

## 490 Computer Aided Design and Drafting (CADD) Requirements

ADOT shall retain all rights and ownership of all Electronic Files and Hardcopy Deliverables throughout the Design Phases.

### **General Specifications:**

All files to be archived shall conform to ADOT drafting and CADD standards (for ADOT CADD standards, Technical Bulletins, and additional archiving information see CADD Management & Support unit's Internet site). Each consultant shall submit all their files in a folder (with no subfolders) to be archived in a project folder. The current ADOT approved version of MicroStation software will be used. All graphic files shall be provided in MicroStation native design file format (.dgn), and contain data in vector format only. Digital Terrain Model (.dtm) files shall be produced with InRoads/Site/Survey compatible file formats. Raster data shall not be accepted unless otherwise stated by ADOT. For non-photogrammetric disciplines, the use of non-MicroStation vector format and subsequent translation of graphic files to the .dgn format shall not be accepted. No zipped files shall be accepted. All reference files shall be delivered, and are not to be copied into the plan sheet files. All electronic "design sheets" shall include border information and display a fitted "plan view" in View 1. View 1 shall be the final plot view and as such, all appropriate reference files, levels, view attributes shall be displayed. No vector or raster elements shall be outside the border. ADOT cells and custom line styles are not to be modified unless approved by ADOT.

All final Consultant project Electronic CADD data files may be delivered through a File Transfer Protocol (FTP) Site. Alternatively, two (2) copies of the electronic files shall be submitted on CD-ROM/DVD (multiple CD's/DVD's shall be allowed). All final project documentation, electronic files and hard copy shall be packaged separately, labeled and delivered to the assigned ADOT Project Manager, and/or to the Technical Leader.

All deliverables shall contain an electronic Index of files and a letter of transmittal to the designated areas and all CD's/DVD's must be labeled with the information stated below:

- **Identification Label For CD and Case:**  
Prepared By:  
Federal Project Number:  
Route:  
Milepost (Beginning/Ending):  
Prefix (Rt, Co, MP) and TRACS Number:  
Project Name:  
Creation Date:  
Disc (#) of (total #)

In addition to the requirements stated above in the General Specifications, all designers of ADOT projects shall provide the following information requested by the individual areas. If unclear about items needed for your project, please contact the Project Manager.

**Bridge:**

- Identification Label
1. Structure Number ( 4 digit number )
  2. Structure Name (Apprentice Wash Bridge)
  3. Type of work category:
    - a) Major Structure – New Bridge
    - b) Bridge Replacement
    - c) Minor Structure
    - d) Deck Rehabilitation
    - e) Hinge, Deck or Joint Repair
    - f) Barrier Replacement
    - g) Bridge Widening
    - h) Scour Protection
    - i) Seismic Retrofit

**Materials and Geotechnical:**

In addition to the CADD requirements stated in the General Specifications, all Consultants of ADOT Geotechnical projects shall provide the following information to the Project Engineer for ADOT Geotechnical Section:

1. One (1) Electronic Copy of the final Geotechnical Design sheets submitted on CD-ROM.
2. One (1) half-size (11"x17") print of the Geotechnical sealed and signed final design sheets.

**Roadway Engineering:**

See General Specifications.

**Right of Way:**

All R/W surveys, R/W plans and R/W monumentation surveys are to conform to current R/W Plans Standards and Manual.

Acceptance Submittal for R/W SURVEY, FINAL R/W PLANS and R/W MONUMENTATION SURVEY

When all comments have been addressed and the R/W Plans Section is ready to accept any of the above products, the designers or consultants of ADOT R/W projects shall submit the following items:

1. Two (2) copies of all Final CADD Files in native MicroStation file format, in a version that is currently acceptable to the R/W Plans Section, and the electronic ASCII file. The files shall be transmitted to the ADOT Right of Way Plans Section on two (2) Compact Disks (CD-R format). Unless the Consultant uses an approved digital signature per ARS 41-132, the seal block on the electronic files shall be left blank.
2. Full-size set of sealed and signed mylars sealed by an Arizona Registered Land Surveyor, trimmed to 22" x 34".
3. One (1) half-size bond copy of sealed sheets.

**Traffic Engineering:**

Upon Final Design Approval for any and all work that involves Traffic Engineering/Design, the Traffic Engineering Group requires that the following Cadd related deliverables be submitted to the Primary Project Manager as indicated in the General Specifications. In addition, a copy of the Letter of Transmittal indicating all Traffic related deliverables have been submitted to ADOT shall be forwarded to the Traffic Engineering Project Manager for approval.

1. All Design files associated with Traffic Design, including Traffic Signal, Signing, Pavement Marking, Traffic Control, Pre-Design, HES Projects, and Permit Designs, shall be submitted in ADOT's current version of MicroStation 2D format (.DGN)(2D).
2. All sign designs/formats shall be submitted in ADOT's current version of sign design software (.sgn).
3. All sign summary Excel spreadsheets used to import sign summary data into MicroStation shall be submitted in ADOT's current version of Excel (.xls).

**Engineering Survey Section (Location Surveys):**

In addition to the CADD requirements stated in the General Specifications, all designers of ADOT projects shall provide the following information, if applicable to the project, to the ADOT Project Manager:

1. Ground Adjustment Factor (G.A.F.)
2. Contour Interval (C.I.)
3. Project Scale
4. Horizontal and Vertical Datum
5. Arizona State Plane Coordinate System Zone
6. Hard copy of reports including any plots

Based on the Scope of Work, select the items to be delivered:

1. Hard Copies may consist of the following:
  - a) Field notes
  - b) Sketches
  - c) Plots
  - d) Reports
2. (.dgn) file containing graphical representation of the project (i.e. planimetrics and contours).
3. (.3d) file containing graphical representation (i.e. breaklines and random points) to produce the DTM.
4. (.dtm) containing Engineering Surveys approved features that make up a correct surface representation.

5. (.alg) file containing the project alignments. (.rpt) file including curve data from the alignment.
6. ASCII (.csv) files shall contain the following:
  - a) File Header Information:
    - i. Project GAF
    - ii. Project Datum
    - iii. Arizona State Plane Coordinate System Zone
    - iv. Basis of Alignment
    - v. Basis of Stationing
    - vi. Basis of Horizontal Control
    - vii. Basis of Elevation
    - viii. Basis of Bearing
  - b) All Project Control
  - c) Section Corners
  - d) R/W Monumentation
  - e) Structures
  - f) Edge of pavement
  - g) Centerline and driving stripes
  - h) Other features as requested
7. Record of Survey: When requested, the Record of Survey will be in electronic format (.dgn or .pdf), with a stamped original.
8. Pictures: Upon request, pictures will be taken for all structures including ends of pipes, headwalls, pipe caps, and any unnatural terrain feature in a .jpg or .bmp file format (check scope of work).

**Note:** Two (.CSV) files shall be submitted, one containing the RAW survey data and another containing the edited survey data.

To facilitate project management, in addition to the current ADOT archiving methods, the Consultant will submit pertinent project metadata to ADOT Engineering Survey Section/Location Surveys. The metadata can be submitted in a text (.txt) or similar file.

Metadata content should include as a minimum:

1. Complete Tracs No.
2. Route number and/or name
3. Project description
4. Beginning and ending mile posts
5. Project datum
6. Ground Adjustment Factor (GAF)
7. Arizona State Plane Coordinate System Zone

If unclear about items needed for your project, please contact the Engineering Survey Section/Location Surveys.

### **ADOT Project Manager:**

All survey projects shall be submitted to the ADOT Project Manager and/or Consultant Project Manager for archiving purposes. Additionally, a copy of the project metadata will be submitted to ADOT Engineering Survey Section/Location Surveys.

### **Engineering Survey Section (Photogrammetry and Mapping):**

In addition to the CADD requirements stated in the General Specifications, all designers of ADOT projects shall provide the following information to the ADOT Project Manager:

1. Scanned images
2. Aerotriangulation files
3. Orthophotographs produced
4. DGN file containing graphical representation of the project (i.e. planimetrics and contours).
5. 3D file containing graphical representation (i.e. breaklines and random points) to produce the DTM.
6. ASCII (.csv) files shall contain the following:
  - a) File Header Information:
    - i. Project GAF
    - ii. Project Datum
    - iii. Arizona State Plane Coordinate System Zone
    - iv. Basis of Horizontal Control
    - v. Basis of Elevation
  - b) All Project Control
  - c) Section Corners
  - d) R/W Monumentation
  - e) Structures
  - f) Edge of pavement
  - g) Centerline and driving stripes
  - h) Other features as requested

To facilitate project management, in addition to the current ADOT archiving methods, the Consultant will submit pertinent project metadata to ADOT Engineering Survey Section/Photogrammetry and Mapping. The metadata can be submitted in a text (.txt) or similar file.

Metadata content should include as a minimum:

1. Complete Tracs No
2. Route Number and/or Name
3. Project Description
4. Beginning and Ending Mile Posts
5. Project Datum
6. Ground Adjustment Factor (GAF)
7. Arizona State Plane Coordinate System Zone
8. Map Scale
9. Aerial Photography Date and Scale
10. Contour Interval

If unclear about items needed for your project, please contact the Engineering Survey Section Photogrammetry and Mapping Advisor/Coordinator.

**ADOT Project Manager:**

All photogrammetry and mapping projects shall be submitted to the ADOT Project Manager and/or Consultant Project Manager for archiving purposes. Additionally, a copy of the project metadata will be submitted to ADOT Engineering Survey Section/Photogrammetry and Mapping.