

INTRODUCTION:

Metra Stations & Parking Design (MSPD) is responsible for developing the electronic files and design guidelines for all stations and parking projects. The intention of this manual is to aid the Consultants in the preparation of project documents and electronic drawings. It is **not** for teaching how to use the CAD/D systems or other system applications. Metra assumes that the consultants have extensive knowledge of stations and parking design standards and guidelines.

These are the major reasons for project electronic file submittals:

- Clarity of Communication of Design Intent.
- Organization of Data regardless of Project Type or Consultant.
- Standardization of Quality Check & Review Process
- Data Management, Storage, & Retrieval.
- Referencing & Transfer of Data from one Project to Another.

MSPD uses MicroStation for drawings. For project scheduling, cost estimating, correspondences, plot/pdf photo files, etc, MSPD uses Microsoft Office systems and Acrobat. Deviation from these application standards will require MSPD Approval.

For all project design submittal, the consultant is responsible for submitting the electronic files deliverables in a CD and the set of half size plans to the Project Manager.

Refer to the web site (metrarr.com/techservices) for design guidelines for **stations and parking projects**.

SUMMARY OF CAD/D STANDARDS

CADD System: Microstation
Drawing Format: .dgn

Seed Files: Seed files have been developed for these disciplines:

- METSEED3.DGN - General
- METSD-C3.DGN - Civil
- METSD-L3.DGN - Landscape
- METSD-S3.DGN - Structural
- METSD-A3.DGN - Architectural
- METSD-P3.DGN - Plumbing
- METSD-M3.DGN - Mechanical
- METSD-E3.DGN - Electrical

Working Units: Unit Names: Master Units = ' (feet)
Sub Units = " (inches)

Resolution: **12 Per '
1600 Pos Units Per**

Settings Managers: In Microstation J, two standard settings managers were developed to help consultants in the drawing preparation. The zip file incorporates the drawing guidelines.

- **civil discipline - metracvl.stg**
- **architectural and other disciplines – metrarch.stg.**

Drawing scales will be plotted at a scale appropriate for the discipline to provide sufficient clarity:

Maintenance of Traffic	50 scale
Roadway Plan & Profile	20 scale
Utility Plans	10 scale
Structural Drawings	20 scale
Architectural Drawings	20 scale

Symbol Cell Library: Standard symbols are in these two cell libraries:

- **Metracvl.cel – civil discipline**
- **Metrarch.cel – architectural and other disciplines**

There are three types of cells:

- Symbols created in 1"= 1' are rescaled to 1"= 20' by setting manager. These symbols can be used in 20 and 40 scales (i.e. manhole, sign, etc.). If different scales have to be used, cells can be set to required scale outside of the setting manager.
- Cells created in 1" = 1' are rescaled to drawing scale by setting managers to appear in correct size in any scale (i.e. border cell)
- Non-scalable features are created in scale 1'=1' to be shown in real dimensions (i.e. pavement markings). Place these cells in the directory easily accessible when executing the setting managers.

Resource Files The line styles are set to scale factor 1 but can be set differently.

- Line Style file - (metrals.rcs)
- Font library - (font.rcs)
- Color Table - (metracvl.tbl)

Linework will be readable from a half-sized set of plans. Similar lines denoting a structural outline, a centerline, etc., will have uniform widths whenever and wherever they are shown within a set of project drawings. Linework will have appropriate gradations of width to give line contrast between outline and dimensions. Linework symbology will be placed according to generally accepted drafting practices. All general notes and text will be left justified except when center justification is more appropriate. All main titles and subtitles will be center justified. Underline titles and subtitles with a single line below each line of text having a weight of 4.

Fonts General text will utilize the standard font 3 with text height = 0.12", text width = 0.10" and line spacing = 0.08" times the drawing scale.
Title text will use standard font 3 with text height = 0.18", text width = 0.15" and line spacing = 0.12" in drawing scale. Weight of text will be set as follows:
Existing text = weight 1
Proposed text = weight 1 or 2
Titles = weight 3

Macros Civil setting manager uses this macro for: leader 16.ba, leader 18ba, etc. (**macro.zip**)

Design Details: Access the website (metrarr.com/techservices) for these design guidelines

- **Accessibility design**
- **Platform design**
- **Parking design**

File Names File names will include the four-numeric project element code, one-alpha discipline code, the numeric sheet type, and the numeric sheet number. Each plan sheet should have the file name and the sheet number.

Example: 1385 C 1 01. dgn
 PE Number Discipline Type Sheet No.

Discipline Codes:

- C-Civil
- L-Landscape
- S-Structural
- A-Architectural
- Q-Equipment
- P-Plumbing
- M-Mechanical
- E-Electrical
- X Other
- G- General

- **Sheet Types**
 - 1-Plan
 - 2-Elevations
 - 3-Sections
 - 4-Large Scale Plans/Elevations
 - 5-Details
 - 6-Schedules and Diagrams
 - 7-Metra defined-Parking Lot Numbering System
 - 8-Open
 - 0-Base/General Notes/Key/Staging
 - R-Reference File

- **Title Sheet Refer to Appendix E** for the example of the standard Title Sheet
- **Border Sheet Refer to Appendix F** for an example of a standard border sheet
- **Sheet Numbering system** – all plan sheets should be numbered accordingly. If the number of a submittal is 100 sheets, the title is the first sheet and should be numbered 1 of 100.

DRAFTING GUIDELINES

GENERAL

- The use of 2D design files is recommended
- Use the appropriate seed file, settings manger, color table, level and symbology etc.
- Use the appropriate Metra border and title sheet.
- Existing conditions will be referenced to the appropriate drawings at 80% screening for clarity.
- Place all notes and identifying text in the drawing for the items to which that note pertains, and not in the base reference drawing.
- All civil drawings will have the coordinate readout format set to "Master Units" to allow readout in feet and decimal parts thereof. All architectural and structural drawings shall have the coordinate readout format set to "Sub Units" to allow for readout in feet and inches. Changing coordinate readout format does not affect scale, size or integrity of the drawing.

DRAWING NOTES

Local Notes and General Notes will clarify features that are more accurately defined by words than by pictures and dimensions. Notes may be used to give instructions for the application of special treatments and/or processes or to supplement standard symbols. Any information relating to the drawing or its use may be placed in the notes. Whenever possible, the use of abbreviations should be avoided. When abbreviations are used due to space limitations, the standard abbreviations for civil and structural features will be used.

Place Local Notes in the field of the drawing outside the outline of the object, and as near as practicable to the portion referred to, or to the point where the operation is to be performed. Leader lines will extend parallel from the right or left of a single or multiple line local notes. Dimensions will be placed above and in the center of the dimension line.

General Notes will be located in the lower right hand corner of the drawings. They are numbered consecutively starting with 1 (one). The General Note column will not exceed 8 inches in width. On multisheet drawings, begin the general notes on Sheet 1 whenever possible. General Notes are punctuated according to the rules of English Grammar. Lengthy notes covering complex processes should be avoided.

UNITS OF MEASURE

Civil Drawings:

The decimal system will be used for coordinate systems, elevations, gradients, points on horizontal and vertical alignments, survey information, inverts, and slope designations. When the decimal system is used for dimensions, elevations, alignments, inverts, slope designations, etc., the number will always be written to two decimal places unless the accuracy of the data obtained is less than a hundredth of a foot (i.e. water surface elevation). For coordinate system designations, the number will always be written to three decimal places. If the number is less than one foot, a 0 shall be placed in front of the decimal place. Examples of the decimal system are as follows:

Dimension	37.50'
Elevation	654.54
Slope	3.50%
Coordinate	175,050.840
Stationing	123+45.67

Structural and Architectural Drawings:

The decimal system will be used for specific elevations, while the feet-and-inches system will use all other layout dimensions and details. Examples of dimensioning in feet-and-inches are as follows:

Overall Dimension	600'-0"
Column Spacing	32'-6"
Wall Thickness	10"

STATIONS DATA CALCULATIONS USING AREA POLYGONS

Use area polygons which are closed figures to calculate the area square feet or linear feet (platforms and rise)) of various station structures, platform and site elements. Show on the existing and plan drawings these area polygons and generate the "PDF file" version. Submit half size plans of the marked up polygons with the area calculated.

STRUCTURES, PLATFORM AND SITE ELEMENTS FOR AREA CALCULATIONS:

- PLATFORMS
- SHELTERS
- CROSSWALKS
- SIDEWALKS
- RAMPS
- STAIRS
- HEADHOUSES
- AIR/TUNNEL-PEDWALKS
- ELEVATORS/ESCALATORS
- RETAINING WALLS
- PARKING
- RIGHT OF WAY/EMBANKMENT
- SITE PERIMETER
- DEPOT
- WAITING ROOM PERIMETER
- WARMING HOUSE
- TICKET AGENT
- WASHROOMS
- VENDOR AREA
- CANOPIES/LOGGIAS
- MISC ROOM (BOILER, JANITORIAL, HVAC.)

DRAWING ORGANIZATION

The typical drawing set is organized into subsets based on the various disciplines. Not all of the subsets or discipline classifications may apply. The drawing organization is dependent on the scope and complexity of the project.

- G General Data
- C Civil
- L Landscape
- S Structural
- A Architectural
- F Fire Protection
- P Plumbing
- M Mechanical
- E Electrical
- T Telecommunications
- X Other

EXAMPLE PLAN SET-

<u>PE # + File Name</u>	<u>Sheet Title</u>
___G001.DGN	Title Sheet
___G101.DGN	Survey Plan
___G102.DGN	Site Utilization Plan
___C101.DGN	Site Plan - North
___C102.DGN	Site Plan - South
___C103.DGN	Site Plan - Drainage
___C501.DGN	Bituminous Platform Details
___C502.DGN	Platform, Ramp and Railing Details
___C503.DGN	2 Track Cross Walk
___S101.DGN	Foundation Plan
___S102.DGN	Framing Plan
___S501.DGN	Structural Details
___S502.DGN	Structural Details
___A101.DGN	Architectural Site Plan
___A102.DGN	Site Signage & Details
___A103.DGN	Demolition Plan
___A104.DGN	Floor Plans
___A105.DGN	Enlarged Toilet Plans
___A106.DGN	Reflected Ceiling Plan & Details
___A107.DGN	Roof Plan
___A201.DGN	Building Elevations
___A202.DGN	Shelter Elevations
___A301.DGN	Building Sections
___A302.DGN	Building Sections
___A303.DGN	Wall Sections
___A034.DGN	Wall Sections & Details
___A501.DGN	Mill Work & Metal Fabrications
___A502.DGN	Roof Details
___A503.DGN	Roof Details
___P101.DGN	Plumbing Floor Plan
___P601.DGN	Schedules & Symbols
___M101.DGN	Demolition & new HVAC Plan
___M601.DGN	Symbols, Notes & Details
___M602.DGN	Schedules
___E101.DGN	Site Demolition Lighting & Utilities
___E102.DGN	Site Plan New Lighting & Utilities

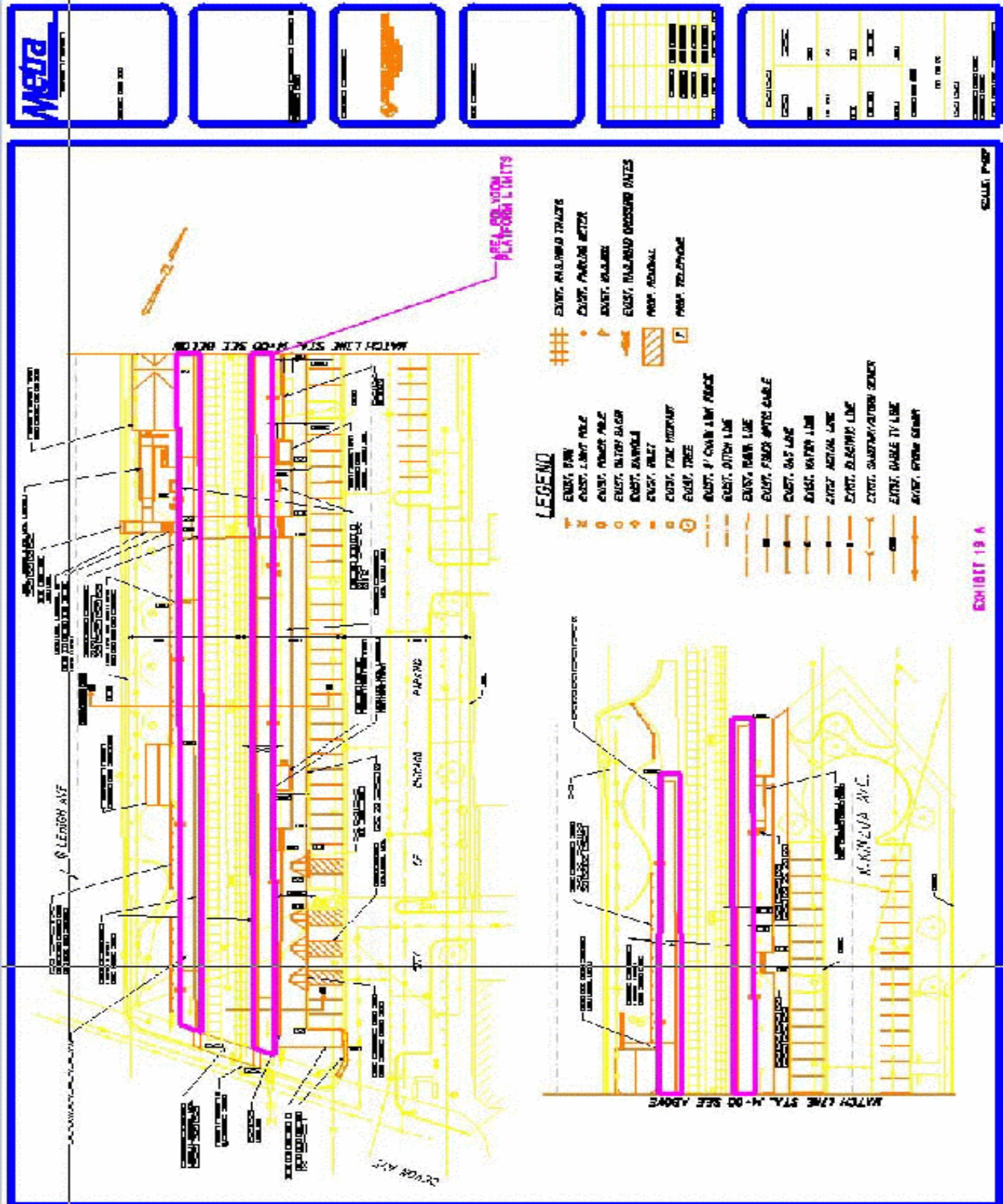
___ E103.DGN	Power & Special Systems Demolition
___ E104.DGN	Power & Special Systems Plan
___ E501.DGN	Details
___ E601.DGN	Symbols, Abbreviations, Schedules
___ E602.DGN	Diagrams & Details
___ E603.DGN	Diagrams & Panels

PROJECT DELIVERABLES – Refer to the Stations & Parking Design website – metrarr.com/techservices

List of project deliverables. All electronic files should be delivered in a CD and the half size plans (12x18) with a transmittal to the project manager.

<u>DELIVARABLES</u>	<u>ELECTRONIC</u>
Hard copies - HD	
1. DRAWINGS- Half Size 12x18 - HD	30%- 60%-90%- 100%- Permittable
2. Project Manual –Supple (.doc)	30%- 60%-90%- 100%- Permittable
3. Photos (.jpg)	30%
4. PDF FILES	30%- 60%-90%- 100%- Permittable
5. Transmittal Appendix A (doc)-HD	30%- 60%-90%- 100%- Permittable
6. Drawing/PDF List (.doc) Appendix B	30%- 60%-90%- 100%- Permittable
7. Station Area Calculations Half size plans-PDF	100% - Permittable
8. CAD/D Checklist (.doc) Appendix D	30%- 60%-90%- 100%- Permittable

Example of Platform Area Polygons



Example Depot-Area Polygons

The image displays a technical architectural drawing of a depot area. On the left, a pink-outlined polygon is labeled "DEPOT AREA POLYGON". To its right is a detailed "LOFT PLAN" showing the internal layout of the depot, including various rooms, corridors, and structural elements. A "GENERAL NOTE" is located on the left side of the drawing, providing additional information. The drawing is titled "WA, M, MC, HOU, PL, 2005, 11-4N" and "EXHIBIT 19 D".

LEVEL ASSIGNMENTS

Microstation V8 has unlimited assignments for Levels: text and dimensioning should be in separate levels.

APPENDICES:

APPENDIX A –

Appendix A lists the items and should include the following project information:

- 1- Project Name/Station code
- 2- Date of Drawings
- 3- If Parking project provide lot number
- 4- Description/ PE number
- 5- Transmittal number and dated of transmittal
- 6- Item Number
- 7- Item Description
- 8- Percent complete.
- 9- Date of submittal
- 10- Signature of consultant project manager.

APPENDIX B –

Appendix B is a listing of the drawing sheets and should include the following:

- 11- Sheet Number
- 12- Last Revision Date
- 13- Description
- 14- File Name
- 15- Comments (Reference file, merged file, PDF file, etc.)
- 16- Consultant Name
- 17- Station Code
- 18- Percent complete
- 19- Date of submittal
- 20- Signature of consultant project manager.

APPENDIX C –

Half size plans should have the following information

- 21- Sheet Number
- 22- Item Number
- 23- Name of element (structure, platform, site, elements)
- 24- Description of element
- 25- File Name
- 26- Area Calculations (LF or SF)
- 27- Project Name/Station Code
- 28- Peak Boarding
- 29- Date of submittal
- 30- Signature of consultant project manager.

APPENDIX D –

Appendix D is an example of a Metra CAD review process – Page 12a

APPENDIX E –

Appendix E is the standard title/cover sheet –Page 12b

APPENDIX F –

Appendix F is an example of a typical border sheet –Page 12c

TYPICAL BORDER BLOCK
TITLE BLOCK- PLAN COVER PAGE