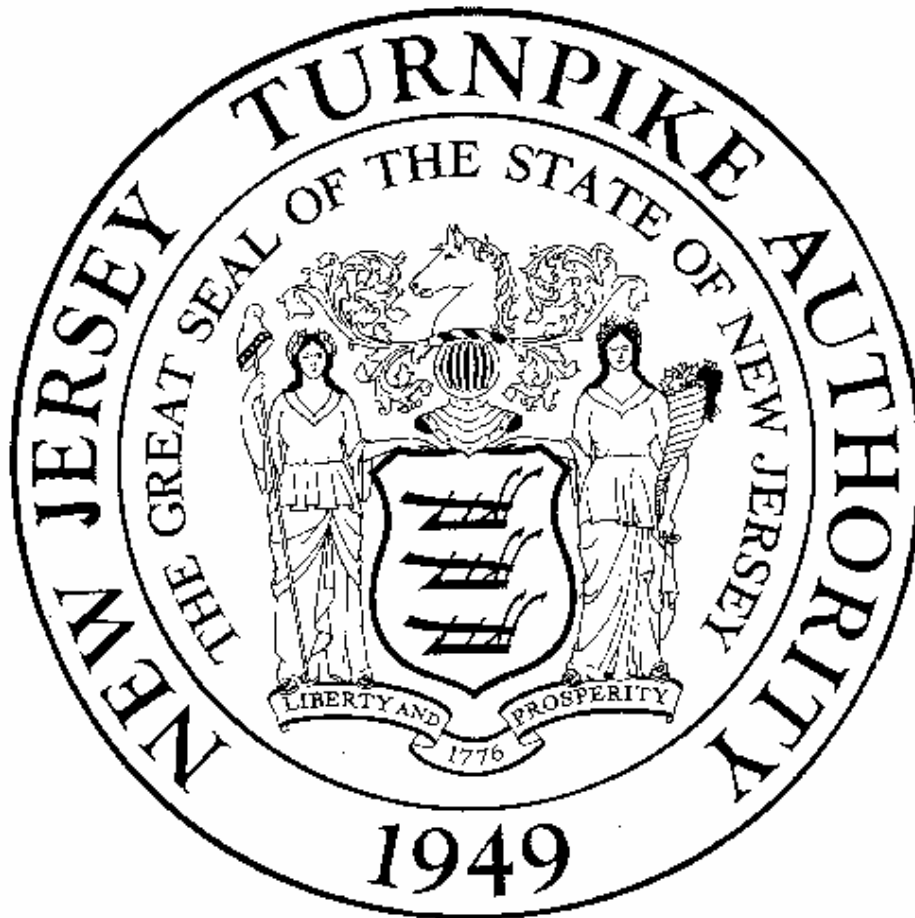


NEW JERSEY TURNPIKE AUTHORITY

**New Jersey Turnpike Roadway
&
Garden State Parkway Roadway
CADD Standards**



**NEW JERSEY TURNPIKE AUTHORITY
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**NEW JERSEY
TURNPIKE & GARDEN STATE
PARKWAY ROADWAYS**



INTRODUCTION

The New Jersey Turnpike Authority has an in-house CADD section. It is the Authority's intention to have in-house staff as well as design consultants develop all design work in CADD. At the conclusion of all projects all CADD files will be turned over to the Authority. Consultants engaged in all New Jersey Turnpike roadway projects are required to prepare all contract deliverables in MicroStation V8 format. They shall adhere to all standards and guidelines as set forth in this document.

In order to assure uniformity in the drawing files and supporting documentation this guide has been developed. The following information will cover most areas of CADD file development and the information to be provided to the Authority. Should the information delivered not meet the Authority's requirements you will be directed to make the necessary changes without additional compensation.

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GENERAL STANDARDS

1.1 INTRODUCTION

This manual presents standards/guidelines for the preparation of all contract plans for the New Jersey Turnpike Authority, utilizing Computer Aided Design and Drafting (CADD) software, hardware and methods. Inquiries regarding the contents of this document should be directed to Bob Rosenbaum of the Engineering Department at (732) 750-5300 / Ext. 8223. The current Internet mailing address is rosenbaum@turnpike.state.nj.us.

1.2 CHANGES TO THE STANDARD

The NJTA CADD system is an evolving process. In general, changes to the system occur because of three factors: 1) additional users and functionality; 2) discovery of, and subsequent fixing of flaws or bugs; 3) changes to utilize advantages of more current technology and software versions. Most of the time, one or more of the above factors are causing changes to the Standard. Therefore, it is reasonable to expect occasional updates to this document. Users of this document are cautioned to frequently inquire about changes hereto, in order to ensure that they also are using the latest version. The latest revision date will be shown on the cover page.

1.3 PLATFORMS

The New Jersey Turnpike Authority currently utilizes the MicroStation V8 software application running on the latest engineering/business oriented workstations. The standards presented herein are for MicroStation V8.

1.4 ADDITIONAL GUIDANCE FOR CONSULTANTS

A Consultant is currently only required to meet the requirements of various sections of this Standard as appropriate to the project scope, or in accordance with the contract language for the project. Engineering firms that perform work for the Authority are expected to comply with these standards as a specification for CADD work.

1.5 GRAPHIC CONCEPTS

Drawing files (.dgn) can contain both vector and non-vector elements. The vector design files can contain text, lines, arcs, shapes and grouped elements. Grouped elements are either cells, graphic groups, or complex elements. Non-vector elements include raster or binary data.

MicroStation V8 drawing files may contain any number of levels for placing elements. Graphic elements shall be separated by level depending on the final uses of the file. For example, many elements shown on a particular plan sheet may not be needed on another. By placing elements on different levels, the designer can control which elements are displayed and which are not.

General file format specifics are to be followed when setting up drawing files for project deliverables. They are as follows:

1. Each drawing will be a separate file. **No File Referencing will be accepted.**
2. All information or elements outside of the image/drawing area will be eliminated from the DGN file.
3. The level naming convention must follow the included outline as shown in Generic Level Naming Convention and Color Assignments on page 10.
4. **Drafting Standards** are outlined in the Turnpike Authority's Procedures Manual.
5. Any exclusive or special fonts used in the creation of the DGN files must be included.

6. If converting from another CADD software application, all DGN files shall be checked for consistency as to match the hard copy contract plans. This includes all text fonts, symbols, linetypes, etc., or other entities particular to a specific application.

1.6 SHEET FILES

Sheet files are design files that display information for a specific type plan sheet (construction, tie and grade, etc.). These are the files from which hard copy is typically plotted to produce a set of plans. If file referencing is used in the creation of sheet files, then, upon completion of project, they shall be bound by the Consultant, thereby making all data and objects permanent parts of each drawing file. In any case, let it be known that each drawing will be a separate file, independent of any directory paths set and/or existing base files. **No File Referencing will be accepted.**

1.7 GRAPHIC STANDARDS

The following graphic standards are considered generic and common to all internal NJTA users. Standards considered specific to individual work groups will be addressed as needed. The fundamental goal of CADD is the computer-automated preparation of plans that graphically meet conventional drafting standards as shown in NJTA standard drawings, and exchangeable digital CADD files. While other users of this Standard may make modification in order to get the files to work properly on their system, any digital files submitted to the NJTA for subsequent CADD work to be performed by the NJTA require absolute adherence to this Standard in all aspects.

1.7.1 Plan Sheet Size

Unless otherwise specified through job specific contract language, the final plan sheet size will be 36 in. x 22 in.

1.7.2 Working Units

The resolution and scaling of the design file affects the accuracy of the drawing. The working units, or number of positional units used to define the sub units and master units will determine the accuracy of the design file. The accepted working units for all drawing files will be feet and inches.

1.7.3 Scales

No scale will be associated with elements in a design file (the model space environment); drawings shall be done to real dimensions. For example, if telephone poles are 25 yards apart, then they will measure 25 yards in the design file. Scaling of the final product is performed using plotting utilities (the paper space environment).

1.7.4 Global Origin & Coordinate Geometry

Since most drawings utilize coordinate systems with positive X and Y values, the standard global origin is set to zero for the X and Y coordinates at the lower left corner of the X-Y plane.

If world coordinates are used in the creation of coordinate geometry of the drawing files, the N.J. State Plane Coordinate System, NAD83 in feet shall be utilized.

1.7.5 Text

Text size and placement shall be in accordance with NJTA Drafting Standards, as outlined in the Turnpike Authority's Procedures Manual. These sizes are selected for the express purpose of proper readability on the scaled plot.

1.7.6 Fonts

Generally, standard text using the various *.shx font files shall be used, such as style ROMANS with font ROMANS.SHX. True Type fonts are to be avoided.

1.7.7 Line Weights & Plotting Files

The use of line weights to produce the graphic image shall be in accordance with NJTA Drafting Standards. Generally, existing features are shown thinner than the proposed work. Pen tables and plotting files shall be included with all CADD contract deliverables to ensure conformity with all hardcopy project deliverables. The NJTA has based the creation of its in-house CADD files primarily on twelve basic MicroStation V8 colors with the corresponding line weights as listed below. All pen tables and plotting files shall be based on these assignments.

PEN COLOR & WIDTH IN INCHES

0 = (.032) White	4 = (.015) Yellow	9 = (.023) Lt. Gray
1 = (.032) Blue	5 = (.013) Magenta	10 = (.015) Lt. Red
2 = (.015) Green	6 = (.020) Orange	11 = (.015) Olive
3 = (.013) Red	7 = (.027) Cyan	14 = (.023) Dark Gray

1.7.8 Linetypes & Legends

A variety of line styles and legends are available for the purpose of producing engineering highway plans. Line styles are to be used that are compatible to both MicroStation and AutoCad software applications. All linetypes and legends are to be created in accordance with NJTA Drafting Standards, as outlined in the Turnpike Authority's Procedures Manual.

1.7.9 Levels

Graphic elements shall be placed on the levels called for by each discipline. Some types of plans may utilize extensive leveling schemes while others may be minimal. As with all of this Standard, adherence to specified levels is NOT optional. (Also see page 10 – Generic Level Naming Convention and Color Assignments.)

1.7.10 Colors

Use of colors in design files will conform to the requirements of the specific color assignments for various levels as outlined in paragraph 1.7.7 and the Level Naming Convention on page 10. The number of the color is more significant than the displayed color. All assigned colors shall be “**bylevel.**”

1.7.11 Reference Files

Reference files are a powerful tool. The consultant has total control over how a particular project is to be created, linked together, and/or file referenced from within their particular design teams. However, the NJTA, as previously mentioned, requires all files included in final contract deliverables to be independent of all file referencing. **No File Referencing will be accepted.**

1.7.12 Base Files

Base files contain the basic topographic information of a project, as well as all other information which is pertinent to, or resulting from, the design process, i.e. property lines, monuments, baselines, traverses, proposed design features, etc. In such a file, this information is represented from end-to-end of the geography, which the project covers (as opposed to the limited length of information that is presented on an individual, non referenced, plan sheet).

Base files shall also be delivered along with the drawing file set comprising the contract plans (which are not referenced) for all contract deliverables. They shall be placed in a separate directory named *BaseFiles*.

1.8 DELIVERABLES AND DATA EXCHANGE

Any exchange of data between the NJTA and the A/E community will necessitate answering many questions about media, formats, etc. so that the exchange will be as efficient as possible.

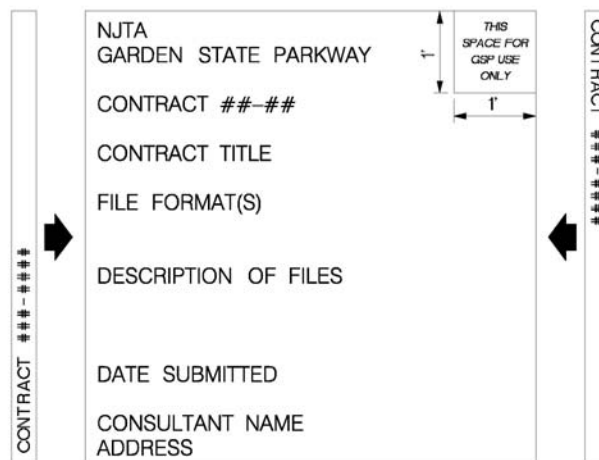
1.8.1 Media

The accepted media for file exchange are the rewritable compact disk (CD-RW) and the Internet. Each CD jewel box containing the rewritable compact disk will have a label indicating the contents. It shall be accompanied with a supporting transmittal letter of documentation describing the contents. This letter will also signify all responsible contact persons associated with the creation and delivery of the electronic MicroStation V8 and corresponding PDF (Adobe Acrobat) files comprising any contract deliverable.

GARDEN STATE PARKWAY STANDARD FOR COMPACT DISK LABELING



COMPACT DISK



JEWEL CASE

The rewritable compact disk (CD-RW) is currently the easiest and most efficient medium utilized by the Turnpike Authority for file exchange of contract deliverables. Please utilize this type of medium whenever possible.

The NJTA encourages the consultant community to use the Internet as another option for delivering/receiving electronic files on an “as need” basis. This can be accomplished through the consultant’s own web site, the Authority’s “FTP” site with an appropriate username and password or conventional email.

1.8.2 Additionally Required File Formats

In addition to the MicroStation V8 .dgn file format, the Consultant is required to deliver a corresponding PDF (Adobe Acrobat) file set replicating each drawing file.

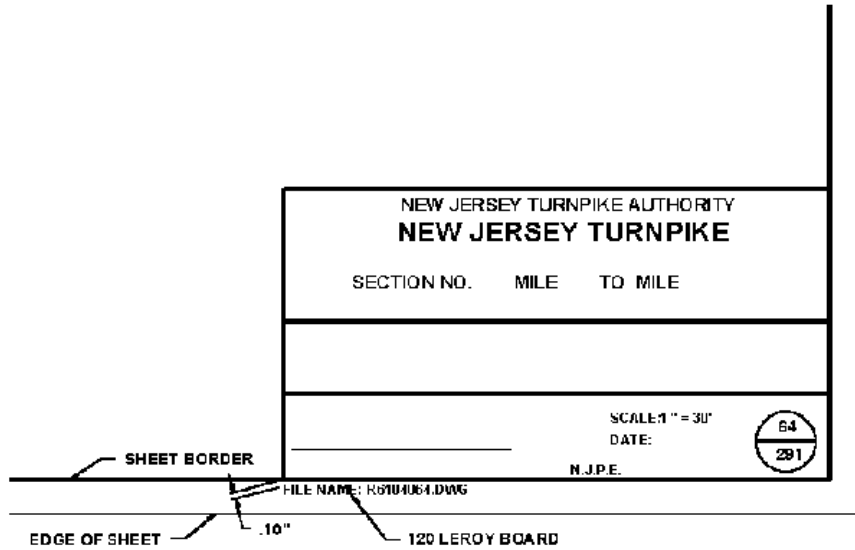
All PDF files shall be monochrome (black and white) at a resolution of 300 DPI, with 100% scaling and a custom size of 36” x22”.

1.8.3 Sheet/Drawing File Naming Convention

The file name is to be placed on every drawing. To insure uniformity the file name will be comprised of combining the roadway designation, category number, contract number, extension and the sheet number such that the resulting file name will be **RNNN_CCC_E_SSS.DGN**, as derived from the table below.

<u>ROADWAY</u> Turnpike/Parkway (R)	<u>CATEGORY</u> # (N)	<u>CONTRACT</u> # (C)	<u>EXTENSION</u> (if applicable) (E)	<u>SHEET</u> # (S)
(T or P)	Structures - 100	001 - 999	A, B, etc.	001 – 999
(T or P)	Highways - 200	001 - 999	A, B, etc.	001 – 999
(T or P)	Interchanges - 300	001 - 999	A, B, etc.	001 – 999
(T or P)	Service Areas - 400	001 - 999	A, B, etc.	001 – 999
(T or P)	Buildings - 500	001 - 999	A, B, etc.	001 – 999
(T or P)	Signage - 600	001 - 999	A, B, etc.	001 – 999
(T or P)	Environmental - 700	001 - 999	A, B, etc.	001 – 999
(T or P)	Major Projects - 800	001 - 999	A, B, etc.	001 – 999
(T or P)	Miscellaneous - 900	001 - 999	A, B, etc.	001 – 999
(T or P)	Future Use - 001	001 - 999	A, B, etc.	001 – 999

Example: **T300_002_015.dgn** is, therefore, the MicroStation CADD file for sheet 15 from a Turnpike roadway Interchange project, Contract number 2.



The .dgn file name is to be placed below the title block as illustrated above.

1.8.4 Final Contract Deliverables

All graphics design (.dgn) files provided to the NJTA shall be compatible with the MicroStation V8 format. When MicroStation V8 files are created by translating from a different format, the Consultant is solely responsible to ensure and verify that the required information has been translated correctly and completely, for the intended purpose. Anything that does not conform to our Standard will be returned for correction, without additional compensation or schedule allowance.

GENERIC LEVEL NAMING CONVENTION AND COLOR ASSIGNMENTS

PEN COLOR & WIDTH IN INCHES

0 = (.032) White	4 = (.015) Yellow	9 = (.023) Lt. Gray
1 = (.032) Blue	5 = (.013) Magenta	10 = (.015) Lt. Red
2 = (.015) Green	6 = (.020) Orange	11 = (.015) Olive
3 = (.013) Red	7 = (.027) Cyan	14 = (.023) Dark Gray

*NOTE: All assigned colors are to be **BYLEVEL**.

GENERAL LEVELS

GNOTES - General notes, schedules (9)
SHTBDR - Title blocks and title block text (0)
MLINES - Match lines and text (1)
MISC-GRAFX - North arrows, bar scales, misc. sheet graphics (4)
GRIDCOORD - Grid coordinate system and text (3)
DATUM - Datum and extension lines (2) datum (4) ext.
MISC-GEO - Miscellaneous geotechnical information (6)
MISC-TEXT - Miscellaneous text (14)

EXISTING LEVELS

E-TXT - Existing general text (4)
E-TOPO-TXT - Existing topographical text (3) or (5)
E-ROW-TXT - Existing right of way text (4)
E-DRN-TXT(E-STRM-TXT) - Existing drainage text (3) or (5)
E-SOILS-TXT - Existing soils text (4)
E-SOILS - Existing soils (2)
E-DRN(E-STRM) - Existing pipes, inlets, headwalls, etc. (3) or (5)
E-TOPO - Existing trees, shrubs, streams, etc. (3) or (5)
E-MMTOPO - Existing manmade planimetrics (roads, buildings, fences, etc.) (3)
or (5)

EXISTING LEVELS

- E-UTIL - Existing utilities (3) or (5); Can be broken down. i.e. - E-WAT, E-TEL, E-ELEC, etc.
- E-CONT - Existing contours, spot elevations, etc. (3) or (5)
- E-ROW - Existing right of way lines, property lines, monuments, etc. (4)

PROPOSED LEVELS

- P-TXT - Proposed directive text (7)
- P-ROW-TXT - Proposed right of way text (7)
- P-DRN-TXT(P-STRM-TXT) - Proposed drainage text (7)
- P-STATION - Proposed baseline stationing text (2) or (7)
- P-DRN(P-STRM) - Proposed pipes, inlets, headwalls, etc. (1) or (7)
- P-DESIGN - Proposed roadway, curbs, barriers, etc. (7); Can be broken down. i.e. - P-RDWY, P-BARR, etc.
- P-UTIL - Proposed utilities (7)
- P-ROW - Proposed right of way lines, monuments, easements, etc. (7)
- P-TOE - Proposed limit of construction (toe of slope) (4)
- P-TOP - Proposed top of cut (4)
- P-PAVE-SYM - Proposed pavement symbols (4)
- P-SEDIMENT - Proposed soil erosion and sediment control (2) e.i. - silt fences, inlet protection, etc.
- P-CONT - Proposed grading, contours, spot elevations, etc. (2)
- P-SOILS - Proposed soils work. i.e. - boring locations (2)
- P-SOILS-TXT - Proposed soils text (7)
- P-SIGNS - Proposed signing (7)
- P-PSTRIPE - Proposed paint striping (7)
- P-SIGNAL - Proposed signalization (2) or (7)
- P-MP-TRAFF - Proposed maintenance and protection of traffic (2) or (7)
- P-LIGHT - Proposed lighting (2)

MISC. STRUCTURAL LEVELS

- B-DIM - Bridge dimensions and section marks (3) or (4)
- B-TXT - Bridge text (9)
- B-REIN - Bridge reinforcement (4)
- B-STEEL - Bridge steel (2) or (7)
- B-MISC - Bridge miscellaneous (4) or (14)
- EB-STRUCT - Existing bridge structure (3)

MISC. POINT MANAGEMENT

PNT-SYM - COGO point symbols (4)

PNT-NUM - COGO point numbers (4)

PNT-TRAV - Survey traverse points (4)

MISC-PNTS - Temporary catch all for miscellaneous COGO points (4)

NOTE:

In the development of CADD files, level naming can become cumbersome, inconsistent and generally outright confusing. In order to avoid some of the confusion which will inevitably arise without any CADD guidelines being set forth for our consultants, it is imperative that the above general level naming format be used as a guide. This level naming format is not intended to be used verbatim, but should be followed as closely as possible as to create a consistent outline for the Turnpike Authority to use for all consultants.

The above level names used in this format are only a few examples of the possible dozens which may arise depending on the type of contract and scope of design. These CADD level naming guidelines, however, will make it clear to all consultants as to how the Turnpike Authority will expect a clear and concise level naming procedure to be used for all future CADD files.

INFORMATION SHEETS

It is expected that these files will be maintained for a considerable amount of time. It is also expected that various information will be requested by the Authority or offered by the Consultant to explain the contract or qualify data. Loose papers will eventually get separated from the CADD files and probably lost. Therefore all supporting documentation requested by the Authority or provided by the Consultant is to be a part of the CADD files. This information is to be placed on standard turnpike plan sheets (120 Leroy upper & lower case) and made into a file. These information sheets are to be labeled alphabetically, starting with 'A', and provided with file names accordingly (i.e. FILE NAME: **T300_002_00A.dgn**).

Information that is to be shown on these sheets will include:

1. The N.J.T.A. liaison engineer.
2. The MicroStation version used.
3. The DGN file level naming convention.
4. The advertisement for proposal pages from the bid.
5. List of drawings in the contract with an asterisk (*) placed to the left of each drawing not included in the CADD files. The only drawings that will not be included will be Standard Drawings and Reference Drawings.