

Transbay Transit Center Program

CADD Standards Manual

Revision 2

November 2010



Transbay Transit Center

TRANSBAY TRANSIT CENTER PROGRAM

CADD Standards Manual Revision 2

November 2010

**Issued by the
Transbay Joint Powers Authority**

Preparation of this report was made possible in part by the Metropolitan Transportation Commission through a grant of Regional Measure 2 (RM2) funds.



Preparation of this report was made possible in part by the San Francisco County Transportation Authority through a grant of Proposition K Local Transportation Sales Tax funds.



**TRANSBAY TRANSIT CENTER PROGRAM
CADD STANDARDS**

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TRANSBAY TRANSIT CENTER PROGRAM

CADD STANDARDS

1.0 Introduction to CADD Standards

The Transbay Joint Powers Authority (TJPA), which oversees the design and building of the new Transit Center and Downtown Rail Extension, is committed to ensuring excellence in all aspects of the Transbay Transit Center Program (Program). At the end of the design process, the TJPA expects construction documents that are clear, consistent, and free of conflicts, errors, and omissions. This CADD Standards Manual contains detailed guidance, procedures, and standardized drawing formats that all consultants must understand and follow to produce consistent and high-quality working drawings with a minimum of production time. As documents will change constantly throughout the design and construction process, these standards will help designers make changes without having to redraft entire documents.

1.1 About this Manual

This manual is divided into eleven main sections covering the design process—from project setup to the delivery and archiving of the final design deliverables. Sections 4.0 and 5.0 contain detailed technical information and procedures for producing drawings in AutoCAD and specific technical requirements for Revit. These sections explain how the TJPA expects drawings for its projects to be produced and managed.

The following key underlying technical requirements, which are reiterated throughout this manual, should govern all CADD work.

- The designer's CADD lead is the point of contact for drawing coordination, particularly changes to AutoCAD reference files. Section 2.1 describes the general responsibilities of the CADD lead.
- All designers must use the TJPA standard border sheets. These are described in Section 4.5. AutoCAD files for the TJPA borders are available from the TJPA.
- All work in AutoCAD must be By Layer. In other words, within each drawing, each entity or class of object must be contained on one—and only one—distinct layer. Refer to Section 5.0 for details on the topic of layers.
- Drawings created using three-dimensional modeling software or BIMM (building information modeling and management) software, such as Revit, may conform to the customized formats described in this manual. Drawings, such as backgrounds and Xreferences, shared among disciplines and among different consultants or agencies must conform to all formats and standards described in this manual.

1.2 CADD Standards Enforcement

Each CADD operator and project staff member is responsible for understanding and following these standards and enforcing their use on all project drawings. The CADD lead must verify that these standards are being properly used.

1.3 Drawing Audits

The design firm and its subconsultants submitting CADD files to the TJPA must audit them and correct any problems found prior to submittal. Submittals will be subject to audit by the TJPA. The TJPA will check a sample of the drawings in each deliverable for conformance to the criteria described in this manual. The TJPA or its Program Quality Assurance representative will periodically survey or audit the drawing submittal and review process for conformance to the criteria described in this manual.

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2.0 Scheduling and Planning

2.1 Set-up and Coordination

The design firm and its subconsultants must establish a critical path schedule of the design process including drawing production and information flow. The specific scheduling requirements for the project will be described in the design firm's agreement with the TJPA.

In the case of a conflict between the contract documents and these procedures, the contract documents will govern.

The design team will include a CADD lead. The CADD lead should communicate the TJPA standards to all CADD operators on the project and ensure their compliance. Additionally, the CADD lead should coordinate work among design consultants on the project and set up the standard layers for all drawings. This will allow the designers to focus on design issues and ensure that all subconsultants are provided with accurate and consistent background files.

2.2 Start-up Meeting

At the beginning of the project, the Program Management/Program Controls (PMPC) Consultant will schedule a start-up meeting with the designer and its subconsultants and the TJPA. The CADD lead from the design team must attend the start-up meeting.

The purpose of the start-up meeting is to review with the designers and CADD personnel the TJPA's CADD standards and specific CADD files prepared for the project. The TJPA will provide a compact disc with the standard CADD files.

The PMPC project manager and TJPA staff will ensure that the CADD standards described in this manual and the TJPA sheet borders with title blocks are given to and coordinated with all design groups involved in the project, including outside engineers and subcontractors.

3.0 Drawing Maintenance Requirements

The TJPA has established basic requirements for working in AutoCAD to streamline drawing production, coordination, and review. These requirements are compiled in this section and reiterated throughout this manual. For design and scope associated with California Department of Transportation (Caltrans) structures, the TJPA CADD Standards will be used as a drafting guide and will supplement the Caltrans CADD Users Manual found at www.dot.ca.gov/hq/oppd/cadd/usta/caddman/english/toc.htm. For designers and consultants working on Caltrans structures, download and print out for use a copy of the Caltrans CADD Users Manual.

3.1 General Set-up, Maintenance, and Close-out of AutoCAD files

- Set the automatic save in your AutoCAD set-up.
- Do not put discarded or unused items on a layer and then *freeze* that layer.
- Place all text and dimensions in Model Space. Other than general notes, do not write any text or dimensions in Paper Space.
- Do not insert dimensions and annotation text as blocks.
- Create a sheet as an individual drawing (.dwg) file. Do not use multiple Paper Space layouts to create more than one sheet per drawing file.
- Periodically do the following:
 - Purge all unused blocks, layers, linetypes, etc.
 - Using Layerwalk, verify that entities are on the correct layer.
 - Check overall distances, etc.
- Lock the Viewport after you have *zoomed* to the correct scale.
- Do not *zoom* in and out of Viewport to get to Model Space. By doing this, you may accidentally change the plotted scale of the drawing.
- Set Viewport to *Do Not Plot*.
- Close or exit all drawings with 0 as the current layer.
- Ensure that Layer 0 is always on and white.
- Close or exit all drawings with *zoom extent* in Model Space and in Paper Space.

3.2 Layers

- Do all work *By Layer*.
- Always assign each entity its own layer, i.e., all entities must be by layer.
- Do not duplicate layers. Use Layerwalk to verify.
- Use *freeze* and *thaw* to control layers. Only in special cases should layers be turned on or off.

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3.3 Blocks

- Do not use nested blocks, i.e., blocks which themselves contain blocks.
- Do not *explode* blocks. To change a block, *redefine* it.
- Do not modify blocks created by others without authorization.
- If you create a block, ensure that it is high-quality and error-free before placing it in the project block folder; then use it consistently.

3.4 Xref Plans

- Always set the path type to *relative path*.
- Always *attach* Xrefs to sheets on a separate layer named *Xref*.
- Always *overlay* Xrefs to drawings.
- Always *detach* Xrefs to delete them from the file. Do not *erase*.
- Always *lock* the Xref layer.
- Do not combine multiple Xrefs into one plan or block, or insert multiple Xrefs as an image (such as a .jpg file); all design elements must be *live*.
- Do not create nested Xrefs.
- Do not *bind* Xrefs.
- Do not rename Xrefs without consulting the CADD lead.
- Do not change the base or Xref in any file without coordination and authorization.
- Do not assign color or linetype in the plot file to externally referenced files.
- Do not place annotations or dimensions on Xrefs.

3.5 Rotations

The standard DView rotation for the Transit Center is the following format: 43 degrees, 41 minutes, 50 seconds. Units in all CADD files must adhere to this format.

- Do not rotate or twist the DView through the Viewport. DView rotation (twist) must be in Model Space.
- Do not rotate sections in Model Space.
- Do not rotate details in Model Space.

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4.0 Technical Requirements for CADD Drawings

All projects shall be completed in Autodesk AutoCAD Release 17.1 file system format. AutoCAD 2008 automatically saves files in the Release 17.1 file system format; users of AutoCAD 2007 must install Service Pack 2 provided by Autodesk. Exceptions must be approved in writing by the TJPA.

Use of MicroStation (Bentley) for Caltrans associated work will not be required unless electronic file review is requested by Caltrans.

All projects will be completed using the Paper Space and Model Space working environments. Paper Space (Layout tab) is the actual drawing sheet. Use Paper Space to create a finished layout for printing and plotting. Use Paper Space for borders with title and revision blocks, vicinity maps, general notes, graphic bar scales, Viewports, and revision triangles and clouds.

Model Space accesses a limitless drawing area. Use Model Space for all other work, such as plans, details, elevations, profiles, sections, dimensions, and text. In Model Space, draw at 1:1 scale. Drawing 1:12 and scaling up is not permissible. Refer to Section 4.10.

Dview rotation must be in Model Space, not through the Viewport. Sections and details do not require rotation.

4.1 Transbay Transit Center Program Drawing Set by Discipline

The design of the Transbay Transit Center will entail thousands of drawings and multiple disciplines. Do not mix multiple disciplines on one sheet; keep each discipline separate. The following lists show the order in which disciplines are organized within the drawing set.

Transit Center Drawing Set

1. Civil
2. Geotechnical
3. Landscape
4. Architectural
5. Structural
6. Mechanical
7. Plumbing
8. Electrical
9. Fire Protection
10. Special Systems
 - Public Address
 - Fare Collection
 - Security and Communication System
 - Intrusion Detection
 - Window Washing
11. Vertical Circulation
12. Reference Drawings
(existing utility, site and building plans)

DTX Drawing Set

1. Civil
2. Alignment
3. Geotechnical
4. Landscape
5. Architectural
6. Structural
7. Tunnel
8. Track
9. Mechanical
10. Plumbing
11. Electrical
12. Fire Protection
13. Rail Systems
 - Overhead Contact System
 - Signals
 - Automatic Train Control
14. Special Systems
 - Public Address
 - Fare Collection
 - Security and Communication System
 - Intrusion Detection
15. Vertical Circulation
16. Reference Drawings (existing utility, site & building plans)

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4.2 General Drawing Arrangement

A drawing set will be arranged in the following order.

Cover Sheet and Drawing Index	Use TJPA-TB FRONT 34 x 44E.dwg
General Notes, Legend, Abbreviation List, Drawing Index (all disciplines)	Use TJPA-TB FOLLOW 34 x 44E.dwg
Existing Conditions/Demolition Plans Layout Plans Elevations Sections Details Reference Plans	Use TJPA-TB 34 x 44E.dwg

4.3 Transit Center Project Required Xreference Plans

The project's design team must provide and control all master Xreference plans shared within the Transit Center project or with other design teams within the Program. The following master Xreference plans are required on the Transit Center Project and must be 1:1 scale, in the UCS World Coordinate System:

XAFLRPK	Park Level
XAFLR03	Bus Deck Level
XAFLR02	Second Level
XAFLR01	Ground Level
XAFLRB1	Lower Concourse
XAFLRB2	Train Platform Level & Shoring Wall
XAGRID (including grid lines, grid bubbles and text, as required for different scales using specific layers)	Grid plan
XATRANBOX	Train Box

4.4 Standard TJPA Drawing Numbering

Assign each drawing a unique six- or seven-character number composed of a discipline code followed by a hyphen and four-digit drawing number, as shown in the following examples. The electronic file name for the drawing must be identical to the drawing number.

Example:

- G-0000 (top cover sheet, drawing index)
- C-0000 (civil TJPA follow-up subcover sheet)
- A-1000 (demolition)
- SE-3012 (access control riser diagram)
- FA-9002 (facility network)

Refer to Section 5.3 for a list of discipline codes and Appendix D for a list of drawing numbers.

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4.5 Standard Sheets

The Transit Center project shall use full-size sheets measuring 34 × 44 inches. Half-size sheets measure 17 × 22 inches.

Full-size sheets measuring 22 x 34 inches (11 x 17-inch half sheets) may be used for engineering projects as identified by the TJPA.

Create each sheet as an individual **.dwg** file. Do not use multiple Paper Space layouts to create more than one sheet in one drawing file. The Layout tab shall indicate “Layout 1” or the drawing file name.

All plans must include the standard project north arrow and a scale bar at the bottom right corner of the drawing. Designers may use a non-standard project north arrow but must be consistent and use the same north arrow for all project drawings.

Include a key map or plan showing the location of the entity the drawing depicts on the site on all sheets with a quadrant system or grid. Refer to Figure 4-1, for an example.

Sections 4.5.1 through 4.5.3 describe the TJPA standard CADD files required for the Program. All TJPA files are available from the TJPA.

4.5.1 TJPA Border Sheets

Use the TJPA border sheets for all standard drawing sheets, described as follows.

Top cover sheet: **TJPA-TB FRONT 34 x 44E.dwg**
Follow-up sheet (for all disciplines): **TJPA-TB FOLLOW 34 x 44E.dwg**
Border sheet (for all design drawings): **TJPA-TB 34 x 44E.dwg**

All borders must be inserted into Paper Space at coordinates 0, 0 and scaled at 1:1.

Refer to figures 4-1 through 4-3 for examples.

4.5.2 TJPA Title Blocks

Use the TJPA title block *text attribute* on all sheets, as follows:

- For title block with two lines, insert **TJPA-2LE.dwg**
- For title block with three lines, insert **TJPA-3LE.dwg**

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4.5.3 TJPA Pen Table

For the standard TJPA pen table, use the following file: **TJPA.ctb**. Do not modify this file. Pen colors and sizes are described in Table 4-1.

Table 4-1, Pen Colors and Sizes

Color Description	Full-Size Pen Widths (mm)	Half-Size Pen Widths (mm)
RED (1)	0.1300	Check or Select Scale Lineweights in Plot Settings
YELLOW (2)	0.2500	
GREEN (3)	0.3500	
CYAN (4)	0.5000	
BLUE (5)	0.6500	
MAGENTA (6)	0.6500	
WHITE (7)	0.1800	
GREY (8)	0.2500	
GRAYSCALE	0.1800	
251	grayscale	
252	grayscale	
253	grayscale	
254	grayscale	

Colors: 1, 33, 65, 97 are pen width = 0.13mm
 Colors: 2, 34, 66, 98 are pen width = 0.25mm
 Colors: 3, 35, 67, 99 are pen width = 0.35mm
 Colors: 4, 36, 68, 100 are pen width = 0.50mm
 Colors: 5, 37, 69, 101 are pen width = 0.65mm
 Colors: 6, 38, 70, 102 are pen width = 0.65mm

The above listed colors set for black ink. Colors: 8, 9, 251, 252, 253, and 254 are set as object colors with grayscale.

Colors in Revit must be set to the standard TJPA pen colors, as shown in Table 4-1. All files exported from Revit must reflect these standard colors and lineweights.

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4.5.4 Caltrans-associated Drawings

Full-size sheets for Caltrans associated drawings shall measure 22 x 34 inches. Half-size sheets measure 11 x 17 inches.

4.6 Plan

Include a north arrow and a graphics scale bar on every sheet that contains a plan. Placement of the north arrow must be consistent on all plans. The TJPA recommends placement of the north arrow at the bottom right corner of the drawing above the scale bar.

4.7 Detail Sheets

Detail sheets will begin with X-5000. Arrange all detail sheets so that the detail numbers and section letters read from left to right; top to bottom, consecutively. Give each sheet its own set of identifying detail numbers and section letters starting from I or A.

- Sections and elevations shall be lettered.
- Details shall be numbered.

Avoid taking sections of a section; take the section from the plan or elevation. If a section is required but cannot be taken from the plan or elevation, give the section a title (for example, *Riser Support*). Do not rotate sections or details in Model Space.

4.8 Text: Standard Fonts and Lettering

Use fonts from the basic AutoCAD software, as shown in Table 4-2.

Table 4-2, Standard Fonts

Text Type	Font	Color	Plot Size (height)
Standard text, notes, notation, dimensions	Roman Simplex (Romans.shx)	green	1/8" (.125)
Subtitles	Roman Duplex (RomanD.shx)	cyan	3/16" (.1875)
Titles, headings, detail letters, section letters	Roman Duplex (RomanD.shx)	cyan	1/4" (.25)

Use upper case lettering, oriented vertically, as shown in Figure 4-4. Do not use italics. Place all text within the plotting limits on all drawings.

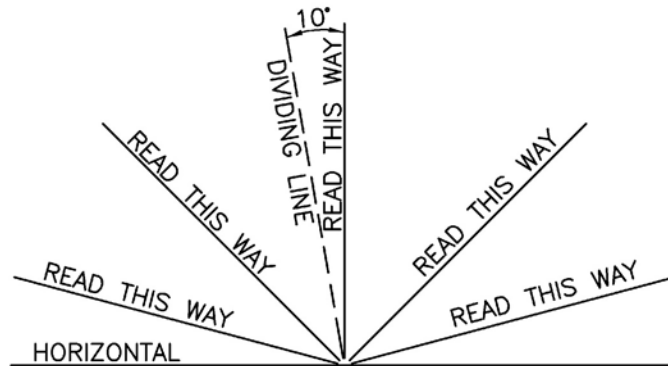


Figure 4-4, Lettering Orientation

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4.9 Scales and Units

Tables 4-3 and 4-4 list common scale factors in English and decimal units, respectively.

Table 4-3 Scale Factor (English Units)

Plotted Drawing Scale	Scale Factor in Inches	AutoCAD Paper Space, Layout, Mview Scale Factor	Text Height In Inches (for 1/8"-high plotted text)
12" = 1'- 0"	1	1/1xp	1/8"
6" = 1'- 0"	2	1/2xp	1/4"
3" = 1'- 0"	4	1/4xp	1/2"
1 1/2" = 1'- 0"	8	1/8xp	1"
1" = 1'- 0"	12	1/12xp	1 1/2"
3/4" = 1'- 0"	16	1/16xp	2"
1/2" = 1'- 0"	24	1/24xp	3"
3/8" = 1'- 0"	32	1/32xp	4"
1/4" = 1'- 0"	48	1/48xp	6"
3/16" = 1'- 0"	64	1/64xp	8"
1/8" = 1'- 0"	96	1/96xp	12"
3/32" = 1'- 0"	128	1/128xp	16"
1/16" = 1'- 0"	192	1/192xp	24"
1/32" = 1'- 0"	384	1/384xp	48"

Table 4-4, Scale Factor (Decimal Units)

Plotted Drawing Scale	Scale Factor in Inches	AutoCAD Paper Space, Layout, Mview Scale Factor	Text Height In Feet (for 1/8"-high plotted text)
1:10	120	1/120xp	1.25
1:20	240	1/240xp	2.50
1:30	360	1/360xp	3.75
1:40	480	1/480xp	5.00
1:50	600	1/600xp	6.25
1:60	720	1/720xp	7.5
1:100	1200	1/1200xp	12.5
1:200	2400	1/2400xp	25.0
1:300	3600	1/3600xp	40.0

4.10 Model Space

At the beginning of the design and drafting stage, drawings are generated in Model Space. At this stage, you must plan the scale of each of the drawings that will show in your final plot in Paper Space.

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Use the appropriate scale factor for each Viewport that will be part of your final plot. Scale factors for Viewport, dimensions, and text must match.

Design work in Model Space must be drawn to scale 1:1. Plans scaled up by 12 (1 foot=12 inches) are not acceptable.

The TJPA recommends using the following scales to develop drawings:

Plans and exterior elevations: $\frac{1}{16}$ " , $\frac{1}{8}$ " or $\frac{1}{4}$ "
Sections of an entire structure: $\frac{1}{4}$ " or $\frac{1}{2}$ "
Partial sections: 1"
Details: $\frac{3}{4}$ " , $1\frac{1}{2}$ " , or 3"
Partial elevations: $\frac{1}{2}$ "

Avoid using scales of $\frac{3}{32}$ " and $\frac{3}{8}$ " .

Scales of 1" = 1' 0" and larger will be shown as an architectural scale, with all dimensions reading in feet and inches. This does not apply to profile sheets with vertical scales larger than 1", where an engineer's scale will be used to match the horizontal scale.

4.11 Paper Space/Layout

Linetypes as defined in Model Space by default do not appear in Paper Space/Layout. The system variable shall be set so the lincotype scales are based on the drawing units of the space (Model or Paper) in which objects were created. This will make the linetypes appear the same in both Model Space and Paper Space/Layout. The system variable should be changed by typing *LTscale* at the command prompt and selecting option 0; by default, it is set to 1.

4.12 Reference System (UCS World Coordinate System)

All plans showing proposed or existing buildings, roadways, parking areas or other major installations to scale shall be positioned horizontally with reference to the California State Plane coordinate system, Zone 3, North American Datum, 1983 (NAD83). Elevations shall be referenced to the North American Vertical Datum, 1988 (NAVD88).

4.13 Notes

Include all general notes in Paper Space. Locate general notes in the upper right-hand corner of all sheets except the cover sheet. The text shall be Romans, $\frac{1}{8}$ " (0.125) high. The subtitles shall be RomanD, $\frac{3}{16}$ " (0.1875) high.

4.14 Bar Scales

Create all view or detail drawings (document drawings, design files, profiles, etc.) in Model Space with the correspondent graphic standard bar scale. All details, elevations, plans, and sections shall have graphic bar scales. Indicate *Not to Scale* on drawings for typical details only. All *Not to Scale* drawings, if required, shall be drawn at 1:1, and each component shall be drawn proportionately for future updating. Include graphic scales showing both a vertical and horizontal scale on all profiles.

Always use standard bar scales. All scales shall be represented graphically as bar scales. If the vertical scale is different from the horizontal scale on the same drawing, both scales shall be noted, with each followed by the letter *H* or *V* as appropriate. For example, 1"=40'H; 1"=10'V.

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4.15 Units of Measure

Use English units on all drawings. Express distances, dimensions, and elevations in feet and inches. Express angles and bearings in degrees, minutes, and seconds.

Express measurements for the following drawing elements as follows:

Elevations, distances, and dimensions expressed in decimal feet: Use two decimal places.

Angles and bearings: Use the nearest tenth of a second of arc.

Dimensions expressed in feet and inches: Use the nearest $\frac{1}{8}$ " as appropriate.

Other quantities such as volume, weight, and slope shall be expressed with the appropriate level of precision.

Examples:

Elevation	654.54'
Grade	+0.50%
Slope	0.005
Coordinate	(N2044643.712, E6016950.302)
Bearing	N 70° 35' 22.5" E
Stationing	STA 180+45.22, or for Tracks MT2 150+52.32
Angular	43° 41'50.0"

4.16 Dimensioning

Use AutoCAD associative dimensions for dimensions, where possible, in accordance with the following requirements. The sizes given are for dimensions as shown on a full-size plot.

The TJPA recommends placing all dimensions—including the dimension line and dimension text—on a dimension layer in Model Space, not in Paper Space. Do not insert dimensions as blocks; dimensions must be *live*. Set the arrow head size to *0.18* and *closed filled*. Set *Dim Text* to Romans. Designers and consultants may use another dimensioning style, but it must be consistent on a project basis.

4.16.1 Architectural Scale

Dimensions in an architectural scale are given in feet and inches, or fractions of an inch, using the following symbols to express the unit of measure: ' for feet; " for inches. Separate the figures for feet and inches with a hyphen. A typical example on a construction drawing dimension is written as 2'-7".

The following specific rules apply to dimensions using architect's scales on construction drawings.

Accuracy = $\frac{1}{8}$ "

Fractions of an inch. Do not precede fractions of an inch with a zero; thus $\frac{1}{4}$ ".

Whole numbers given in inches. Do not precede whole inches with a zero; thus 5".

Mixed numbers given in inches. Do not use a zero; thus $3\frac{1}{8}$ ".

Feet and inches. Do not use a zero; thus 5'-9".

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Whole numbers given in feet. Use a zero to indicate zero inches; thus 6'-0".

Mixed numbers given in feet and fractions of an inch. Place a zero before the fraction to indicate zero whole inches; thus 4'-0 $\frac{3}{8}$ ".

Express one foot as 1'-0"; never as 12". Express any measurement smaller than one foot in inches.

4.16.2 Engineering or Decimal Scales

In engineering and decimal scales, dimensions are given in feet and tenths or hundredths of a foot, not in feet and inches. The following specific rules apply to placing dimensions using engineering or decimal scales on construction drawings.

Accuracy. Display dimensions using two decimal places regardless of the size of the dimension. For example, show two feet as 2.00'; fifteen feet as 15.00'.

Elevations. Always give elevations in decimals. Elevations are vertical reference heights and are not to be confused with elevation views. They must always be accompanied with the abbreviation EL (elevation), or with the appropriate symbol or abbreviation found in either the legend or table of abbreviations. Structural, paving, and utility elevations shall be shown to the hundredth of a foot. Excavation, grading, and surfacing elevations shall be shown to the tenth of a foot.

Survey Units. Survey units are given in feet and tenths or hundredths of a foot, not in feet or inches. Define all directions for lines as a bearing with degrees, minutes, and seconds.

4.17 Leader Lines

When detailing, line up the callouts vertically and insert leader lines parallel to each other. Do not cross leader lines.

Use straight leader lines from notes to objects. Always start a leader from the top text row. Set arrowheads to *0.18* and *closed filled*.

4.18 Hatching

The TJPA recommends using standard AutoCAD hatching only. This will ensure the availability of the hatch in-house and to any outside consultants. Appendix E contains some recommended specific patterns and their associated purpose. For non-standard hatching, submit a table of hatching styles and hatching files to the TJPA for review and written approval.

If a temporary border is needed to place a hatch pattern, create it, and then remove it from the drawing. Set hatching as *associated*. Use consistent hatch patterns throughout the construction set and note them in the drawing's legend.

4.19 Plotting Protocol

Plot all drawings in Paper Space using the Layout tab. The full-size plot scale should be set at 1:1; the half-size plot scale at 1:2. Verify that the plot offset is set to *Center the Plot*, and the drawing orientation at the 90-degree position for all plotting purposes. Figure 4-5 shows the Plot dialog box for a half-size page with the correct options selected.

The Transit Center Project uses a single color-dependent pen table. This file, **TJPA.ctb**, is available from the TJPA.

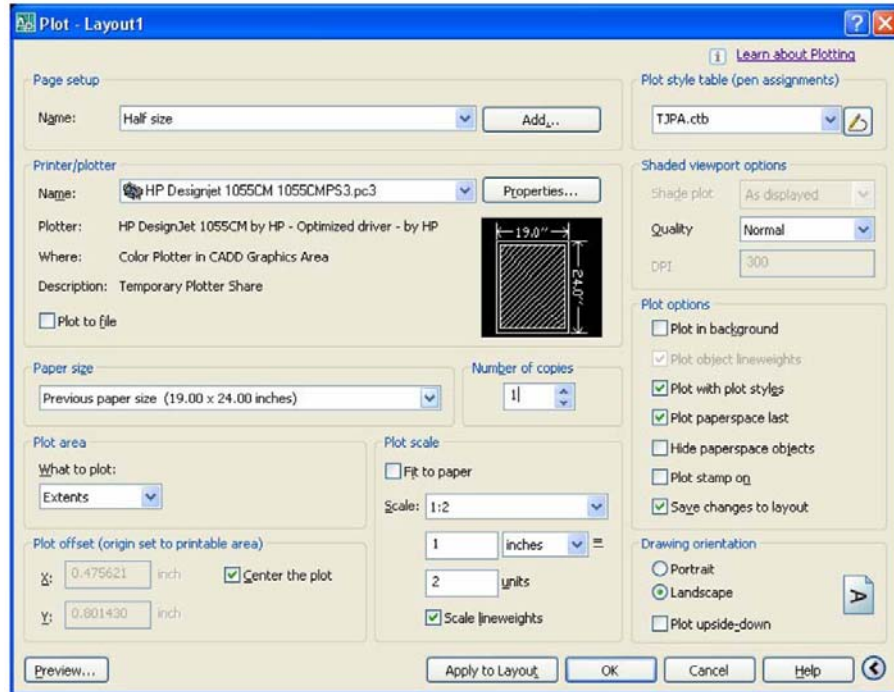


Figure 4-5, Plot Dialog Box

4.20 Plot Stamp or Time Stamp

Include a plot stamp on all hardcopy deliverables and PDF plot files (*.pdf). The plot stamp shows the time and date of creation, the path to the source file, and the user login name current at the time the plot command was executed. The plot stamp or time stamp is important because it shows the location of the document in the file system and it indicates the current status of the drawing.

The plot stamp is a block, which is embedded in the TJPA standard border sheet and updates automatically each time files it is embedded in are opened and plotted.

4.21 Professional Stamp and Signatures

Design professionals shall wet stamp and sign drawings in accordance with professional licensing board requirements. Sheets for preliminary phase deliverables must be stamped but do not require signatures. Bid Sets, including all addenda, and CD Sets, including all revisions, must be stamped and signed. Indicate the expiration date of the license below the signature.

4.22 Closing a Drawing

Save drawings in a view that shows the entire drawing. Set view to *zoom extent* in Model Space and in Paper Space. Set the UCS World Coordinate to *World*. Layer 0 should be white and set as the *current* layer.

4.23 Mark-ups

The TJPA recommends using the following colors to indicate modifications to a hardcopy drawing. Each designer or consultant must have a documented and systematic method to review and mark up drawings.

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Mark-ups in red. Modifications to be put directly on the CADD drawing (object, dimensions, text) or deletions.

Mark-ups in blue. Instructions to the CADD operator, necessary dimensions and information to complete the drawing that should not appear on the completed drawing.

All incorporated modifications shall be back-checked and highlighted with yellow.

4.24 Revit

When using Revit in the preparation of drawings for any project in the Program, the design team must adhere to the following requirements.

Survey Point. The survey point or project base point must match in all Revit drawing files. For the Transit Center building, the survey point or project base point should be at grid lines E1 and E35, for consistency.

Links. Links (or Xreference plans) must match. All links should be provided at the same Survey Point.

Units. Units must be set for decimal and scale 1:1 in all exported Revit files. Shared coordinates must be used for exported files. Master Xreference plans used by all consultants in the Program should be exported in feet, and the UCS World Coordinate System must be correct.

Exporting to CADD. Convert all drawings to AutoCAD format using the export function in Revit. Ensure that all exported drawings are *live*. Frozen, blocked, or exploded CADD files are not acceptable. Refer to Section 4.0 for the version of AutoCAD being used on the Program.

Property Lines. Property lines must be indicated in all links (or Xrefs). Links must be moved to the same survey point or base point, and all links must indicate property lines and survey points.

UCS World Coordinate System. All CADD files (Xrefs) used in Revit models must be in the UCS World Coordinate System at insertion point 0, 0. Use *shared coordinates* when exporting to CADD format. Files will be aligned with the DWG file's World Coordinate System origin and Revit internal origin.

By Layer. Export drawings must be set in accordance with the TJPA color table (or pen table) (refer to Section 4.5.3). All colors should be *by layer* and must be consistent in all drawing files. Colors for dimensions, text, titles, matchlines, and all TJPA standards symbols (blocks) must be consistent on all sheets. For example, the TJPA Title Block cannot be white.

Plot Stamp or Time Stamp. Exported CADD drawing border sheets must include the TJPA standard time stamp.

Logic Model. A Logic Model or Logic Diagram should be attached to the Revit models. The Logic Model must indicate all file names and the file origin for each link used.

BIMM Manager. Each Revit model must be coordinated by a BIMM (Building Information Modeling and Management) manager. For coordination and communication purposes, the BIMM manager's name must be included on all transmittals of BIMM files for the Transbay Transit Center project.

5.0 Layers

All drafting must be *By Layer* consistently throughout the entire project.

Layers are used to organize information in CADD documents. Layering facilitates drawing coordination and the sharing of similar graphic information for viewing and plotting purposes. Layers allow information common to several floors of a multistory project to be shared among multiple drawings, which reduces drawing effort and improves consistency. By manipulating layers, you can control the visibility of classes of objects within the drawing, which facilitates editing, improves CADD system response time, and reduces visual clutter. Layers also control the appearance of visual characteristics such as color or linetype.

5.1 Layer Properties

During the start-up phase for each project, the CADD lead will set up the standard layers for all drawings. It is the responsibility of the designer to ensure that all drawings of a project have the same layer properties.

All entities or classes of objects must be separated on distinct layers that are organized so that drawings can be easily modified and edited.

- Do not create multiple layers representing the same entity, for example, S-STL, S-STEL, S-STEEL, on a single drawing.
- All text within a drawing should be contained on no more than two layers: C-ANNO-NOTES for notes and C-ANNO-TEXT for text.
- All colors and linetypes must be set up *by layer*. Set line weight to *default*, typical for all layers. Set the AutoCAD variable Visretain to 1. Pen colors and weights are described in Section 4.5.3.
- Use the commands *freeze* and *thaw* to control layers. Only in special cases should layers be turned on or off.

Use Layerwalk to verify that layers have been set up according to these standards.

Identify in Layer Properties only those layers used for the project. *Purge* all others. Place all Viewport windows on a layer titled VPORT and ensure that they are *off* at the time of final deliverable. Set the Viewport layer to *Not to Plot*.

5.2 Layer Naming Standards

Appendix A contains a list of layer names; the list is not intended to be comprehensive. A typical drawing may contain only a small subset of these layers. The U.S. National CADD Standards will be an acceptable source for layer naming conventions.

Layer names are written in capital letters, as shown in Appendix A.

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CADD STANDARDS

5.3 Discipline Codes

The following discipline codes correspond to the traditional discipline designations used in construction document sheet numbering and layer naming.

A	Architectural	OC	Overhead Contact System
C	Civil	P	Plumbing
E	Electrical	S	Structural
EQ	Equipment	SC	Supervisory Control and Data Acquisition (SCADA)
FA	Fire Alarm	SE	Security and Communications
FC	Fare Collection	SG	Signals
FP	Fire Protection	SV	Survey/Mapping
FS	Food Service	TE	Telecommunications (including acoustical & audiovisual)
G	General	TP	Traction Power
GT	Geotechnical	TR	Track
H	Hazardous Materials	TU	Tunnels
ID	Interior Design	U	Utilities (Civil Works)
IS	Interior Signage	VT	Vertical Circulations
L	Landscape	WW	Window Washing
LI	Irrigation	Z	Contractor/Shop Drawings
M	Mechanical	X	Xreference

5.4 Common and Multidiscipline Layers

Common and multidiscipline layer names can be used by any discipline or to construct new layers through the use of modifiers and status values. These elements are defined separately from the individual disciplines to avoid repetition, but can be assumed to be available wherever they make sense.

Annotation layers comprise text, dimensions, sheet borders, detail references, and other elements that do not represent the physical aspects of a building. Annotation layers are described in Table 5-1.

Table 5-1, Annotation Layers

Layer	Description	Pen/Color	Linetype
*-ANNO-NOTES	General notes	3 Green	Continuous
*-ANNO-KEYP	Key plan	2 Yellow	Continuous
*-ANNO-LEGN	Legends	3 Green	Continuous
*-ANNO-MATC	Match line	7 White	Phantom
*-ANNO-REVS	Revision **	5 Blue	Continuous
*-ANNO-SCHD	Schedules	2 Yellow	Continuous
*-ANNO-SYMB	Symbols	5 Blue	Continuous
*-ANNO-TEXT	Text	3 Green	Continuous
*-ANNO-TTLB	Title block (attribute text)	6 Magenta	Continuous

* Use the discipline's letter: **A** for architect, **C** for Civil, **S** for Structural layers, etc.

** Use the revision letter or number. (All revision triangles and bubbles are on this layer.)

Graphical layer names are based on corresponding pen weights, shown in Table 5-2. The project-specific pen table is described in Section 4.5.3.

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CADD STANDARDS

Table 5-2, Graphical Layer System

AIA Layer	Description	Color/Pen
*-****-FINE	Fine line weight	1 Red
*-****-THIN	Thin line weight	2 Yellow
*-****-MEDM	Medium line weight	3 Green
*-****-WIDE	Wide line weight	4 Cyan
*-****-XWID	Extra wide line weight	6 Magenta

5.5 Layer Requirements

Observe the following rules when working with layers.

5.5.1 Layer 0

Use Layer 0 for inserting blocks or pasting items from other sheets. Do not use Layer 0 for work. Set Layer 0 as *closing/exiting* from drawing. Ensure that Layer 0 is white. Do not turn off or *freeze* Layer 0.

5.5.2 Defpoints Layer

Do not use the Defpoints layer for work. Do not create Viewports on the Defpoints layer. Do not turn off or *freeze* the Defpoints layer.

5.5.3 Viewport Layer

Create a layer for the Viewport titled VPORT. Do not place a Viewport on the Defpoints layer or Layer 0. Lock the Viewport after you have *zoomed* to the correct scale. Do not *zoom* in and out of Viewport to get to Model Space, as you may accidentally change the plotted scale of the drawing. Set the Viewport layer to *Do Not Plot*.

5.5.4 Xref Layer

Always *attach* Xrefs to sheets on a separate locked layer named *Xref*.

5.6 Creating New Layer Names

If your drawing requires a layer that is not defined in the standard sources cited in Section 5.2, work with the CADD lead to create and name a new layer. Add the new layer to the standard layer list for the project. Layer names should be intuitive, easy-to-remember abbreviations, such as A-WALL for an architectural wall.

Layers that are not identified on the standard layer list may create problems with the utilities, macros, or customized third-party add-ons of the CADD software. Therefore, it is very important that the designer maintain a unified and fully documented standard layer list and share it among all subconsultants on the project.

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CADD STANDARDS

6.0 Revisions

Milestone deliverables must be prepared according to the specifications in this section and delivered in accordance with the design firm's agreement with the TJPA. Section 10 of this manual contains specific procedures for transferring files to the TJPA.

Schematic Design documents are *Rev. SD* and Design Development documents are *Rev. DD*. Bid Set documents are *Rev. A*, and addenda to the Bid Set are lettered sequentially beginning with *Rev. B* for Addendum 1. The Construction Document Set is *Rev. O*. Subsequent revisions to the CD Set are numbered sequentially beginning with *Rev. 1* for the first revision. As-Builts are assigned the next sequential revision number. The as-built revision is the final submittal of the construction documents. Refer to the following list.

Preliminary Design Phase

Rev. SD	Schematic Design
Rev. DD	50% Design Development
Rev. DD	100% Design Development

Bid Documents

Rev. A	Issued for Bid (Bid Set)
Rev. B	Addendum 1
Rev. C	Addendum 2

Construction Documents

Rev. 0	Issued for Construction (CD Set)
Rev. 1	<revision description>
Rev. 2	<revision description>
Rev. 3	<revision description>

As-Builts

Rev. <next sequential revision number>	As-Built (As-Built Set)
--	-------------------------

6.1 Making Revisions

Before making any revisions, ensure that all submitted drawings are properly archived in the Archive folder. Refer to Section 8.2. Also, ensure that a hard copy printed as *Record Print* is filed in the project file.

Incorporate all revisions in the original design drawing file.

Revisions indicating design changes shall be saved in the Sheets folder. In accordance with QA/QC procedures, the engineer is responsible for the documentation of design changes to ensure that the contractor always receives the latest updated design information.

Include a revision description and date in the revision title block for each revision.

Revisions shall be made by either crossing out unwanted information, adding new or revised information, or redrawing. Indicate all new revisions by placing a revision cloud around and a revision symbol next to each change, except when revising for as-built conditions.

No revision clouds or symbols are required on preliminary design phase deliverables.

TRANSBAY TRANSIT CENTER PROGRAM CADD STANDARDS

Bid Set. Delete all previous revision descriptions in the title block and start with *Revision A, Issued for Bid*. All Bid Set addenda must be clouded with triangles.

CD Set. Delete all previous revision descriptions in the title block and start with *Revision O, Issued for Construction*. Delete all RFI layout tabs in Paper Space. All revisions to the CD Set must be clouded with triangles.

Place revision clouds and triangles on a layer titled *REV*; name the layer for the specific revision. For example, REV. B, REV. 1. The revision clouds and triangles must be in Paper Space.

Delete all previous revision clouds and triangles in subsequent revisions, but retain in the revision title block all revision descriptions with their revision triangles and dates. Refer to Figure 6-1.









Submittal Type	Revision	Format	Requirements
Schematic Design	SD	Set	
50% Design Development	DD	Set	
100% Design Development	DD	Set	
Issued for Bid	A	Set	Stamp and Signature
Addendum 1	B	Sheet	
Addendum 2	C	Sheet	
Issued for Construction	0	Set	Stamp and Signature
First revision	1	Sheet	
Second revision	2	Sheet	
As-Built	Final revision	Set	

Figure 6-1, Typical Submittals

Do not change sequence numbers on revised sheets in either the Bid Set or CD Set; the revised sheet replaces the original sheet. Figures 6-2 through 6-7 show how the drawing index and the standard sheet should be annotated for the Bid and CD sets.

Field Orders. A field order may require revisions to a drawing. Indicate the field order number in the revision description on the drawing. For example, *Incorporated FO-x.xx*.

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CADD STANDARDS

6.2 Adding and Deleting Drawings

Add new sheets to the end of the drawing set, and revise the index sheet to include the new sheets. Include new drawings under the heading *Sheets Added to the Original Set*. The description in the revision title block will read *New Sheets Added*. Refer to the example shown in Figure 6-4.

The total number of sheets for the revised drawing set shall be left blank for added sheets. If the designer must insert new sheets at intermediate locations after the CD Set has been issued, then the project manager, construction manager, and contractor must be informed before the new sheets are issued.

To indicate drawings deleted from the drawing set, place a bold X across the image area and retain the deleted sheet in the drawing set. Do not renumber the sheet or change the total number of sheets for the revised plan set. Add a revision triangle to the revision title block with a note indicating *Sheet Deleted*. Plot and submit the deleted sheet.

6.3 As-Builts

The contractor's As-Built drawing set shall be a *redline*-marked hard copy showing all field changed conditions. No revision clouds and symbols are required on the as-built set. Each as-built mark-up will be stamped and signed:

AS-BUILT – CONTRACTOR'S REDLINE DWG.	
Contractor Project Manager: _____	DATE _____
TJPA Construction Manager: _____	DATE _____
TJPA Project Manager: _____	DATE _____

AS-BUILT RECORD DRAWING	
THIS DRAWING HAS BEEN REVISED TO REFLECT THE FINAL AS-CONSTRUCTED CONFIGURATION AS REPORTED BY THE CONSTRUCTION CONTRACTOR. THESE CONTRACTOR-REPORTED CHANGES HAVE BEEN REVIEWED AND APPEAR CONSISTENT WITH PROJECT DOCUMENTS AND OBSERVATIONS PERFORMED BY THE DESIGNER DURING AND COMPLETION OF CONSTRUCTION. ALL APPROVED DESIGN CHANGES HAVE ALSO BEEN INCORPORATED. WHILE EVERY REASONABLE ATTEMPT HAS BEEN MADE TO MAKE THESE DRAWINGS ACCURATE, PERSONS USING THESE DRAWINGS SHOULD CHECK THE CONFIGURATIONS BEFORE ATTEMPTING REPAIRS OR MODIFICATIONS. SPECIAL CAUTION SHOULD BE USED WHEN UNDERGROUND WORK IS INVOLVED.	
Design Consultant Architect/Engineer: _____	DATE _____
Design Consultant Project Manager: _____	DATE _____

Original sheets will be revised to reflect the contractor's as-built set. The revision title block will read *As-Built* accompanied by a numbered revision symbol and date.

6.4 Request for Information (RFI)

All requested design information from the contractor must be created in the original drawing file of the Bid Set.

In Model Space, copy the requested area to a new location, and then make modifications as necessary. In Paper Space, create a new layout tab; name the tab as follows: *RFI-
<original four-digit drawing number>*. Insert (as a block, at 0,0) the standard RFI border, as shown in Figure 6-8. All sketch (SK) drawings will list the original drawing and revision number. SK drawing numbers must match the original sheet number.

6.5 Sketch Guidelines for Design Coordination and Communication

A sketch is any drawing that is not included in the design submittal. Sketches are used for communication and design coordination purposes only. For cost estimating or analysis, sketches can be provided to the contractor with the TJPA's approval.

Follow these guidelines when producing sketches and using them for communication.

- Include the following on every sketch:
 - Title block
 - Scale bar
 - North arrow
 - Title or name of subject
 - Date and initials
- Do not use the TJPA title block on any sketch.
- Do not submit hand drawn sketches for formal design or construction submittals.
- Do not submit any sketch
 - to outside agencies for any reason
 - for construction under any circumstance
 - to any consultant as an official design document

TRANSBAY TRANSIT CENTER PROGRAM CADD STANDARDS

TRANSBAY JOINT POWERS AUTHORITY
CONTRACT NO. _____
TRANSBAY TRANSIT CENTER PROGRAM
____PROJECT TITLE _____
SAN FRANCISCO, CALIFORNIA

DRAWING INDEX

DRAWING INDEX

SEQ. NO.	REV. NO.	TITLE
1.	K-0000	TITLE
2.	K-0001	TITLE
3.	K-0001	TITLE
4.	K-0001	TITLE
5.	K-0000	TITLE
6.	K-0001	TITLE
7.	K-0000	TITLE
8.	K-0000	TITLE
9.	K-0000	TITLE
10.	K-0000	TITLE
11.	K-0010	TITLE
12.	K-0011	TITLE
13.	K-0012	TITLE
14.	K-0013	TITLE
15.	K-0014	TITLE
16.	K-0014	TITLE
17.	K-0020	TITLE
18.	K-0031	TITLE
19.	K-0100	TITLE
20.	K-0101	TITLE
21.	K-0102	TITLE
22.	K-0103	TITLE

DRAWING INDEX

INSTRUCTION NOTE FOR "ISSUED FOR BID":

- LIST ALL DRAWINGS WITH SEQUENCE NUMBER, SHEET NUMBER, AND TITLE. DO NOT INCLUDE A REVISION NUMBER FOR EACH DRAWING (REV. NOS. WILL BE INCLUDED IN THE EXCEL MASTER DRAWING LIST).
- THE DRAWING INDEX SHEET WILL BE REVISED ONLY IF SHEETS FROM THE ORIGINAL LISTING ARE ADDED OR DELETED OR IF SHEET TITLES REQUIRED EDITING.

DRAWING INDEX

ONCE THE DRAWING SET IS ISSUED FOR BID, THE TOTAL NUMBER OF SHEETS CANNOT BE CHANGED. FOR EXAMPLE, THE TOTAL NO. OF SHEETS IN THIS SUBMITTAL IS 22. TOTAL NUMBER OF SHEETS WILL NOT CHANGE AS A RESULT OF REVISION ISSUANCE FOR BID. SEE INSTRUCTION NOTIFS ABOVE.

SPECIAL/TEMPORARY TITLE SHOULD BE IN SHEET FILE BECAUSE THIS IS NOT APPLICABLE ON ALL DRAWINGS. USE THIS STAMP ON GLAZING SHIFTS. USE STAMP STYLE AS SHOWN HERE AND ADD STAMP ON ALL SHEETS APPROXIMATELY IN THIS LOCATION.

TC 08.1 STAGE ONE GLAZING SYSTEM DESIGN BUILD ONE

SPECIAL NUMBER FOR DESIGN/BUILD GLAZING (G-0000 HAS ALREADY BEEN USED FOR TTC DD SET)

SUBMITTAL/TEXT IS IN BORDER XREF.

TRANSBAY TRANSIT CENTER PROGRAM
SAN FRANCISCO, CA

DRAWING INDEX

00-00-ABCD-000

TRANSBAY JOINT POWERS AUTHORITY

ISSUED FOR BID

TRANSBAY TRANSIT CENTER PROGRAM
SAN FRANCISCO, CA

00-00-ABCD-000

TRANSBAY JOINT POWERS AUTHORITY

ISSUED FOR BID

Figure 6-2, Drawing Index Revision A, Issued for Bid

TRANSBAY TRANSIT CENTER PROGRAM CADD STANDARDS

TRANSBAY JOINT POWERS AUTHORITY
CONTRACT NO. _____
TRANSBAY TRANSIT CENTER PROGRAM
____PROJECT TITLE _____
SAN FRANCISCO, CALIFORNIA

DRAWING INDEX

SEQ. NO.	SH. NO.	TITLE
1.	4-0000	TITLE
2.	4-0001	TITLE
3.	4-0001	TITLE
4.	4-0001	TITLE
5.	4-0001	TITLE
6.	4-0001	TITLE
7.	4-0001	TITLE
8.	4-0001	TITLE
9.	4-0001	TITLE
10.	4-0001	TITLE
11.	4-0001	TITLE
12.	4-0001	TITLE
13.	4-0001	TITLE
14.	4-0001	TITLE
15.	4-0001	TITLE
16.	4-0001	TITLE
17.	4-0001	TITLE
18.	4-0001	TITLE
19.	4-0001	TITLE
20.	4-0001	TITLE
21.	4-0001	TITLE
22.	4-0001	TITLE

DRAWING INDEX

DRAWING INDEX

INSTRUCTION NOTE - FOR REVISIONS:
1. DO NOT REVISE THE SEQUENCE NUMBER FOR EACH REVISION.
2. THIS REVISED SHEET REPLACES THE ORIGINAL SHEET IN THE DRAWING SET.

TG 08.1 STAGE ONE
DESIGN BUILD
GLASSING SYSTEM

DRAWING INDEX

SAN FRANCISCO, CA

TRANSBAY TRANSIT CENTER PROGRAM

00-00-ABCD-000

ISSUED FOR BID
G-0800
1 of 22

Figure 6-3, Drawing Index Revision B, Issued for Bid (revised title)

TRANSBAY TRANSIT CENTER PROGRAM CADD STANDARDS

<p>TRANSBAY JOINT POWERS AUTHORITY CONTRACT NO. _____ TRANSBAY TRANSIT CENTER PROGRAM _____PROJECT TITLE _____ SAN FRANCISCO, CALIFORNIA</p>	<p>DRAWING INDEX</p>	<p>DRAWING INDEX</p>
<p>DRAWING INDEX</p>	<p>DRAWING INDEX</p>	<p>DRAWING INDEX</p>

INSTRUCTION NOTE FOR REVISIONS:

1. DO NOT REVISE THE SEQUENCE NUMBER FOR EACH REVISION.
2. THIS REVISED SHEET REPLACES THE ORIGINAL SHEET IN THE DRAWING SET.

TRANSBAY TRANSIT CENTER PROGRAM
SAN FRANCISCO, CA
DRAWING INDEX


00-00-ABCD-000

TRANSBAY TRANSIT CENTER PROGRAM
SAN FRANCISCO, CA
DRAWING INDEX


ISSUED FOR BID
G-0800 I of 27

Figure 6-4, Drawing Index Revision C, Issued for Bid (new sheets added)

TRANSBAY TRANSIT CENTER PROGRAM CADD STANDARDS



TRANSBAY JOINT POWERS AUTHORITY



Key Map

NO.	DATE	BY	DESCRIPTION

CONTRACT NO. _____

TITLE
TRANSBAY TRANSIT CENTER PROGRAM
SAN FRANCISCO, CA

DESIGNED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE

A-2345

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INSTRUCTION NOTE FOR "ISSUED FOR CONSTRUCTION":

- ALL PREVIOUS REVISION CLOUDS AND DESCRIPTIONS ARE DFLTFD.
- SEQUENCE NUMBER IS UPDATED.

DRAWING--SAMPLE 5

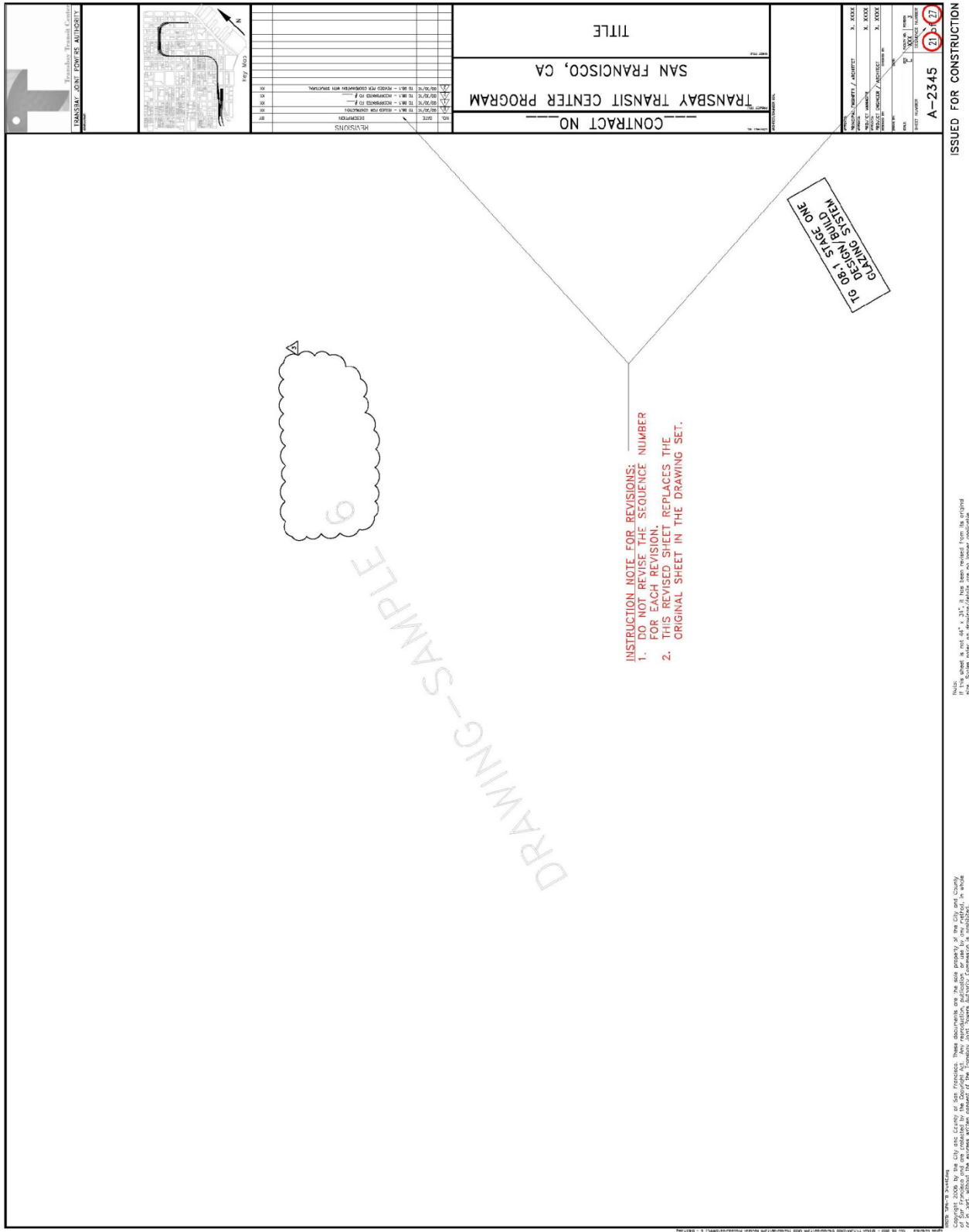
TG 08.1 STAGE ONE
GLAZING SYSTEM

NOTES: 1. THIS DRAWING IS THE PROPERTY OF THE TRANSBAY JOINT POWERS AUTHORITY. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON. ANY REPRODUCTION, DISTRIBUTION, OR USE BY ANY OTHER PARTY WITHOUT THE EXPRESS WRITTEN CONSENT OF THE TRANSBAY JOINT POWERS AUTHORITY IS PROHIBITED.

2. IF THIS SHEET IS NOT 48" x 36", IT HAS BEEN REPRODUCED FROM THE ORIGINAL SIZE. SOME NOTES OR DIMENSIONS MAY BE AFFECTED.

Figure 6-6, Drawing Sheet Revision 0, Issued for Construction

TRANSBAY TRANSIT CENTER PROGRAM CADD STANDARDS



**TRANSBAY TRANSIT CENTER PROGRAM
CADD STANDARDS**

agnes_katronics Sep 16, 2007 1:18pm T:\Transbay Terminal\TJPA\Sheet Borders\TJPA-RFI TB.dwg

A/E LOGO ADDRESS				PROJECT TITLE			
				DRAWING TITLE/REFERENCE DRAWING/SUBJECT		REFERENCE DRAWING NO. ___-XXXX	REV. NO. X
0				DESIGNED:	CONTRACT NO.:	SKETCH NO.	REV. NO.
REV.	DESCRIPTION	DATE	BY	DATE:	SCALE:	SK-__-XXXX	X
						RFI-XXXX	

Figure 6-8, Standard RFI Border

7.0 Internal Reviews

The design team should schedule internal reviews at appropriate intervals in the design process to identify issues that could result in unnecessary delays, design changes, or wasted effort in redrawing or duplicating information.

During the progress of the work, the project manager and the CADD lead should continually check the working drawings. All drawings shall have a preliminary and final review using full-size sheets.

The design firm will submit to the PMPC project manager and the TJPA a quality plan that defines the process for internal design reviews. All internal design reviews must follow the procedures in the approved quality plan.

7.1 CADD Review

In compliance with the Program's Quality Management System, the design firm's quality plan must include a CADD review process. The design firm will implement the CADD review using a checklist to verify that all technical requirements for CADD drawings as detailed in these CADD standards have been met. The design firm will submit the completed checklist as part of its design submittal. Appendix B contains a CADD review checklist.

7.2 Internal Technical Review (ITR)

The design firm's project manager is responsible for developing plan review checklists for each discipline and coordinating with quality assurance management.

The following are suggested guidelines for reviewing drawings.

- A senior engineer not associated with the project checks all documents before they are issued.
- One person checks all important dimensions.
- The staff responsible for the drawings reviews the specifications, and the specifier reviews the drawings.
- Consultants review the documents produced by other contributors for coordination. The project engineer must schedule this in the Work Plan.

Appendix C contains a suggested ITR checklist.

Design professionals shall wet stamp and sign drawings in accordance with professional licensing board requirements. Sheets for preliminary phase deliverables must be stamped but do not require signatures. Bid Sets, including all addenda, and CD Sets, including all revisions, must be stamped and signed. Indicate the expiration date of the license below the signature.

8.0 CADD File Directory and Project Folder Structure

The TJPA recommends that firms maintain a well organized and structured CADD system; firms are encouraged to use the TJPA's guidelines contained within this section but may use their own established file directory and project folder structure protocols. Firms opting to use their own protocols must submit them to the TJPA as part of their quality management plans.

Within the design firm's CADD system, all drawing files should be organized into a standard set of folders under a single project name: *Transbay Transit Center*.

8.1 File Names

The electronic file name for each drawing must be identical to the drawing number. Section 4.4, Standard TJPA Drawing Numbering, contains details on numbering drawings.

The designer's reference file names consist of up to ten characters and the three characters of the drawing file extension. All letters in reference file names are capitalized. The first character is an X, signifying that the reference file is intended for external referencing. The second character is the discipline code. Do not insert blank spaces or special characters in reference file names. Refer to Section 5.3 for a list of discipline codes.

Examples:

XAFLR01.dwg	XAFLR03.dwg	XAFLRPK.dwg
XAFLR02.dwg	XSURVEY.dwg	XUSEWER.dwg
XCTOPOBASE.dwg	XUELEC.dwg	XUWATER.dwg

Reference files are shared among multiple drawing files and multiple parties producing drawings for the project. Therefore, any change to a reference file name must be coordinated with the CADD lead and overseen by the person or the design office responsible for the particular file.

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8.2 Creating the Folder Structure

The basic folder structure is predefined for the CADD project team, as shown. Each folder is described in the following sections.

📁 Archive	Read-only drawings at milestones
📁 <Revision–Descriptive Name_Date>	
📁 Graphics	Figures and presentations created by technical illustration department
📁 Figures	
📁 Presentations	
📁 Blocks	Project-specific blocks
📁 Plans	Plans – Xrefs
📁 Old Plans	Superseded plans
📁 Sheets	Current drawings
📁 Old Sheets	Superseded drawings
📁 Support	Menus, LISPs, title blocks, .pc2, etc.
📁 Transfer	Files received or sent to other offices
📁 Incoming	
📁 Recv'd from <Name & Date>	
📁 Outgoing	
📁 Sent to <Name & Date>	
📁 Work	Working drawings by various people
📁 <Subject/Team–Member>	

Archive Directories are created under Archive, as needed, to record the status of the drawings at milestone points. This record is important for legal and other managerial reasons, and typically corresponds to drawing project deliverables.

Use the following naming convention for subfolders under Archive: <Descriptive Name_MM-DD-YYYY>. Use title case, as shown in the examples below.

Examples:

Schematic Design_12-14-2003
50% Design Development_02-21-2004
100% Design Development_2-28-2004
Issued for Bid_05-28-2004
Issued for Construction_10-28-2004
As-Builts_11-01-2006

Archive all CADD deliverable files for all disciplines. The archive files must include all supporting files (Xrefs, title blocks, and pen table). Use AutoCAD's eTransmit tool to ensure that all support files are included. (Refer to Section 9.3.) The files may be backed up from the archive directory and placed on another medium, such as a compact disc or DVD.

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After submitting the project milestone deliverable, ensure that all files related to the deliverable are protected as *read-only* and compressed into a zip file to minimize storage space on the server. Section 10 describes the process of transferring deliverables to the TJPA.

Blocks Special project-specific blocks should be stored as separate .dwg files in the Blocks folder. Blocks that are part of the office standard library should not be placed here.

Figure 8-1 shows the TJPA standard blocks. This sheet, **TJPA-STANDARD BLOCK.dwg**, is available from the TJPA. The TJPA palette is also available for standard blocks. File names: **TJPA PALETTE.xtp** and **TJPA LINETYPES.xtp**.

Graphics Store site photographs, logos, and similar material, including all presentations, in the Graphics folder.

This folder is also used to store drawing files that are not part of the regular drawing package and files composed for discussion or presentation purposes. Presentation material that is AutoCAD-based should be included in this folder in order to preserve a single-level structure for Xref paths. If other programs are used, such as Corel Draw or PowerPoint, a subfolder should be created here to hold those files.

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Plans All plan files that are externally referenced (Xref) in the sheet files are stored in the Plans folder. These include floor plans, site plans, surveys, and others, as is appropriate for the discipline. Components of plan files, such as the grids, topo, and alignments, are also located here.

Old Plans

Rename and place all superseded plans in the Old Plans subfolder. Rename the files as follows: <Original file name_MM-DD-YY>.

Examples:

C-4010.dwg **C-4010_08-04-02.dwg**
XCTOPOBASE.dwg **XCTOPOBASE_01-22-03.dwg**

This procedure allows a CADD operator to keep track of all changes made and easily retrieve an older version of a drawing.

To minimize long external reference paths, do not add additional subfolders in the Plan directory.

Sheets All current sheet files in a drawing package are stored in the Sheets folder. One individual drawing file (.dwg) will exist for each individual drawing listed in a drawing package.

Old Sheets

As with superseded plans, rename and place all superseded drawings in the Old Sheets subfolder. Rename the superseded files as follows:

<Original file name_MM-DD-YY>. Refer to the examples under Old Plans.

Support The Support folder is used for CADD standards, LISP programs, and plot styles or other files that are potentially shared between disciplines and the CADD project team.

Where applicable, the Support folder also contains TJPA-driven standards, documentation, and libraries.

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Transfer The Transfer folder contains a record of original files that are transferred to and from the project. Incoming files are copied to an appropriate directory, and the original version left in the Recd subfolder. Likewise, a copy of outgoing files is placed in the Sent subfolder, and the original is left in its original location. The Recd and Sent subfolders identify the source or target party, such as a consultant name or the TJPA. These files may be zipped together to keep the files grouped and reduce the overall size of the files.

eTransmit all sheets, Xrefs, fonts, and the pen table into the appropriate subfolder and create a zip (.zip) file, as shown in the example.

Example:

- 📁 **Transfer**
 - 📁 **Incoming**
 - 📁 Recd from James Doe 04-12-2005 (36" Gas Line)
Sheets C2034, C2065 for review_04-12-05.zip
 - 📁 **Outgoing**
 - 📁 Sent to James Doe 04-12-2005 (36" Gas Line)
Sheets C2034, C2065 for review_04-12-05.zip

The transfer copies must be associated with a transmittal, whether electronic or paper.

Work The Work folder stores drawings that are temporary or unusual in nature.

All files under Work should be located in subfolders. Ideally, the subfolders should define a discrete subject and have a self-explanatory name.

Subfolders named after team members are also used. These folders can store temporary or in-progress work that is not developed enough to be shared with other team members. Team member folders are self-managed. Unless in progress, no files should reside in this directory.

8.3 Using Alternate and Additional Folders

Additional folders may be added to the defined folder structure. The CADD lead must approve any modifications or additions to this structure as moving or renaming any project folder can create problems between current sheets and attached reference files.

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9.0 Deliverables

The design firm's agreement with the TJPA will specify the format and quantity of each milestone drawing deliverable required by contract. The TJPA requires hard copies in addition to electronic files in both native format and PDF. In addition to submitting the required native formats and PDFs, designers and consultants may also submit electronic files in DWF. All electronic submittals shall be compatible with the Microsoft Windows XP operating system. All drawing deliverables must be transmitted to the TJPA with pertinent information necessary to properly log the deliverable into the TJPA's Program Management Information System. Refer to Section 10 for details on transferring the deliverable packages to the TJPA.

The responsible design project manager shall review all deliverables prior to transmittal. CADD files shall be transferred with all components to enable the TJPA to compose and plot CADD drawings duplicating exactly the hardcopy deliverable. Bid Sets, including all addenda, and CD Sets, including all revisions, must be stamped and signed.

All drawings shall comply with the guidelines and procedures in this CADD standards manual. Any deviation from these standards could delay final payment of a project or result in the rejection of the submitted drawings.

9.1 Hardcopy Submittals

Full-size drawing sets shall include the TJPA top cover sheet, Drawing Index. Each discipline's drawing set shall contain the TJPA follow-up sheet listing all drawings included in the discipline set. The drawing set shall be black and white and gray only, and punched and bound with Chicago screws. All full-size drawings with the exception of Caltrans associated work will be plotted on 20 lb bond paper, trimmed to 34 x 44 inches, and wet stamped. Scanned, half-size reductions will be printed on 20 lb bond paper and measure 17 x 22 inches. All Caltrans associated full-size drawings will be plotted on 20 lb bond paper, trimmed to 22 x 34 inches, and wet stamped. Reduced-size drawings in 11 x 17 inches may be printed upon request and approval of the TJPA.

9.2 Electronic Submittals

Electronic submittals will comprise both AutoCAD files and PDFs. Designers and consultants may submit DWF files in addition to AutoCAD files and PDFs.

9.2.1 AutoCAD Files

All files generated must be with Autodesk AutoCAD release 17.1 file system. The TJPA will not accept drawing files that do not comply with Autodesk AutoCAD release 17.1 file system.

Use the AutoCAD eTransmit command to create a complete, usable, executable file for each drawing. Refer to Section 9.3 for eTransmit procedures.

Copy all electronic files to a compact disc or DVD. Use read-only discs for electronic submittals; the TJPA will not accept submittals on rewritable discs. Create a label for each disc using the standard TJPA label template and package each disc in a standard jewel case. Include the project name, contract number, deliverable phase, date of submittal, and the name of the consultant making the submittal on each label. Appendix F shows the disc label template.

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The electronic CADD files must contain the following.

- A separate and unique drawing file specific to each sheet submitted in a drawing set
- All externally referenced files *attached* to the sheet files
- All referenced image files
- All font files
- All linetype files
- Color-dependent pen table (**TJPA.ctb**)

Special care should be made in instances where object data are used.

9.2.2 PDFs

In addition to the project CADD files, a full-size PDF file for each sheet in the deliverable package must be submitted to the TJPA. Drawings must be in landscape orientation and black and white. Do not link individual PDFs together; keep each sheet file separate.

9.2.3 DWFs

In addition to the project CADD files and full-size PDF files for each sheet in the deliverable package, DWFs can be submitted. Drawings must be in landscape orientation.

9.3 Preparing Electronic AutoCAD Files

Ensure that the following procedures are performed before drawings are packaged and delivered.

- Remove all extraneous graphical information and *purge*.
- Do not *bind* external reference drawings.
- Select the Layout tab (Paper Space) that the hard copy was generated from.
- Set *LTscale* to 1.
- Set current layer to 0 and the color to *white*.
- Verify that all entity colors are *By Layer*.
- Verify that each drawing has a layer named *VPORT*, which shall remain off. Only *frozen* and *off* layers that relate to the project will be allowed.
- Verify that no extraneous items are placed outside the paper size setting, which is set in the page setup layout dialog.
- Verify that each Layout tab identifies the drawing number.
- Verify that the plot scale is set at 1:1, the plot offset is 0, 0, and the north orientation is at the 90 degree position for all plotting purposes.

Files such as fonts and Xrefs associated with drawing files must be transmitted with the drawing files. In some cases, without these associated files, the original drawing may be unusable by the recipient.

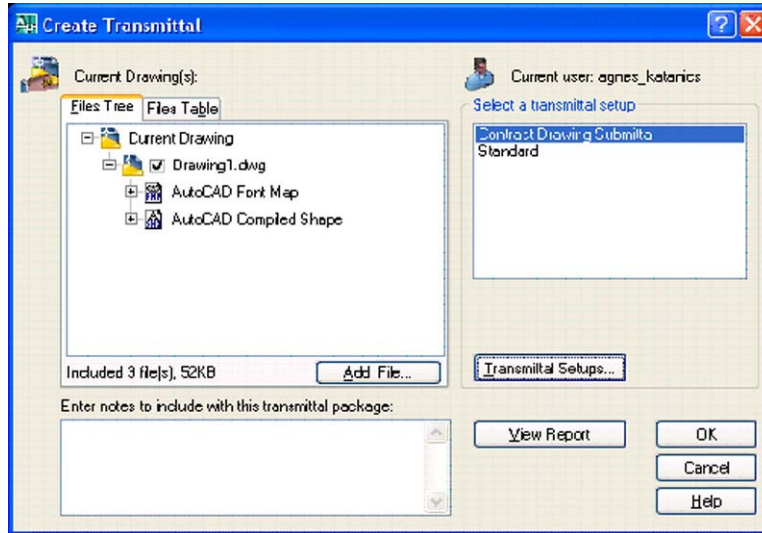
TRANSBAY TRANSIT CENTER PROGRAM CADD STANDARDS

eTransmit

Use the AutoCAD eTransmit command to prepare your electronic files for submittal.

Begin by creating under Archives a new subfolder that corresponds to the milestone deliverable, for example, *Schematic Design Submittal_04-11-2005*. All sheets will be archived in this one folder. Do not create additional folders.

1. From the File menu, choose eTransmit, or type eTransmit at the command prompt. (The Create Transmittal dialog box is displayed.)



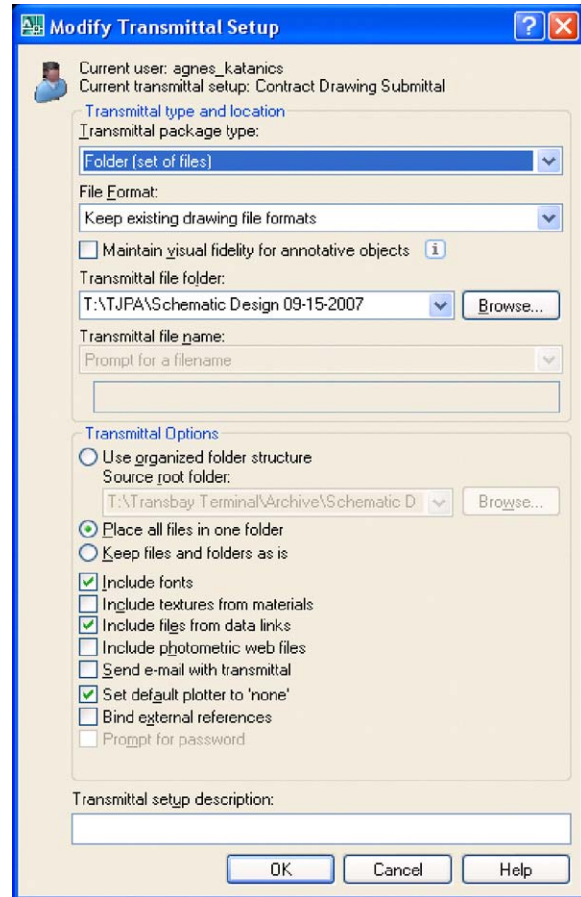
2. Under Select a transmittal setup, select Contract Drawing Submittal.
3. Click Transmittal Setups.
4. Click Modify. (The Modify Transmittal Setup dialog box is displayed.)

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5. Complete the dialog box, as shown.
 - Under Transmittal type and location, ensure that the file format is set to *Keep existing drawing file format*.
 - Click Browse, navigate to the designated folder, for example, Schematic Design 09-15-2007, and select the folder.
 - Under Transmittal Options, select the following options:
 - *Place all files in one folder*
 - *Include fonts*
 - *Include files from data links*
 - *Set default plotter to 'none'*
6. Click OK.
7. Click Close.
8. Click OK.

At the *Overwrite* prompt, click Yes. This will ensure that all sheets, Xrefs, fonts, and the pen table are placed in the master folder you created.

Do not zip individual drawing files. Do not create self-extracting executable (*.exe) files.



9.4 Survey Data

Accompany all final drawings containing survey data with the following documentation.

- A description of the survey codes used
- A description and values of the control points that are based on
 - date and method of survey
 - datum and derivation of the control

A full description of survey field codes used shall accompany all final drawings having survey data.

9.5 Drawing Index

Drawing Index Sheet: Format the top cover sheet, the drawing index, in AutoCAD format as follows:

- List the sequence number, drawing number, and title of all drawings.
- Do not list revision letters or numbers for any drawing.
- Revise the drawing index sheet only if sheets from the original drawing are added or deleted or if sheet titles require editing.

TRANSBAY TRANSIT CENTER PROGRAM CADD STANDARDS

Administrative Submittal Transmittal Letter. All new and revised sheets must be listed in the transmittal letter indicating the current revision of each drawing. Refer to Section 9.6.

Drawing Index in Excel Format. A master drawing list must be maintained in Excel format according to the following requirements:

- List all sheets, existing or new, on the master drawing list, indicating all revisions.
- Maintain and revise the master drawing list as necessary. Do not start a new drawing list for each submittal.
- Resubmit the master drawing list to the TJPA with every submittal.

9.6 Transmittal Sheet

A transmittal sheet containing, but not limited to, the following information must accompany all deliverables.

- Name of the individual or firm submitting data
- Date of the transmittal
- Contract number
- Project title

Attach the Excel-format drawing index to the transmittal.

An Excel template for the transmittal is available from the PMPC Document Control Center. The completed electronic transmittal file should accompany the AutoCAD and PDF files submitted to the TJPA.

The footer of the master drawing list in Excel format must indicate the document file name, version number, date, and time. The filename for the Transit Center drawing list should be “TTC Master Drawing list.xls.”

10.0 Transferring Files to the TJPA

The design firm's agreement with the TJPA will specify the format and delivery method of deliverable packages required by contract. The TJPA requires electronic files in both native format and PDF and hard copies of all drawing deliverables.

10.1 Uploading to Constructware

Constructware is the Program Management Information System. The design firm is responsible for uploading each PDF file in the deliverable package to Constructware. Files will be uploaded to the Drawing Log module, and the associated data will be entered into a template to create a data record for each drawing in the package. The PMPC project manager will provide specific instructions and training to the designer and its CADD staff.

10.2 Using an FTP Site

Large numbers of electronic files or large files may be uploaded to the TJPA's FTP site by TJPA personnel only. Provide to the TJPA a copy on CD or DVD of all electronic files to be uploaded to the TJPA's FTP site; allow for three working days for confirmation of uploaded files. Designers and consultants may use their own FTP sites for transferring files to the TJPA.

11.0 Project Backup Files and Archives

All consultants must have electronic file backup and archive procedures. The procedures should include step-by-step directions for archiving files and designate a primary backup administrator, contact telephone number, software to use (if applicable), and the location of data storage, both on-site and off-site. Prior to undertaking a major drawing effort, the design project manager and CADD lead should review their backup and archive procedures.

The TJPA recommends the following archiving procedures to the design firm and its subconsultants.

11.1 Backup Procedures

The design firm will maintain a backup of working files on compact discs that are readily accessible. All original (submitted) drawings—one full-size copy and one half-size copy—will be stamped *Record Set* and stored in the project flat file.

Electronic files that have been modified during the day should be backed up at a minimum once each day. The backup of files stored on the design firm's server is the sole responsibility of the design firm's IT manager.

11.2 On-Site Data Storage

Store backup files in a safe place, preferably a fire-rated file cabinet or safe. For security reasons, only the design firm's IT manager should have access to these files.

11.3 Off-Site Data Storage

The design firm should store a copy of full backups at an off-site storage location that is physically separated from the primary site. This protects the project team from major delays if a catastrophic disaster renders an office inaccessible. The design project manager should know the location of the off-site storage and the name of the primary contact for the facility.

Appendix A: Standard Layers

C – Civil Engineering and Site Work

Name	Description	Recommended	
		Color/ Pen	Linetype
C-BLDG	Proposed building footprint	4	Continuous
C-BLDG-DEMO	Footprints of (E) buildings to be demolished	3	Hidden
C-BLDG-EXST	Footprints of existing buildings to remain	3	Continuous
C-BLDG-FUTR	Future building footprint	4	Dashed
C-COMM	Site comm. (telephone poles, boxes, towers)	1	Continuous
C-COMM-OVHD	Overhead communication lines	1	Continuous
C-COMM-UNDR	Underground communication lines	3	Dashedx2
C-DIM	Dimensions	2	Continuous
C-ELEC	Site electrical substations and poles	1	Continuous
C-ELEC-LITE	Site lighting	2	Continuous
C-ELEC-OVHD	Overhead lines	1	Continuous
C-ELEC-POLE	Electric poles	1	Continuous
C-ELEC-UNDR	Underground electrical lines	3	Dashed2
C-FIRE	Fire hydrants and connections	1	Continuous
C-NGAS	Natural gas manholes, meters, and storage tanks	1	Continuous
C-NGAS-UNDR	Natural gas (underground lines)	3	Dashed2
C-PKNG	Parking lots	2	Continuous
C-PKNG-CARS	Cars	1	Continuous
C-PKNG-DEMO	Existing parking lots to be demolished	3	Hidden2
C-PKNG-DRAN	Parking lot drainage slope indications	1	Continuous
C-PKNG-EXST	Existing parking lots to remain	3	Continuous
C-PKNG-ISLD	Parking islands	2	Continuous
C-PKNG-STRP	Parking lot striping and handicapped symbol	1	Continuous
C-PROP	Property lines and survey benchmarks	4	Phantom
C-PROP-BRNG	Bearings and distance labels	3	Continuous
C-PROP-CONS	Construction controls	1	Continuous
C-PROP-ESMT	Easements, rights-of-way, setback lines	4	Dashed
C-ROAD	Roads	2	Continuous
C-ROAD-CNTR	Centerlines	3	Dashdot2
C-ROAD-CURB	Curbs	2	Continuous
C-ROAD-DEMO	Existing road to be demolished	3	Hidden2
C-ROAD-EXST	Existing parking road to remain	3	Continuous
C-ROAD-SYMB	Road striping, graphics, crosswalks, etc.	3	Continuous
C-SSWR	Sanitary sewer (manholes, pumping stations)	1	Continuous
C-SSWR-UNDR	Sanitary sewer (underground lines)	3	Dashdot2
C-STRM	Storm drainage catchbasins and manholes	1	Continuous
C-STRM-UNDR	Storm drainage pipe (underground)	3	Continuous
C-TEXT	Text	3	Continuous
C-TOPO	Proposed contour lines and elevations	3	Dashed2
C-TOPO-BORE	Test borings	1	Continuous
C-TOPO-DEMO	Existing lines and elevations to be changed	3	Continuous
C-TOPO-EXST	Existing lines and elevations to remain	3	Continuous
C-TOPO-RTWL	Retaining wall	3	Continuous
C-TOPO-SPOT	Spot elevations	3	Continuous

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Appendix A: Standard Layers

C-VPORT	Viewport	5	Continuous
C-WATER	Domestic water (manholes, pumps, tanks)	1	Continuous
C-WATER-UNDR	Domestic water (underground lines)	3	Center2

Railroad Layers

Name	Description	Recommended	
		Color/ Pen	Linetype
C-RAIL-XXXX-TRAK	Railroad: track (XXXXX=track's designation)	3	Rail
C-RAIL-XXXX-PBASE	Railroad: XXXX Track Profile Grid Base	252	Continuous
C-RAIL-XXXX-PEGC	Railroad: XXXX Track Profile Ex Ground C. line	2	Center
C-RAIL-XXXX-PEGCT	Railroad: XXXX Track Profile Ex Ground Center line STA Text	3	Continuous
C-RAIL-XXXX-PEGL	Railroad: XXXX Track Profile Ex Ground Offset Left	4	Continuous
C-RAIL-XXXX-PEGLT	Railroad: XXXX Track Profile Ex Ground Left STA Text	3	Continuous
C-RAIL-XXXX-PEGR	Railroad: XXXX Track Profile Ex Ground Offset Right	4	Continuous
C-RAIL-XXXX-PEGRT	Railroad: XXXX Track Profile Ex Ground Right STA Text	3	Continuous
C-RAIL-XXXX-PFGL	Railroad: XXXX Track Profile Finish Grade Offset Left	3	Continuous
C-RAIL-XXXX-PFGR	Railroad: XXXX Track Profile Finish Grade Offset Right	3	Continuous
C-RAIL-XXXX-PFGC	Railroad: XXXX Track Profile Finish Grade Centerline	2	Center
C-RAIL-XXXX-PFGCT	Railroad: XXXX Track Profile Finish Grade Centerline Text	3	Continuous
C-RAIL-XXXX-PGRID	Railroad: XXXX Track Profile Grid	252	Continuous
C-RAIL-XXXX-PGRIDT	Railroad: XXXX Track Profile Grid Text	3	Continuous
C-RAIL-XXXX-STAEQU	Railroad: XXXX Track Station Equations	3	Continuous
C-RAIL-XXXX-STABL	Railroad: XXXX Track Station Labels	4	Continuous
C-RAIL-XXXX-STAPTS	Railroad: XXXX Track Station Points	3	Continuous
C-RAIL-XXXX-PVGRID	Railroad: XXXX Track Profile Vertical Grid Base	252	Continuous

Structural Layers

Name	Description	Recommended	
		Color/ Pen	Linetype
S-ANGL	Steel angles	3	Continuous
S-BEAM	Concrete & steel beams	3	Continuous
S-BEAM-ALUM	Aluminum beam	3	Continuous
S-BEAM-CONC	Concrete beam	3	Continuous
S-BEAM-GLUE	Glue-laminated beams	3	Continuous
S-BEAM-STEEL	Steel beam	3	Continuous
S-BEAM-WOOD	Wood beam	3	Continuous
S-BOLT	Anchor & steel bolts	3	Continuous
S-BRAC	Braces	3	Continuous
S-BRAC-ALUM	Aluminum bracing	3	Continuous
S-BRAC-CONC	Concrete bracing	3	Continuous
S-BRAC-STEL	Steel bracing	3	Continuous
S-BRAC-WOOD	Wood bracing	3	Continuous
S-CHNL	Steel channels	2	Continuous
S-COLS	Columns	3	Continuous
S-COLS-BUBS	Column grid lines, bubbles, and text	3	Continuous
S-COLS-DIMS	Column grid lines, dimensions	3	Continuous
S-COLS-GRID	Column grid lines	1	Continuous
S-COLS-MISC	Misc. columns	2	Continuous

**TRANSBAY TRANSIT CENTER PROGRAM
CADD STANDARDS**

Appendix A: Standard Layers

S-CONC	Concrete	3	Continuous
S-DECK	Metal decks	1	Continuous
S-DECK-FLOR	Structural deck floor	1	Continuous
S-DECK-ROOF	Structural deck roof	1	Continuous
S-DECK-CURB	Deck curb	2	Continuous
S-DETL	Details and sections	2	Continuous
S-ELEV	Steel concrete elevations	3	Continuous
S-EX-CO	Existing concrete	3	Continuous
S-EX-DE	Demolition – existing to be removed	3	Continuous
S-EX-GR	Existing grid	3	Continuous
S-EX-RE	Existing remain	3	Continuous
S-FNDN	Foundation	2	Continuous
S-FNDN-FTNG	Foundation footing	2	Continuous
S-FNDN-GRBM	Foundation grade beam	2	Continuous
S-FNDN-PCAP	Foundation pile cap	2	Continuous
S-FNDN-PIER	Foundation pier	2	Continuous
S-FNDN-PILE	Foundation piles	2	Continuous
S-FNDN-RBAR	Foundation rebar	2	Continuous
S-GIRD	Girders	3	Continuous
S-GRID	Grid lines	1	Center2
S-GRID-IDEN	Grid bubbles & numbers	2	Continuous
S-HIDE	Miscellaneous hidden elements	1	Hidden2
S-JOIS	Joists	2	Continuous
S-JNTS	Joints	1	Continuous
S-JNTS-CNTJ	Construction joints	1	Continuous
S-JNTS-CTLJ	Control joints	1	Continuous
S-JNTS-EXPJ	Expansion joints	1	Continuous
S-NAIL	Nails & screws	3	Continuous
S-PLTE	Steel plate	3	Continuous
S-PLYW	Plywood	2	Continuous
S-RBAR	Steel reinforcing	4	Continuous
S-OPEN	Opening for MEP/stairs	1	Continuous
S-PATT	Hatches, patterns (steel, concrete, soil, etc.)	1	Continuous
S-SCRN	Screen objects	252 or 9	Continuous
S-SLAB	Edge of slab	3	Continuous
S-SLAB-CONC	Edge of slab	6	Continuous
S-SLAB-STEEL	Edge of slab	6	Continuous
S-SLAB-WOOD	Edge of slab	6	Continuous
S-SLAB-OPNG	Edge of slab	1	Continuous
S-SLAB-OPNX	Edge of slab	1	Continuous
S-SLAB-EDGE	Edge of slab	6	Continuous
S-TEXT	Text	3	Continuous
S-TRUS	Trusses	3	Continuous
S-VPORT	Viewport	5	Continuous
S-WALL	Wall	4	Continuous
S-WALL-CMUV	Concrete Masonry Unit Wall	4	Continuous
S-WALL-CONC	Cast-In-Place Wall	4	Continuous
S-WALL-MSNW	Masonry Wall	4	Continuous
S-WALL-PCST	Pre-Cast Wall	4	Continuous
S-WALL-SHEA	Structural Shear Wall	4	Continuous
S-WALL-STEL	Steel Stud Wall	4	Continuous

**TRANSBAY TRANSIT CENTER PROGRAM
CADD STANDARDS**

Appendix A: Standard Layers

S-WALL-WOOD	Wood Wall	4	Continuous
S-WOOD	Wood	1	Continuous

Tunnel Layers

Name	Description	Recommended	
		Color/ Pen	Linetype
TU-EXC	Tunnel Excavation Line	4	Continuous
TU-EXC-BYD	Tunnel Excavation Line – Beyond	4	Dashed
TU-SHOT	Tunnel Lining – Shotcrete	3	Continuous
TU-SHOT-DEMO	Tunnel-Lining – Demolition Shotcrete	2	Continuous
TU-SHOT-PATT	Tunnel Lining – Shotcrete Pattern	1	Continuous
TU-CONC	Tunnel Lining – Concrete (Cast-in-place)	3	Continuous
TU-CONC-HIDN	Tunnel Lining – Concrete - Hidden	3	Dashed
TU-CONC-BYD	Tunnel Lining – Concrete - Beyond	2	Dashed
TU-CONC-PATT	Tunnel Lining – Concrete Pattern	1	Continuous
TU-JOINT-CONST	Tunnel Lining – Construction Joint	2	Continuous
TU-JOINT-CTRL	Tunnel Lining – Control Expansion Joint	2	Continuous
TU-CONC-PATT	Tunnel Lining – Concrete Pattern	1	Continuous
TU-CONC-DEMO	Tunnel Lining – Demolition Concrete	2	Phantom
TU-SEGL	Tunnel Lining – Concrete Pre-Cast Segments	3	Hidden
TU-BHOL	Tunnel Probe Holes (at face)	3	Continuous
TU-ANCR	Tunnel Support (Rock anchors or bolts)	2	Cont./hid.
TU-LATT	Tunnel Lattice Girders	3	Cont./hid.
TU-ARCH	Tunnel Arches (TH profiles or formed ribs)	3	Cont./hid.
TU-RSPL	Rebar Splices	3	Continuous
TU-GSPL	Grouted Pipe Splices (IBO or MIA all thread splices)	3	Cont./hid.
TU-BVM	Grouted Canopy Pipes	3	Cont./hid.
TU-PSUP	Tunnel Pre-Support – Misc support (steel sheets)	3	Cont./hid.
TU-WWF	Welded Wire Fabric	2	Cont./hid.
TU-STEL	Tunnel – Misc. Steel Beams, Uni-strut, etc	3	Cont./hid.
TU-REIN	Tunnel Reinforcement – General	3	Cont./hid.
TU-MEMB	Waterproofing System (Membrane, Geotextile, Geodrain)	6	Dashed
TU-WBAR	Water barriers	5	Cont./hid.
TU-PIPE	Control and Grouting Pipes	3	Cont./hid.
TU-FUKO	Re injectable Grout Hose (Fuko Hose)	3	Cont./hid.
TU-DRAN	Tunnel Drainage Pipe	3	Cont./hid.
TU-SEAL	Tunnel-Hydrophilic Water stop – Gaskets, Seals, etc.	2	Cont./hid.

Appendix B: CADD Review Checklist

Verify that all CADD drawings adhere to the following TJPA CADD standards:

- a. Cover sheets and follow-up sheets are the TJPA-provided standards, as shown in Section 4.0, figures 4-1 and 4-2.
- b. Border sheets with title block comply with the TJPA standards shown in Section 4.0, figure 4-3.
- c. Working drawings are AutoCAD or Revit based and do not contain PDF, TIFF, JPEG, or other image file formats, unless explicitly approved by the TJPA.
- d. All plans in Model Space are in the UCS World Coordinate System.
- e. All plans in Model Space are scaled 1:1.
- f. Text annotation and dimensions are “live” (i.e., they are not inserted as blocks).
- g. Section callouts are lettered and detail callouts are numbered.
- h. Section and details are not rotated in Model Space.
- i. External references are set to relative path, and are referenced on a dedicated and locked layer such as XREF or 0-XREF.
- j. The filenames of all external references (Xrefs) are in accordance with sections 4.3 and 8.1.
- k. Plot or time stamps comply with the TJPA CADD standards (refer to Section 4.19) .
- l. TJPA-provided blocks—including matchlines, section cuts, titles, dimensions, text and fonts—are used as shown in Figure 8-1.
- m. Unused layers, linetypes, blocks, text styles, etc., were purged prior to upload.
- n. Layerwalk has been used to verify that items have been placed on the appropriate layers with no duplicated layers.
- o. Layer 0 and Defpoints have not been used for any work.
- p. All colors on a layer are consistent.
- q. Layer 0 is the current layer and retains the default AutoCAD settings (white).
- r. External references are not nested.
- s. Viewports have been set to the appropriate scale and locked.
- t. Drawings show the full extent (zoom extent).
- u. All floor plans in Revit have been saved in UCS World Coordinate System and are related to architectural floor plans and/or site locations.
- v. The layer for the property lines is turned on.
- w. The layer for the survey monuments is turned on.
- x. The layer for the TTC (Transbay Transit Center) reference point (red dot) is turned on.

Appendix C: Suggested Internal Technical Review Checklist

Plan Check Civil

- Site plans with new underground utilities (power, telephone, water, sewer, gas, storm drainage, fuel lines, grease traps, fuel tanks) have been checked for interferences.
- Existing telephone poles, pole guys, street signs, drainage inlets, valve boxes, manhole castings, etc., do not interfere with new driveways, sidewalks, or other site improvements on architectural site plans.
- Limits of clearing, grading, grass, or mulch are shown and are consistent with architectural or landscaping plans.
- Fire hydrant and street light pole locations have been checked against electrical and architectural drawings.
- Profile sheets show other underground utilities and avoid conflicts.
- Horizontal distances between drainage structures and manholes match with respect to scaled dimensions and stated dimensions on both plan and profile sheets.
- Provisions have been included for adjusting valve box and manhole castings (sewer, power, telephone, drainage) to match final or finish grade of pavement, swales, or sidewalks.
- All existing and proposed grades are shown.
- Location of building from property line is indicated.

Plan Check Structural

- Column lines are indicated on structural and architectural.
- All column locations are the same on structural and architectural.
- Perimeter slab on structural matches architectural.
- All depressed or raised slabs are indicated.
- Slab elevations have been checked against architectural.
- Foundation piers are identified.
- All foundation beams are identified.
- Roof framing plan column lines and columns have been checked against foundation plan column lines and columns.
- Perimeter roofline has been checked against architectural roof plan.
- All columns and beams are listed in column and beam schedule.
- Length of all columns is indicated in column schedule.
- All sections are properly labeled.
- All expansion joint locations have been checked against architectural.
- Dimensions are correct and consistent.
- Drawing notes do not conflict with specifications.

**Appendix D: Drawing Organization and Guidelines for Design and Construction Drawings
for the Transbay Transit Center**

TRANSIT CENTER DRAWING SET

GENERAL SHEETS

G-0000 TOP COVER SHEET (for the as-built Transit Center project)

The drawing index sheet for each trade group package will have a discrete number. For example, the drawing index sheet for the glazing trade package could be G-0800. The CADD lead will determine the numbering scheme for the trade package drawing index sheets and use it consistently throughout the construction phase.

CIVIL DRAWINGS

C-0000 DRAWING INDEX

GENERAL NOTES, ABBREVIATIONS

C-1000 EXISTING CONDITION AND DEMOLITION PLAN

CONSTRUCTION STAGING

C-2000 SITE PLAN

C-3000 BASEMENT EXCAVATION PLAN

C-4000 GRADING AND DRAINAGE PLAN

C-5000 DETAILS, CROSS-SECTIONS AND MISC. INFORMATION

C-6000 PAVEMENT PLANS AND DETAILS

C-7000 SIGNING AND STRIPING

C-8000 TRAFFIC SIGNAL PLANS

GEOTECHNICAL DRAWINGS

GT-0000 DRAWING INDEX

GENERAL NOTES, ABBREVIATIONS AND LEGEND

GT-1000 DESIGN CRITERIA FOR CONTRACTOR DESIGNED SUPPORT OF EXCAVATION

GT-2000 SUBSURFACE EXPLORATION LOCATION PLANS

GT-3000 INSTRUMENTATION PLANS

GT-4000 INSTRUMENTATION LOCATION SCHEDULE

GT-5000 INSTRUMENTATION LOCATION DETAILS

GT-6000 INSTRUMENTATION LOCATION CROSS SECTIONS

UTILITY DESIGN DRAWINGS

U-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
U-1000	COMPOSITE PLANS OF EXISTING UTILITIES
U-2000	COMPOSITE PLANS OF UTILITY RELOCATIONS
U-3000	UTILITY RELOCATION PLANS AND PROFILES
U-4000	CROSS SECTIONS
U-5000	DETAILS

LANDSCAPE DESIGN DRAWINGS

L-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
	OVERALL KEY SITE PLAN
L-1000	LAYOUT PLANS
	ENLARGED LAYOUT PLANS
L-2000	MATERIALS INDEX SHEET
	MATERIALS PLANS
L-3000	GRADING INDEX SHEET
	GRADING PLANS
L-4000	PLANTING INDEX SHEET
	PLANTING PLANS
L-5000	GENERAL CONSTRUCTION DETAILS
	CONSTRUCTION DETAILS
L-6000	GENERAL PLANTING DETAILS

IRRIGATION DESIGN DRAWINGS

LI-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS, AND LEGEND
LI-1000	IRRIGATION PLANS
LI-2000	IRRIGATION DETAILS

ARCHITECTURAL DRAWINGS

A-0000	ARCHITECTURAL DRAWING INDEX
A-0001	GENERAL NOTES, ABBREVIATION AND LEGEND
A-1000	DEMOLITION PLANS (Existing Building Demo) SITE IMPROVEMENT CONSTRUCTION PHASING FIRE LIFE SAFETY PLANS SITE ACCESSIBILITY DIAGRAMS SITE DETAILS (5' OUTSIDE BUILDING) BUILDING LOCATION PLANS (1/16" scale)
A-2000	FLOOR PLANS (all plans are 1/8" scale) 1 st LEVEL 2 nd LEVEL 3 rd LEVEL ROOF PLAN
A-3000	FLOOR PLANS (all plans are 1/4" scale) EQUIPMENT LOCATION DOOR NUMBERS WALL DIMENSIONS
A-4000	REFLECTED CEILING PLANS (1/8" scale) DETAIL PLANS (1/4" scale)
A-5000	ELEVATIONS (from small scale 1/16" up to detailed elevations 3/4" as required)
A-6000	BUILDING SECTIONS (1/8" scale) DETAILED SECTIONS (1/2" scale)
A-7000	VERTICAL CIRCULATION (1/4" scale) ELEVATORS ESCALATORS STAIRS
A-8000	EXTERIOR AND WATER PROOFING DETAILS (Taken off from A-600 drawings at various scales as required)

- A-9000** INTERIOR ELEVATIONS AND STANDARD MOUNTING HEIGHTS OF FURNITURE,
FIXTURES AND EQUIPMENT (1/4" scale)

INTERIOR DETAILS (various scales)

FINISH SCHEDULES

DOOR, WINDOW AND OPENING SCHEDULE

INTERIOR DESIGN

- ID-0000** INTERIOR DESIGN DRAWING INDEX

ID-1000 FINISH FLOOR PLANS (1/4" scale)

WALL FINISH PLANS (1/4" scale)

FOOD SERVICE

- FS-0000** DRAWING INDEX

FS-1000 FOOD SERVICE EQUIPMENT PLAN (1/4" scale)

FS-2000 FOOD SERVICE EQUIPMENT ELEVATIONS (1/4" scale)

SIGNAGE AND WAYFINDING

- SG-0000** DRAWING INDEX

SG-1000 SIGNAGE LOCATION PLANS (1/8" scale)

SG-2000 ELEVATIONS (various scale as required) (1/4" scale)

SG-3000 SIGNAGE DETAILS (various scales)

STRUCTURAL DRAWINGS

- S-0000** DRAWING INDEX

GENERAL NOTES, ABBREVIATIONS

GEOTECHNICAL SECTIONS

S-1000 LOAD DIAGRAMS

SHORING AND EXCAVATION PLANS AND DETAILS

CUT AND COVER

S-2000 FLOOR AND FOUNDATION PLANS (1/8" scale)

S-3000 CONCRETE AND MASONRY DETAILS (various scales)

S-4000 FRAME ELEVATIONS

COLUMN SCHEDULE

S-5000 STEEL DETAILS

S-6000	STRUCTURAL SECTIONS
S-7000	STAIR, ELEVATOR AND ESCALATOR PLANS, ELEVATIONS AND DETAILS
S-8000	EQUIPMENT ANCHORAGE DETAILS

MECHANICAL DRAWINGS

M-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS, AND LEGEND
M-1000	EQUIPMENT SCHEDULE
	AIRFLOW AND CRITERIA SCHEDULE
	ENERGY COMPLIANCE FORMS
M-2000	MECHANICAL FLOOR PLANS (1/8" scale)
M-3000	MECHANICAL PLANS (1/4" scale)
M-4000	HVAC FLOW AND RISER DIAGRAMS
M-5000	HVAC DETAILS
M-6000	HVAC CONTROLS
M-7000	HVAC SECTIONS
M-8000	SMOKE REMOVAL SYSTEMS
M-9000	HEAT RECOVERY/GEOTHERMAL PILES

PLUMBING DRAWINGS

P-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
P-1000	PLUMBING EQUIPMENT SCHEDULE
	PLUMBING FIXTURE SCHEDULE
	PLUMBING SCHEDULE
P-2000	PLUMBING PLANS (1/8" scale)
P-3000	PLUMBING PLANS (1/4" scale)
P-4000	SANITARY WASTE AND VENT RISER DIAGRAM
	DOMESTIC WATER RISER DIAGRAM
	NATURAL GAS RISER DIAGRAM
P-5000	PLUMBING DETAILS

ELECTRICAL DRAWINGS

- E-0000** DRAWING INDEX
 - GENERAL NOTES, ABBREVIATIONS AND LEGEND
 - SINGLE LINE DIAGRAMS
 - NORMAL POWER
 - SINGLE LINE DIAGRAM EMERGENCY POWER
 - SINGLE LINE DIAGRAM MOTOR CONTROL CENTER
 - E-1000** ELECTRICAL SITE PLANS (1/8" scale)
 - E-2000** LIGHTING PLANS (1/4" scale)
 - POWER PLANS (1/8" scale)
 - COMMUNICATION / SIGNAL PLANS (1/4" scale)
 - EQUIPMENT LAYOUT PLANS
 - E-3000** POWER AND LIGHTING PLANS (1/4" scale)
 - E-4000** LIGHTING PLANS (1/8" scale)
 - E-5000** LIGHTING CONTROL DIAGRAM AND DETAILS
 - ELECTRICAL DETAILS
 - ELECTRICAL DETAILS AND RISER DIAGRAM
 - E-6000** POWER DISTRIBUTION SINGLE LINE DIAGRAM
 - NORMAL POWER
 - SINGLE LINE DIAGRAM EMERGENCY POWER
 - SINGLE LINE DIAGRAM MOTOR CONTROL CENTER
 - E-7000** LOAD SUMMARIES
 - E-8000** ELECTRICAL PANEL SCHEDULE
 - E-9000** LIGHTNING PROTECTION
- FIRE ALARM**
- FA-0000** DRAWING INDEX
 - GENERAL NOTES, ABBREVIATIONS AND LEGEND
 - FA-1000** FIRE ALARM EQUIPMENT LIST
 - FA-2000** FIRE ALARM PLANS
 - FA-3000** WIRE LEGEND SEQUENCE OF OPERATION

FA-4000	REMOTE FIRE ALARM CONTROL PANELS
FA-5000	WIRING DETAILS
FA-6000	VOLTAGE DROP CALCULATIONS
FA-7000	BATTERY CALCULATIONS
FA-8000	RISER DIAGRAMS
FA-9000	FACILITY NETWORK

FIRE PROTECTION DRAWINGS

FP-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
FP-2000	FIRE PROTECTION PLANS (1/4" scale)
FP-4000	FIRE PROTECTION SPRINKLER AND STANDPIPE RISER DIAGRAM
FP-5000	FIRE PROTECTION DETAILS

SPECIAL SYSTEMS

SECURITY AND COMMUNICATIONS

SE-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
	DEVICE AND CABLE LEGENDS
SE-1000	SECURITY PLANS (1/8" scale)
SE-2000	PANEL AND EQUIPMENT LAYOUTS
SE-3000	ACCESS CONTROL RISER DIAGRAMS
SE-4000	CCTV RISER DIAGRAMS
SE-5000	DETAILS
SE-6000	INTERCOM MOUNTING AND WIRING DETAILS
SE-7000	POWER SUPPLY WIRING DIAGRAM
SE-8000	CCTV WIRING DIAGRAM AND SCHEDULE
SE-9000	PHONE AND ENTRY SYSTEM WIRING DIAGRAMS
SE-9900	INTRUSION DETECTION

PUBLIC ADDRESS

PA-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
PA-1000	PLANS AND DETAILS

FARE COLLECTION

FC-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
FC-1000	SUBSYSTEM BLOCK DIAGRAMS
FC-2000	EQUIPMENT ARRANGEMENT PLANS
FC-3000	LAYOUT PLANS
FC-4000	CONDUIT AND CABLE SCHEDULES
FC-5000	INSTALLATION DETAILS

TELECOMMUNICATION (including audiovisual and acoustical sheets)

TE-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
TE-1000	PLANS AND DETAILS

WINDOW WASHING

WW-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
WW-1000	COMPOSITE ROOF PLAN
WW-2000	BUILDING SECTIONS AND DETAILS
WW-3000	ELEVATIONS
WW-5000	DETAILS

VERTICAL CIRCULATION

VT-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
VT-1000	VARIOUS ELEVATOR PLANS AND SECTIONS
VT-2000	VARIOUS ESCALATORS PLANS AND SECTIONS
VT-5000	DETAILS

DTX DRAWING SET

GENERAL SHEETS

G-0000 TOP COVER SHEET (DRAWING INDEX)

CIVIL / TRACK WORK DRAWINGS

C-0000 DRAWING INDEX

GENERAL NOTES, ABBREVIATIONS

C-1000 EXISTING CONDITION AND DEMOLITION PLAN

CONSTRUCTION STAGING PLANS

C-2000 SITE PLAN, SURVEY CONTROL DATA, MOBILIZATION, CONSTRUCTION AREAS

C-3000 ALIGNMENT DATA AND TABLES

C-4000 PLANS AND PROFILES (Scales for plans 1"=40', profile H 1"=40', V 1"=4')

C-5000 DETAILS, CROSS SECTIONS AND MISC. INFORMATION

C-6000 GRADING AND PAVING PLANS

C-7000 DRAINAGE PLAN, PROFILES AND DETAILS

C-8000 DETAILS AND SECTIONS

C-9000 TRAFFIC MAINTENANCE PLANS

C-9900 SIGNING AND PAVEMENT MARKING PLANS

SIGNING AND PAVING MARKING DETAILS

TRAFFIC SIGNAL PLANS

GEOTECHNICAL DRAWINGS

GT-0000 DRAWING INDEX

GENERAL NOTES, ABBREVIATIONS AND LEGEND

GT-1000 DESIGN CRITERIA FOR CONTRACTOR DESIGNED SUPPORT OF EXCAVATION

GT-2000 SUBSURFACE EXPLORATION LOCATION PLANS

GT-3000 INSTRUMENTATION PLANS

GT-4000 INSTRUMENTATION LOCATION SCHEDULE

GT-5000 INSTRUMENTATION LOCATION DETAILS

GT-6000 INSTRUMENTATION LOCATION CROSS SECTIONS

UTILITY DESIGN DRAWINGS

- U-0000** DRAWING INDEX
- GENERAL NOTES, ABBREVIATIONS AND LEGEND
- U-1000** COMPOSITE PLANS OF EXISTING UTILITIES
- OVERHEAD AND UNDERGROUND POWER FACILITIES
- WATER MAINS
- SANITARY, STORM AND COMBINED SEWERS
- OVERHEAD AND UNDERGROUND TELEPHONE FACILITIES INCLUDING FIBER
 OPTIC
- GAS MAINS, OVERHEAD AND UNDERGROUND CABLE TELEVISION FACILITIES
- PIPELINE COMPANY PRESSURE MAINS
- OVERHEAD AND UNDERGROUND TELEGRAPH FACILITIES
- OVERHEAD AND UNDERGROUND STREET LIGHT AND TRAFFIC SIGNAL
 FACILITIES
- RAILROAD COMMUNICATION AND SIGNAL CABLES
- EMERGENCY SERVICES COMMUNICATION CABLES
- OTHER UTILITIES AS NECESSARY
- INVERT CROSSING
- U-2000** COMPOSITE PLANS OF UTILITY RELOCATIONS
- U-3000** UTILITY RELOCATION PLANS AND PROFILES
- U-4000** CROSS SECTIONS
- U-5000** DETAILS

STRUCTURAL DRAWINGS

- S-0000** DRAWING INDEX
- GENERAL NOTES, ABBREVIATIONS
- GEOTECHNICAL SECTIONS
- S-1000** LOCATION PLAN AND LOGS OF BORINGS
- S-2000** CONSTRUCTION STRUCTURES
- UNDERPINNING SHORING AND PROTECTION
- S-3000** STRUCTURAL GENERAL ARRANGEMENT PLANS (1/8" scale)

S-4000	ABOVE-GRADE AND BELOW-GRADE STRUCTURE CONTROL SCHEDULES
S-5000	STRUCTURAL PLANS
S-6000	STRUCTURAL ELEVATIONS AND SECTIONS
S-7000	STRUCTURAL DETAILS
S-8000	STRUCTURAL STEEL FRAMING PLANS
S-9000	STRUCTURAL STEEL SCHEDULES AND DETAILS
S-9900	APPURTENANT STRUCTURES
	INCLUDING ENTRANCES, VENTILATION SHAFTS AND FAN ROOMS, EMERGENCY EXISTS, PUMP STATIONS, ETC.
	SPECIAL STRUCTURES
	INCLUDING OVERPASSES, UNDERPASSES, NONSTANDARD RETAINING WALLS, DRAINAGE STRUCTURES, SUBSTATIONS, UTILITY STRUCTURES, ETC.
	MISCELLANEOUS IRON AND STEEL

MECHANICAL DRAWINGS

M-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS, AND LEGEND
	EQUIPMENT SCHEDULE
	AIRFLOW AND CRITERIA SCHEDULE
	HVAC SCHEDULE
M-1000	HVAC PLANS
M-2000	HVAC EQUIPMENT LAYOUT FOR MECHANICAL ROOM
M-3000	HVAC CONTROL SYSTEM AND INSTRUMENTATION DIAGRAMS
M-4000	HVAC FLOW DIAGRAMS AND SCHEDULES
M-5000	PLUMBING AND DRAINAGE PLANS
M-6000	PLUMBING AND DRAINAGE EQUIPMENT ROOM LAYOUT
M-7000	PLUMBING AND DRAINAGE RISER DIAGRAMS
M-8000	MISCELLANEOUS PIPING SYSTEMS
M-9000	PLUMBING AND DRAINAGE SCHEDULES
M-9900	FIRE PROTECTION PLANS
	FIRE PROTECTION EQUIPMENT ROOM LAYOUT

ELECTRICAL DRAWINGS – TUNNEL OPERATING SYSTEM

- E-0000** DRAWING INDEX
 - GENERAL NOTES, ABBREVIATIONS AND LEGEND
 - SINGLE LINE DIAGRAMS
 - NORMAL POWER
 - SINGLE LINE DIAGRAM EMERGENCY POWER
 - SINGLE LINE DIAGRAM MOTOR CONTROL CENTER
- E-1000** ELECTRICAL SITE PLANS (1/8" scale)
- E-2000** LIGHTING PLANS (1/4" scale)
 - POWER PLANS (1/4" scale)
 - COMMUNICATION / SIGNAL PLANS (1/4" scale)
 - EQUIPMENT LAYOUT PLANS
- E-3000** REFLECTED CEILING LIGHTING PLANS (1/4" scale)
- E-4000** FIRE ALARM SYSTEM
 - FIRE ALARM SYSTEM RISER DIAGRAM
- E-5000** LIGHTING CONTROL DIAGRAM AND DETAILS
 - ELECTRICAL DETAILS
 - ELECTRICAL DETAILS AND RISER DIAGRAM
- E-6000** POWER DISTRIBUTION SINGLE LINE DIAGRAM
- E-7000** LOAD SUMMARIES, COMMUNICATIONS RACEWAY PLAN

**PUBLIC TELEPHONE, RACEWAY SYSTEM FOR CCTV, TRAIN TELEPHONE SYSTEM,
EMERGENCY, COURTESY AND MAINTENANCE TELEPHONES**

- E-8000** ELECTRICAL PANEL SCHEDULE
- E-9000** LIGHTING PROTECTION

TUNNEL DESIGN DRAWINGS

- TU-0000** DRAWING INDEX
 - GENERAL NOTES, ABBREVIATIONS AND LEGEND
- TU-1000** CONSTRUCTION SEQUENCE PLANS
- TU-2000** CONSTRUCTION STAGING PLANS AND DETAILS
- TU-3000** TUNNEL PLANS AND PROFILES

TU-4000	TUNNEL CROSS SECTIONS
TU-5000	TUNNEL DETAILS
TU-6000	REINFORCEMENT PLANS – INITIAL AND FINAL LINER

TRACK DESIGN DRAWINGS

TR-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
	SURVEY CONTROL DATA
TR-1000	MOBILIZATION, CONSTRUCTION STAGING PLANS

MAINTENANCE AREAS

TR-3000	TRACK ALIGNMENT PLANS AND PROFILE
	ALIGNMENT DATA AND TABLES
TR-4000	CROSS-SECTIONS
TR-5000	DETAILS
TR-6000	GRADING AND DRAINAGE PLAN AND PROFILES
TR-7000	DETAILS AND SECTIONS
TR-8000	TRAFFIC MAINTENANCE PLANS
TR-9000	SIGNING AND PAVEMENT MARKING PLAN

SIGNAL DESIGN DRAWINGS

SG-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
SG-1000	CONSTRUCTION STAGING PLANS
SG-2000	ASPECT CHARTS
SG-3000	INTERLOCKING DIAGRAMS
SG-5000	SIGNAL ALCOVE DETAILS
SG-6000	LED SIGNAL DETAILS

TRACTION POWER FACILITY DESIGN DRAWINGS

Drawings for single line diagrams, control system schematics, and schedules shall be *not to scale*.

Site plans for existing conditions/demolition, grading and paving, drainage, site access roadways and existing utilities shall be 1"=40'.

Equipment plans, equipment arrangements, grounding, duct banks/trench/cable vault, structural steel
1"=20'-0"

TP-0000	DRAWING INDEX GENERAL NOTES, ABBREVIATIONS AND LEGEND
TP-1000	SINGLE LINE DIAGRAMS METER AND RELAY SINGLE LINE DIAGRAM AUXILIARY / HOUSE POWER SINGLE LINE DIAGRAMS CIRCUIT BREAKER CONTROL SCHEMATICS
TP-2000	CIVIL DRAWINGS (per earlier sections)
TP-3000	TRACTION POWER FACILITY SITE ACCESS PLANS
TP-4000	UTILITY DESIGN DRAWINGS (per earlier sections)
TP-5000	TRACTION POWER FACILITY EQUIPMENT ARRANGEMENT PLANS & ELEVATIONS
TP-6000	STRUCTURAL STEEL DESIGN DRAWINGS (per earlier sections)
TP-7000	EQUIPMENT STRUCTURAL STEEL FOUNDATION PLANS AND SECTIONS
TP-8000	TRACTION POWER FACILITY GROUNDING GRID PLANS
TP-9000	CONDUIT AND CABLE SCHEDULES
TP-9900	MANHOLE SCHEDULES POWER PANEL SCHEDULE TYPICAL INSTALLATION DETAILS

OVERHEAD CONTACT SYSTEM (OCS) DRAWINGS

OC-0000	DRAWING INDEX GENERAL NOTES, ABBREVIATIONS AND LEGEND
OC-1000	SECTIONALIZING DIAGRAMS (diagrams shown on the track charts in a separate single-line representation)
OC-2000	TENSION LENGTH DIAGRAMS
OC-3000	TECHNICAL SHEETS

Technical sheets shall provide details for the required conductors, wires and cables. Design and installation data shall be shown, including structure spacing wire tensions, conductor loading, hanger lengths and pantograph clearance envelopes.

OC-4000 GENERAL ARRANGEMENT LAYOUTS

Drawings shall provide information on typical tension lengths, insulated and uninsulated overlaps, phase break, side pole and headspan power feeding arrangements, section insulators and disconnect switches, bridge and tunnel arrangements, crossovers and turnouts and typical sections throughout the right-of-way.

OC-5000 ASSEMBLY DRAWINGS

OCS assembly drawings shall include typical details of foundations, poles and structures and wiring assemblies from cantilevers and headspans through hangers and jumpers. Material allocation references shall be shown against each assembly.

OC-6000 WIRING LAYOUTS

OCS wiring layouts shall be overlaid on top of the track alignment drawings for the entire route. The track alignment centerline shall be shown.

OC-7000 CONDUCTOR, CABLE AND CONDUIT SCHEDULES

SECURITY AND COMMUNICATIONS

SE-0000 DRAWING INDEX

GENERAL NOTES, ABBREVIATIONS AND LEGEND

DEVICE AND CABLE LEGENDS

SE-1000 SECURITY PLANS (1/8" scale)

SE-2000 PANEL AND EQUIPMENT LAYOUTS

SE-3000 ACCESS CONTROL RISER DIAGRAMS

SE-4000 CCTV RISER DIAGRAMS

SE-5000 DETAILS

SE-6000 INTERCOM MOUNTING AND WIRING DETAILS

SE-7000 POWER SUPPLY WIRING DIAGRAM

SE-8000 CCTV WIRING DIAGRAM AND SCHEDULE

SE-9000 PHONE AND ENTRY SYSTEM WIRING DIAGRAMS

SE-9900 INTRUSION DETECTION

PUBLIC ADDRESS

PA-0000 DRAWING INDEX

GENERAL NOTES, ABBREVIATIONS AND LEGEND

PA-1000 PLANS AND DETAILS

FARE COLLECTION

FC-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
FC-1000	SUBSYSTEM BLOCK DIAGRAMS
FC-2000	EQUIPMENT ARRANGEMENT PLANS
FC-3000	LAYOUT PLANS
FC-4000	CONDUIT AND CABLE SCHEDULES
FC-5000	INSTALLATION DETAILS

TELECOMMUNICATION

TE-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
TE-1000	PLANS AND DETAILS

SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) DRAWINGS

SC-0000	DRAWING INDEX
	GENERAL NOTES, ABBREVIATIONS AND LEGEND
SC-1000	BLOCK DIAGRAMS (NOT TO SCALE)
	COMMUNICATION SYSTEM INTERFACE DIAGRAM (NOT TO SCALE)
SC-2000	SCADA EQUIPMENT ARRANGEMENT PLANS AND ELEVATIONS (SCALE 1"=20')
SC-3000	SCADA INTERFACE CABINET WIRING DIAGRAMS
SC-4000	LOCAL USER INTERFACE
SC-5000	CONDUIT AND CABLE SCHEDULE
SC-6000	TYPICAL INSTALLATION DETAILS
	TRAIN CONTROL SYSTEM DRAWINGS (to be completed)
	CORROSION CONTROL DRAWINGS (to be completed)
	REFERENCE DRAWINGS (to be completed)
	ROLLING STOCK DRAWINGS (to be completed)

Appendix E: Basic Hatching Patterns

	SCALE:		
	1-1/2"=1'-0"	3"=1'-0"	HALF SIZE
CMU - ANSI-37 @ 3.0/1.5 scale, 35 deg rotation (Red) AR-SAND @ .35/.175 scale, 0 rotation (Yellow)			
Gypsum - AR-SAND @ .25/.125 scale, 0 rotation (Yellow)			
Concrete - AR-CONC @ .25/.125 scale, 0 rotation (Yellow)			
Steel Section - STEEL @ 2.0/1.0 scale, 0 rotation (Red)			
Floor Finish - LINE @ 1.0/.50 scale, 90 deg rotation (Yellow)			
MDF - ANSI 31 @ 3.0/1.5 scale, 0 rotation (Yellow)			
Fabric - ANSI 37 @ 4.0/2.0 scale, 0 rotation (Red)			
Wood - AR-PARQ1 @ .10/.05 scale, 45 deg rotation (Red)			
Stone - ANSI 34 @ 1.0/.50 scale, 90 deg rotation (Red)			
Grout - DOTS @ .30/.15 scale, 0 rotation (Yellow)			
Acoustic Ceiling - ANSI 31 @ 2.0/1.0 scale, 45 deg rotation (Red)			
Fire Proofing - AR-SAND @ .25/.125 scale, 0 rotation (Yellow)			
Special Fire Proofing - ANSI 31 @ 1.0/.50 scale, 0 rotation (Red)			
Sealant - PLINE: GLOBAL WIDTH VARIES (Green)		OR	
Insulation - PLINE (Red)			

Appendix F: TJPA Disc Label Template

