Specifications
- Sewer Extension Design Data (Sewer Projects Only)

DRAINAGE PLAN:

- Layout Drawing
 - Drainage Areas (showing contours)
 - Centerline Of Project and Stationing
 - Drainage Arrows
 - Structures, Pipes and Culverts
- North Arrow and Scale
- Inlet Flow Data Table (Drainage Area, C, I, Q10, Qtotal, Qintercept, Qbypass, Inlet Type, What Happens with Q100 at Sump Locations)
- Pipe Flow Data Table (Q, percent slope, pipe size and type, velocity, pipe capacity)
- General Notes

TYPICAL SECTIONS:

- Sections For All Situations
 - Typical Sections Show
 - Back to Back Width of Pavement
 - Curb & Gutter Type and Width
 - Traffic Lane Widths
 - Pavement Cross-Slope
 - Project Centerline
 - Type and Thickness of Pavement
 - Subgrade Treatment
 - Width and Slope between Back of Curb and Sidewalk
 - Sidewalk Width, Slope and Material

- Right-of-Way Line
- ADA Ramps at Intersections
- Slope to Existing Ground

PLAN-PROFILE SHEETS

PLAN

- Bench Marks
- Horizontal Layout Control
- Standard Scale: Horiz. 1"=20', Vert. 1'=5", Must be Approved Otherwise
- North Arrow
- Project Centerline with Stationing and Angles
- Right-of-Way at least Minimum Width
- Existing Easements, Proposed Permanent and Temporary Easements
- Construction Limits
- Utilities, Existing and Proposed
- Existing Street Material
- New Streets, Sewers, Manholes, Sidewalks, Etc.
 - Return Radius
 - Curve Data
 - Street Width
 - Street Names
 - Correct Markers at Dead Ends
 - Show all Inlets, Manholes, Pipes, Outlets, Culverts, Connections to Existing
 - Show Stationing, Distance from Centerline, Type of Structure, Size on Inlets & Manholes
 - Show Diameter and Length of All Pipes
- Legal Description of Adjacent Lots and House Street Addresses
- Cul-de-sac -- 45 feet Radius in 60 feet of Right-of-Way
- Call out Items to be Removed and/or Replaced and How Paid For
- Are all Manholes Accessible for Cleaning
- Sidewalks shown (future or proposed)

PROFILE:

- Existing Ground Profile Shown
- Top of Curb Line Left and Right or Profile Grade at Centerline
- Finished Profile for Proposed Sewers
- Vertical Curves showing Length, Stationing & Elevation of PVC, PVI and PVT, K Values, and Tangent Grades
- Show Elevation Datum
- Top of Curb or Centerline Elevations at 25 feet intervals
- Show Utilities in Profile
- Show Flowline out, Flowline in for all Pipes, Top or Cover Elevation for all

Manholes and Inlets

- Grades, Length and Pipe Diameter for All Pipes
 - Profile and Typical Sections for Channels and Ditches. Sections should show Existing Ground
 - Trenching and Compaction on Sewers
 - Encasement or Cradle on Pipes if required
 - Boring Locations, Depths, Materials, Refusal
 - Show Connections to Existing Structures
 - Is Sewer Deep Enough to Serve Basements
 - Extend 4" Service Lines Across New Streets
 - On Deep Sewers, are Risers Required
-
- Is Pavement Removal Adequate to Construct Safe Trench for Sewer
 - Is Temporary Construction Easement adequate to allow for Dirt Pile, Equipment, Working Room, Pipe Material, etc. on Sewers
 - Was a Pavement Design Made with Subgrade Treatment
 - Are Utility Conflicts called out
 - Is Sewer Sized and Located to be extended Upstream if Required
 - Does Storm Water Discharge point Create Problems Downstream
 - Are Drive Entrances Concrete to Right-of-way Line

CURB RETURN PROFILES

- Profile for Each Quadrant of the Intersection
- Street Grades Shown at Each End of Return
- Street Name Shown at Each End of Return
- Total Length Around Return Shown
- Elevation Datum
- Top of Curb Elevations at Ends, Mid and Quarter Points
- Is Return Profile Smooth Curve or Transition
- Each Profile Labeled
- Show Angle, Length, Radius and Tangent for Each Return

CROSS SECTIONS

- Existing Ground Shown as Dashed Line
- New Grading Shown as Heavy Solid Line
- Top of Curb or Centerline Elevations Shown
- Cut and Fill Quantities

Structures shall be drawn in profile. Existing and proposed manholes and drainage structures shall be labeled with a note showing the station, departure, structure, identification number, existing and proposed inlet, outlet and top elevations. In cases where two or more drainage structures occupy the same station at different departures, the intercepting structure, or otherwise the farthest right structure shall be shown on the main profile. If several connecting structures occupy the same station, a cross section through the structures shall be drawn, in the general vicinity of the subject station. All pipes shall be shown in profile along with a label showing the quantity, in linear feet, of the particular type and size of pipe and the percentage of grade. Pipe tops shall be shown in areas of utility conflicts. The location and elevation of conflicting utilities shall be shown.

Street improvement projects shall show centerline elevations or top of curb elevations at the bottom of the profile sheet. Elevations shall be calculated and listed for curves at points of curvature and tangency, at ends of curb returns, at stations and at 25 feet intervals. If an elevation for a 25 feet interval is within 5 feet of any of the above situations, it need not be shown. Elevations shall be listed looking along the centerline with the left elevations on top and the right elevations below. Stations shall be shown horizontally, below the lowest gridline. Special stations and their designations, e.g. P.C. P.V.C. shall be placed immediately to the left of the station line and are to be read from the left. The elevations shall be immediately to the right of the station line.

Sewers built of pipe shall not show elevations at the bottom of the profile block. Elevations shall be shown for reinforced concrete boxes. A sidewalk project shall show the top of one edge of the sidewalk. Waterline projects may show elevations, at the direction of the Design Engineer.

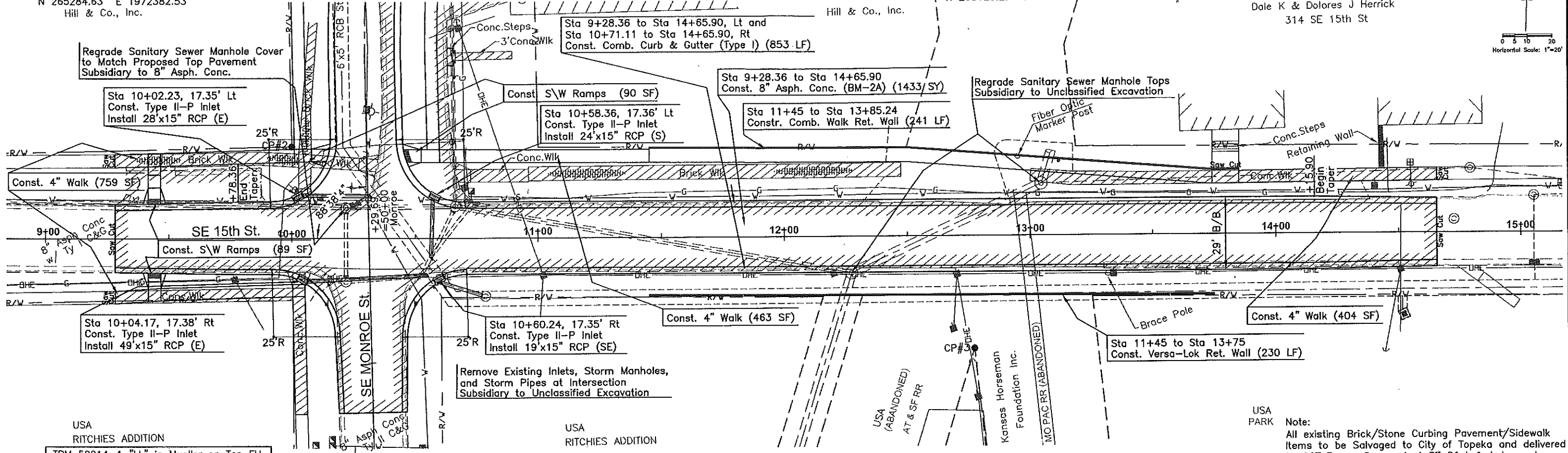
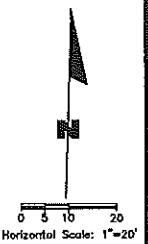
Vertical curve data shall be shown in conjunction with profile grade lines. Length of curve shall be dimensioned between extension lines from the point of vertical curvature (P.V.C.) and point of vertical tangency (P.V.T.). Tangent lines shall be shown along with percentage of grade. The "K" factor shall be shown, usually in the vicinity of the length of curve dimension. If top of curbs have different vertical curves or differ from the centerline curve, their dimensions may be placed above and below the profile lines.

Geological formations, such as rock, shall be shown in profile when in conflict with proposed improvements. Test holes drilled or pits dug shall be shown in profile. The hole shall extend below the improvement unless refusal is encountered. If no rock is encountered, the bottom of the hole will be labeled "No Rock". If soft sedimentary formations such as soft sand stone or shale are encountered, the elevation first encountered shall be shown and the hole shall extend below the improvement or to refusal. Different general formations shall be noted, along with the elevation at the bottom of the hole. If refusal is encountered in such a manner as to indicate a pay item for rock removal, the bottom of the hole shall be shown with elevation, the term "Refusal" and the general type of formation, if known. Work requiring detailed geology shall be shown on a geology sheet.

CP #2 Sta 10+00.00, 36.55' Lt
 1. Fnd 5/8" Pin @ NE Cor 15th & Monroe
 2. 57.43' SW to set N&T at E Fc PP
 3. 71.28' SE to set N&T at N Fc PP
 4. 150.13' W to Fnd 5/8" Pin
 N 265284.63 E 1972382.53
 Hill & Co., Inc.

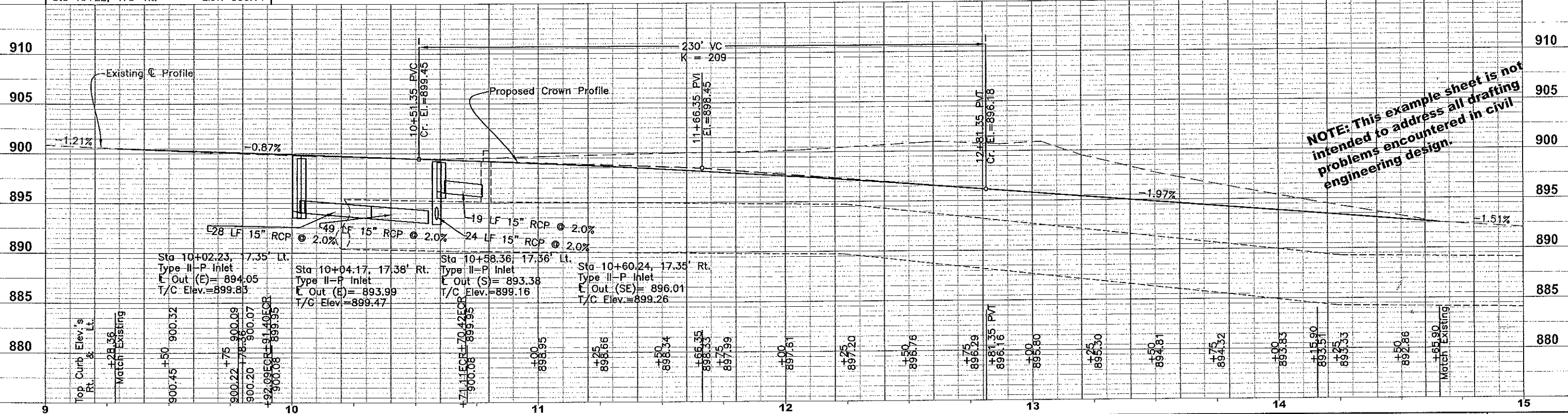
CP #3 Sta 12+77.32, 45.19' Rt
 1. Fnd 5/8" Pin @ former RR R/W PI
 2. 10.97' NW to set N&T on E Fc PP
 3. 19.13' S to set N&T on E Fc PP
 4. 63.71' NE to set N&T on S Fc PP
 N 265120.27 E 1972620.23

Dale K & Dolores J Herrick
 314 SE 15th St



TBM 50214-1 "LL" in Mueller on Top FH
 NW Cor Monroe St & 17th St
 Sta 10+22, 478' Rt. Elev.=900.14

Note:
 All existing Brick/Stone Curbing Pavement/Sidewalk Items to be Salvaged to City of Topeka and delivered to COT Trans. Op. yard at SE 21st & Lakewood. Subsidiary to Unclassified Excavation.



NOTE: This example sheet is not intended to address all drafting problems encountered in civil engineering design.

NO.	DATE	REVISION	BY	APP'D

DRAWN BY: D. SPAAR
 APP'D BY: I. GREEN
 FIELD BOOKS: F-436/440
 SURVEYED BY: J. CUMMINGS

TOPEKA
 Public Works
 ENGINEERING
620 SE MADISON ST. • 2nd Floor • TOPEKA, KS 66607
 Phone: (785) 268-3642 • Fax: (785) 268-3881

STREET IMPROVEMENT
 PROJECT T-60XXXX.XX

PLAN/PROFILE
 SE 15th Street
 Sta 9+00 to 15+00

DATE: Month Year
 SHEET: 2 of 20
 PROJ.: T-60XXXX.XX

2.1.2.5 Site Plan - Site plans are used for sidewalk, parking lot, building and area grading projects. Sidewalks will generally be drawn on a plan-profile sheet, but specific projects may require a site plan. Examples of exempted area grading projects that are shown on plan-profile sheets are: levees and dikes, and drainage ditches and channels.

Layout shall be similar to that required for the plan block on a plan-profile sheet. Building projects shall show all other improvements, other than the building, and only the outline, or "footprint" of the building, with sufficient dimensioning to easily and accurately locate it.

Elevations shall be shown on pavements. Top of curb, top of slab and top of sidewalks shall be shown at grade breaks and at 25 feet intervals. Parking lots shall show elevations gridded on 25 feet intervals.

Area drainage systems shall show structures and pipes in profile according to standards for sewers on the profile block of plan-profile sheets.

Contours may be drawn on the site plan to clarify grading situations. If contours will decrease neatness and visual clarity of the plans, they shall be placed on a separate contour map. In no case will contours be substituted for elevations on pavements.

All existing topography and proposed improvements shall be shown according to general drafting standards using appropriate line weights and standard plan symbols.

2.1.2.6 Construction Layout - Bridge projects require a construction layout sheet with the following information shown:

1. All existing topography
2. Proposed profile grade - grades and vertical curve data across bridge
3. Benchmarks
4. Drainage Data
 - a. Design frequency
 - b. Drainage area
 - c. Estimated discharge
 - d. Waterway opening required
 - e. Waterway opening provided (below design high water and total below structure)
 - f. Average velocity
5. Proposed bridge (elevation view)
 - a. Bridge length (end to end of wearing surface)
 - b. Span lengths
 - c. Design high water elevation and clearance
 - d. Existing and new ground profile along centerline
 - e. Bottom of footing elevations
 - f. Piles (top of pile elevations and estimated length)
 - g. Stationing and 10' elevation grid
 - h. Berm elevations and widths
 - i. Excavation Boundary Plane elevation

- j. Bridge description
- 6. Proposed bridge (plan view)
 - a. Show contours, existing topographical features and new construction in immediate vicinity of bridge
 - b. Centerline of project and centerline of lanes
 - c. Plan dimensions - widths and distances left and right of centerline of project
 - d. Span lengths
 - e. Skew
 - f. Channel, street, railroad, etc. to be spanned by bridge
 - g. Points of minimum horizontal and vertical clearance, if applicable
 - h. Embankment and cut slopes
 - i. North arrow and scale
- 7. General Notes - as applicable
- 8. Summary of Quantities for bridge

The sheet shall be drawn according to general drafting standards using appropriate line weights and standard plan symbols.

2.1.2.7 Contour Map - Types of projects requiring a contour map are as follows:

- 1. Area grading
- 2. Channel changes
- 3. Buildings
- 4. Bridges
- 5. Parking lots

Area grading is the only type of project that will use a contour map as its main plan sheet. Other projects may have specific plan sheets that may show contours to clarify grading situations. If these contours detract from the clarity and appearance of the plan sheet, a separate specific contour map will be drawn.

Items which shall appear on a contour map are as follows:

- 1. All existing topography contours
 - a. Existing contours shall be subdued and drawn at the same interval as the proposed contours
- 2. Proposed improvements and contours
 - a. Proposed contours shall be drawn to a sufficient vertical interval to accurately communicate the intention of grading patterns
- 3. Specific elevations, where known, shall be used in lieu of a contour interval

The sheet shall be drawn according to general drafting standards using appropriate line weights and standard plan symbols.

2.1.2.8 Pavement Geometry - Pavement geometry sheets shall be used for all street improvement projects and may be used for concrete parking lots. The purpose of the pavement geometry sheet is to show information that would otherwise complicate a plan-profile sheet.

The paving plan shall be shown in its entirety. Only paving, curbing and the top of attached drainage structures will be shown. General drafting standards, appropriate line weights, graphic scales and North arrows shall be used. A horizontal scale of 1" = 20' shall be used.

Ends of curb returns, points of curvature and tangency, and points of intersection, shall be shown with station and departure. Radius measure and the interior angle (Δ) shall be shown for curb returns. The pavement shall be stationed the same as in the plan view on the plan-profile sheet. Curve data for all curves, including the centerline, shall show: Δ , R, T and L. Curves may be labeled by number with their corresponding curve data shown in tabular form.

Longitudinal and transverse jointing shall be shown. Dimensioning between joints, instead of stationing, shall be used to show joint location. The exception to this rule is expansion joints, which must be located by stationing.

Top of curb elevations shall be shown at expansion joints, at stations, at 25 feet intervals, at ends of curb returns, at points of curvature and tangency, at points of intersection, and at grade break points for main line paving and intersections not requiring intersection contour sheets. Top of slab elevations shall be shown for longitudinal joints at the same points if in crown, transition or if the joint is two driving lanes from the curb and between the curb and the crown. The crown elevations shall be shown at the points designated, whether at a longitudinal joint or not. Side streets shall likewise show curb, joint and crown elevations. The top of slab elevations at the toe of curb shall not be used in a standard curb and gutter section.

2.1.2.9 Intersection Contours - An intersection contour sheet is required for street intersections meeting the following conditions:

1. Both streets are controlled by signalization
2. The mainline pavement is uncontrolled and has cross slope in transition
3. The narrower approach pavement is 39 feet back of curb to back of curb or greater in width

The following information shall be shown:

1. Curb lines
2. Centerlines and baselines
3. Street names
4. Centerline intersection stations
5. Centerline station ticks and numbers
6. Ends of curb returns including stationing and intersection angles at

- centerlines (or North Azimuths on centerlines)
7. Curb returns showing radius and fractional or special points with corresponding elevations at the toe of the curb and gutter section. These elevations shall specifically be noted as "toe".
 8. All jointing by dimension except for longitudinal joints on centerline which shall be shown by station
 9. Top of Slab elevations for all joint intersection points, grade breaks and crowns.
 10. Contour lines, drawn at 0.1 foot intervals, over all pavement within the intersection except curb and gutter section.
 11. ADA Ramp and landing elevations.

The sheet shall be drawn according to general drafting standards using appropriate line weights and standard plan symbols. A North arrow and horizontal graphic scale of 1" = 10' shall be shown.

The name of the intersection shall be placed in the lower right hand block.

2.1.2.10 Curb Return Profiles - The purpose of this sheet is to provide specific vertical and horizontal information for curb returns at each intersection. A horizontal scale of 1" = 5' and vertical scale of 1" = 1' shall be used. Vertical elevations in one foot increments shall be shown at the left or right of each profile.

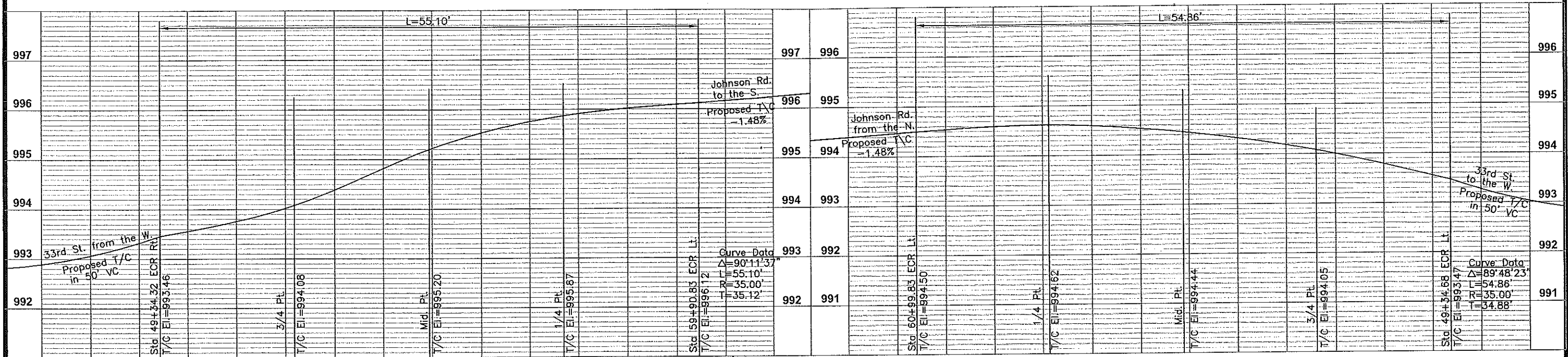
All returns of the same intersection shall be shown on the same sheet. Each profile shall be labeled as to which return.

The top of curb profile line shall show incoming and outgoing top of curb profiles of intersecting streets and their algebraic signed percentage of grade.

Horizontal curve data for the back of curb line for each return shall be shown (Δ , R, T and L). The ends of curb return (ECR) shall be so marked, along with the station of the appropriate street. The total length of curve (L) shall be dimensioned above the profile, between extension lines from the ECR's.

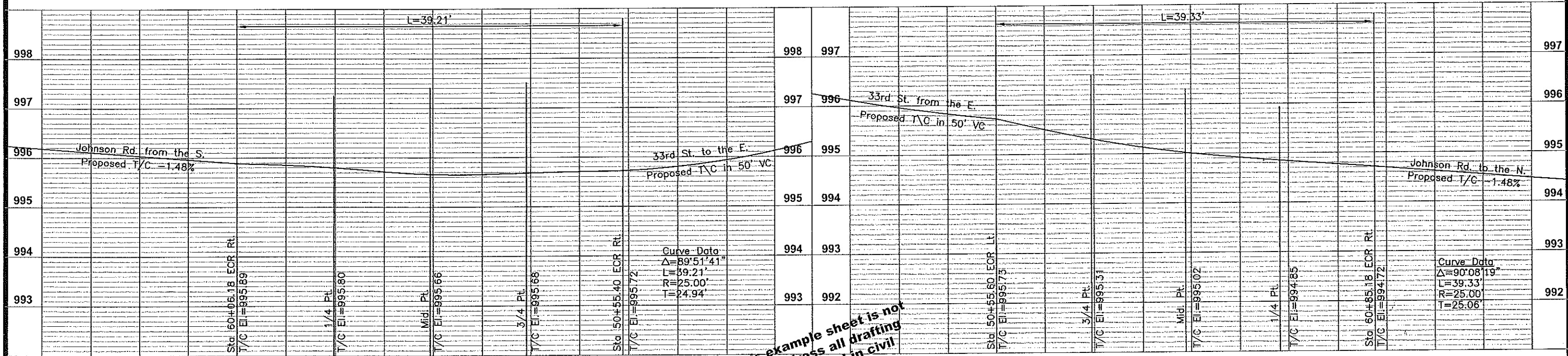
Fractional points, such as 1/4 points and 1/5 points, shall be shown on the profile line, with elevations. Fractional points are equally spaced around the return. Additional points may be added for features such as valley gutters or special drainage situations, but shall be dimensioned as to arc length from an ECR.

See example "RETURN ELEVATIONS" on page 2 - 24.



SW Curb Return
Johnson Rd. & 33rd St.

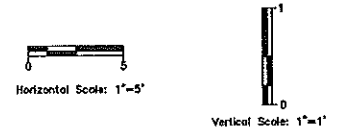
NW Curb Return
Johnson Rd. & 33rd St.



SE Curb Return
Johnson Rd. & 33rd St.

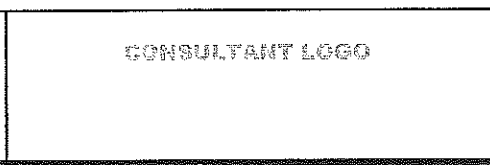
NE Curb Return
Johnson Rd. & 33rd St.

NOTE: This example sheet is not intended to address all drafting problems encountered in civil engineering design.



NO.	DATE	REVISION	BY	APP'D

DRAWN BY: D. SPAAR
APP'D BY: S. BRUNS



TRAFFICWAY IMPROVEMENT
PROJECT T-70XXXXXX
NE Johnson Rd. - 33rd St. to 38th St.

RETURN ELEVATIONS
Johnson Rd.
& 33rd St.

DATE: Month Year
SHEET: 37 of 83
PROJ.: T-70XXXXXX

2.1.2.11 Special Details - A special detail sheet will be provided at the direction of the Design Engineer to provide information for any structure, surface or subsurface improvement, or special condition that does not fit into other sheet categories or requires special detail for clarity. Examples include bridge detailing and dimensioning, special pavement sections, mechanical drawings of lift and pumping stations, guard rails, fences, drainage and sewer structures, and auxiliary views.

The Kansas Department of Transportation maintains a library of structures and improvement details that may be used on the special detail sheet.

The sheet shall be drawn according to appropriate drafting standards using appropriate line weights, standard plan symbols, graphic scales and a North arrow.

2.1.2.12 Geology - A geology sheet is required for bridges or other improvements requiring geotechnical design. The following information shall be shown:

1. Plan view of structure and test hole locations
2. Elevation view of structure
 - a. Geological formations encountered
3. Legend to define geological formations shown
4. General notes - as applicable

The sheet shall be drawn according to general drafting standards using appropriate line weights and standard plan symbols.

2.1.2.13 Cross Sections - Cross sections shall be plotted on a grid. Scales shall be shown. Horizontal distances left or right of the centerline or baseline shall be noted in 10 feet increments at the top and bottom of the sheet and elevations shall be noted in 5 feet increments at the right side of the sheet. Both horizontal and vertical scales shall be 1" = 5'.

Cross sections shall be plotted with stationing beginning at the bottom of the sheet and increasing towards the top. Sections shall be plotted to be read from the right side of the sheet. Wide sections may be plotted to be read from the bottom of the sheet. Folded sections may only be used when plotted to be read from the bottom. Elevations incremented by 5 feet shall be shown on both sides of the sheet.

The range of stations sectioned shall be shown in the lower right hand corner block, listing the beginning and ending station on the particular sheet.

Main line project cross sections shall be ordered first, followed by side street or auxiliary sections. Full sections shall be plotted, for the purpose of earthwork quantities. An exception will be driveways, plotted in half section, to show required slopes.

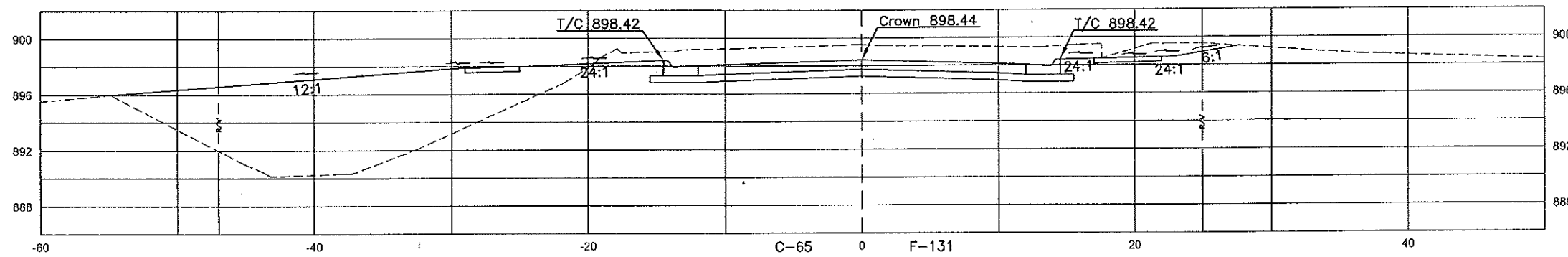
Existing features, including ground lines and pavement tops and bottoms, shall

be shown in a subdued manner. Proposed features, including ground lines, pavement tops and bottoms and subgrade preparation shall be easily distinguishable from existing features.

All lettering shall be 0.125 inch minimum. Labels to be shown are: stations, "centerline of drive", cuts and fills in square feet, proposed elevations and cross-slopes. Cross-slopes shall be formatted in a rise to run ratio. If two successive cross sections have consistent cross-slope, the second need not show cross-slope. Cross sections in transition shall be shown as "variable".

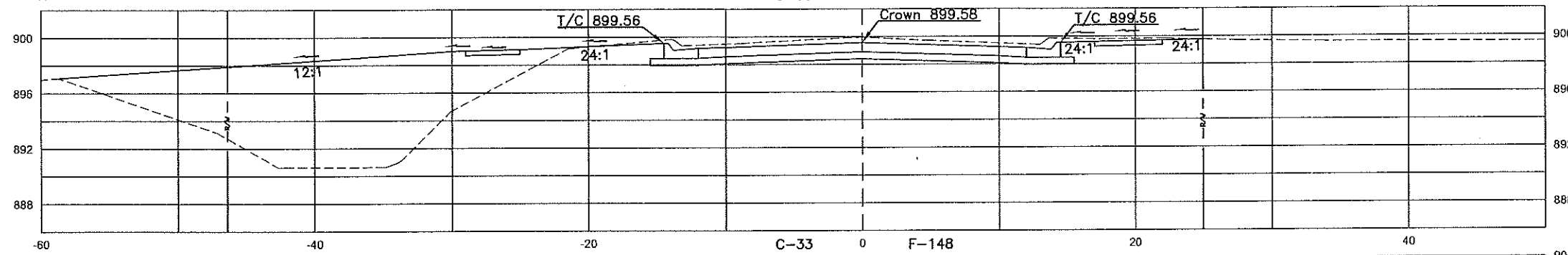
See example "Cross Sections" on page 2 - 27.

10+00



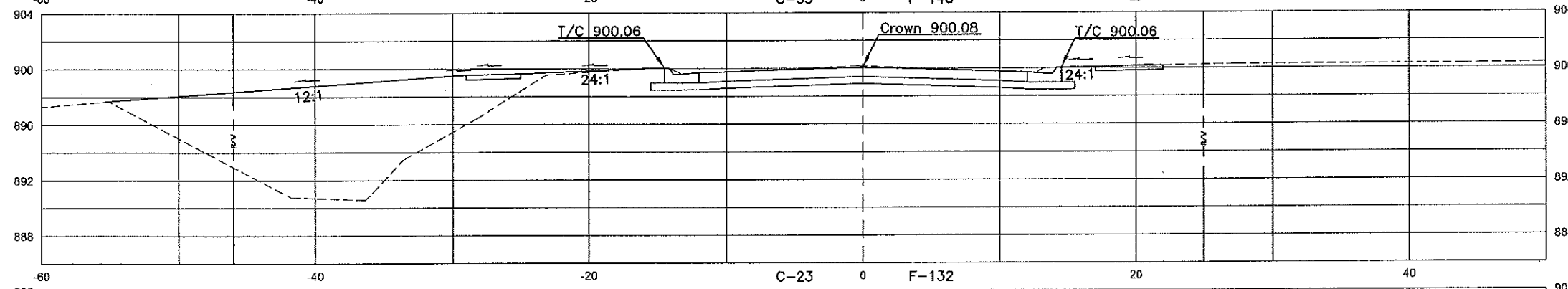
10+00

9+50



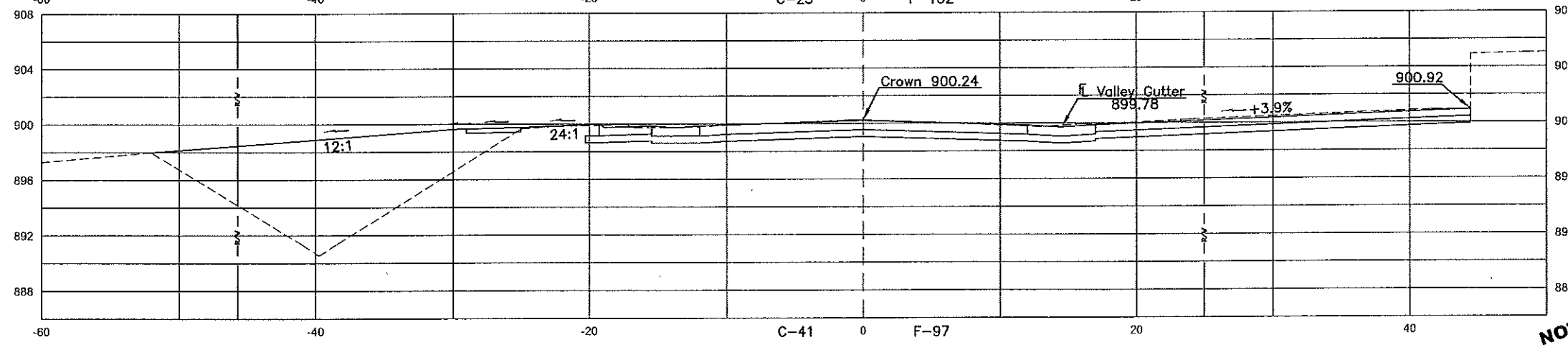
9+50

9+15.98



9+15.98

9+00



9+00

NOTE: This example sheet is not intended to address all drafting problems encountered in civil engineering design.

Scale: 1"=5' Vert. & Horz.

NO.	DATE	REVISION	BY	APP'D

DRAWN BY: D. SPAAR
 APP'D BY: J. GREEN

CONSULTANT LOGO



STREET IMPROVEMENT
 PROJECT T-60XXXX-XX

CROSS SECTIONS
 SE 17th Street
 Sta 9+00 to Sta 10+00

DATE: Month Year
 SHEET: 2 of 20
 PROJ.: T-60XXXX-XX