

Appendix Z

Digital Disk Requirements and Formatting

DIGITAL DATA SUBMISSION STANDARDS

INTRODUCTION

The JCSD has adopted Geographic Information System (GIS) technologies to store and manage any data (water, sewer, parks, easements etc..) to a location within JCSD service area. It is the goal of JCSD to implement these technologies to expedite the design and review processes within the administration, by developing standards and procedures for integration of digital engineering CAD drawings into the GIS environment while maintaining the integrity and positional accuracy of the data. Thus, in addition to the submittal of Mylar plans for approval, JCSD is now requiring the submission of **two CDs** of water and sewer improvement plans of either Computer Aided Design (CAD) files or ESRI shapefile or ESRI file geodatabase based on the standards set forth in this document and **a fee** payable to JCSD for the work effort to update the District's Enterprise GIS.

DIGITAL SUBMITTAL REQUIREMENTS

Digital files submissions will only be accepted if conditions pertaining to the following factors are met:

- I. Spatial Reference
- II. AutoCAD file guidelines
- III. GIS Shapefile or file geodatabase guidelines
- IV. GPS Data Collection guidelines
- V. Line and Point work, Text and Labels
- VI. Deliverable
- VII. Contact Information

If it does not comply with the standards outlined in this document, a resubmittal will be requested until it meets the Digital Submittal Requirements.

I. Spatial Reference

All files must be correctly projected into the following coordinate system:

- **Projection:** State Plane
- **Zone:** California_VI_FIPS_0406
- **Units:** US Survey Feet
- **Horizontal Datum:** North American Datum (NAD) 1983 adjusted to the High Accuracy Reference Network (HARN)
- **Vertical Datum:** North American Vertical Datum (NAVD) 1988

This is defined in ESRI ArcGIS for Desktop as follows:

NAD_1983_StatePlane_California_VI_FIPS_0406_Feet
WKID: 2230 Authority: EPSG
Projection: Lambert_Conformal_Conic
False_Easting: 6561666.666666666
False_Northing: 1640416.666666667
Central_Meridian: -116.25
Standard_Parallel_1: 32.78333333333333
Standard_Parallel_2: 33.88333333333333
Latitude_Of_Origin: 32.16666666666666

Linear Unit: Foot_US (0.3048006096012192)
Geographic Coordinate System: GCS_North_American_1983
Angular Unit: Degree (0.0174532925199433)
Prime Meridian: Greenwich (0.0)
Datum: D_North_American_1983
Spheroid: GRS_1980
Semimajor Axis: 6378137.0
Semiminor Axis: 6356752.314140356
Inverse Flattening: 298.257222101

Notes: JCS D base data is derived from Riverside County (<http://gis.rivcoit.org/>)

II. AutoCAD file guidelines

- Digital files are to be submitted in AutoCAD version 2010 or higher and in “.DWG” file format.
- Drawing name convention shall be JCS D Project Number-Sheet Number (ex. JCS D Capital Project → C155010-01.dwg)
- All line work, text, and points must be in Model space.
- Drawings shall be North oriented and scale at 1:1 U.S. Survey Foot.
- Add layout elements such as the legend, scale bar, neat line, and publication credits to Layout space, NOT Model space.
- Do not add Viewport entities to the drawing in Model space. Only use Viewports in Layout space.
- All blocks will be created on the layer “0” and defined on layer “0”.
- XREF’s are not allowed in the final AutoCAD DWG file delivery.
- No annotation shall be included in any feature layer and no feature shall be included in any annotation layer
- All JCS D required layers from specification (table 1) below shall be made visible prior to submission – all other layers can be turned off.
- Closure is critical in converting AutoCAD elements to GIS features. All digital line work must be geometrically correct, topologically clean without slivers, dangles, undershoots or inappropriate breaks. Polygon features drawn as polylines must properly close without gaps.
- Each drawing shall reference (“tie to” or “georeferenced”) at least two survey control points or 2 point features (e.g., center of manhole, hydrant spindle, center of catch basin, or System Valve), present in JCS D GIS database.

III. GIS shapefile or file geodatabase guidelines

- Decimal Degrees, a minimum of 8 significant digits (ex. -121.363469, 37.948884) are preferred over Degrees/Minutes/Seconds for the capture and storage of data.
- The following tolerances must be followed for all data:
 - Double Precision
 - Fuzzy Tolerance 0.0001
 - Dangle Tolerance 0.0
 - Edit 0.5
 - Node Snap 0.0001
 - Snap 0.5

- Layer names as indicated (and not necessarily be limited to) in the specifications below:

Layer Name	Description	Feature Type
	Geodetic Control Points	Points
	Secondary Control Points ¹	Points
	Map Reference Features ²	Polylines
Property_Boundary	Property Boundary	Polygons
Building_Footprint	Building Footprint	Polygons
ROW_Boundary	Right-of-Way Boundary	Lines
Tract_Boundary	Tract Boundary	Polygons
Easement	Easement	Polygons
WATER		
wAirRelease	Water air release valve	Points
wAirReleaseValve	Water air release valve	Points
wBackflowDevice	Water backflow device	Points
wBlowOff	Water blow off	Points
wBlowOffValve	Blowoff Valve	Points
wBoosterPumpStation	Booster Pump Station	Points
wFireServiceValve	Valve control fire service	Points
wFitting	Water reducer, bend, tee, Plug, Cap, etc..	Points
wHydrant	Water Hydrant	Points
wHydrantValve	Water hydrant valve	Points
wIntertie	Water intertie connection	Points
wLateralLine	Water Service line	Lines
wMainLine	Water Main	Lines
wMeter	Water Meter	Points
wOffset_Dimension	Measurement from Mainline to ROW, CURB, or Centerline	Dimension
wPRStation	Water Pressure Reducing Station	Points
wPump	Water Pump	Points
wReservoir	Water Reservoir	Points
wSystemValve	Water System Valve	Points
wWell	Water Well	Points
	Water Text	Text
SEWER		
AirReleases	Sewer Air release	Points
BlowOffs	Sewer Blow off	Points
CleanOuts	Sewer Clean out	Points
ControlValves	Sewer control valve	Points
Fittings	Sewer bend, tee, cross, etc..	Points
ForceMains	Sewer forcemain line	Lines
GravityMains	Sewer gravity main	Lines
LateralLines	Sewer lateral line	Lines
LiftStation	Sewer lift station	Points
Manholes	Sewer manhole	Points
Pump	Sewer Pump	Points
ServicePoints	Sewer Service Node	Points
SystemValves	Sewer System Valves	Points
	Sewer Text	Text

Table 1

¹ Secondary reference points are features from JCSD GIS database such as System valve, manhole, and fire hydrant would be provided for this layer by requested.

² Map reference features are features from Riverside County GIS database such as street centerlines, parcel outlines, right-of-way, etc...that may be useful as background orientation.

- The names, notes, area sizes, etc. of particular features should be stored in the attribute table of the feature and not only as a separate piece of annotation text.
- Do not include spaces, dashes, or other special characters (e.g. -% () # @ . , * & [] / \).
- Start data and field names with alphabetical characters. Avoiding names starting with a number.
- Layer attribute fields as indicated (and not necessarily be limited to) in the specifications below:

Field Name	Data Type
Source	Text
Owner	Text
TractNo	Text
ProjectNo	Text
SheetNumber	Short Integer
Engineer	Text
Diameter	Double
Material	Text
StreetName	Text

- All GIS data must have Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM) as defined here <https://www.fgdc.gov/metadata/csdgm-standard>

IV. GPS Data Collection Standard

The use of the Global Positioning System (GPS) for accurately and efficiently storing mappable feature locations and attributes has become a widely accepted method for collecting GIS data. With many now having the ability to use this technology to collect GIS data, it is imperative that the JCSD adopts GPS data collection standards to insure data quality and consistency. The minimum GPS standards to be used by JCSD as follow:

- The GPS receiver used to collect data for JCSD must be of **Mapping Grade** or better. It must:
 1. Routinely achieve 1 meter or better horizontal accuracy, using either real time or post processed differential corrections.
 2. Operate in a 3D mode, where the receiver requires signals from a minimum of four satellites to determine a 3D (latitude, longitude, and elevation) location (a fix).
 3. Allow the storage of position fixes for features that are being mapped. When mapping point features, the receiver must be able to store a sample of position fixes (the minimum number depending on the quality of the receiver) for the feature. The receiver must have enough data storage capacity for a typical day's worth of data collection.
 4. Be user configurable for critical settings, including DOP, SNR, elevation mask, and logging rate.

5. Produce and store data in a format compatible with the base station data used to perform the differential corrections or have the capability to receive real-time corrections from the base station.
- All collected GPS data must be differentially corrected, either in real time or in a post processed using the nearest operating base station with the highest integrity rating.
 - Along with the following parameters, JCSD suggests standing at a collection location for 5-10 seconds to evaluate the quality of signal (PDOP and number of satellites) before gathering points.

Position Mode	All position fixes must be determined with 4 or more satellites.
Elevation Mask	15 degrees above horizon.
PDOP (Position Dilution of Precision) Mask	Max PDOP = 8
Signal to Noise Ratio Mask (SNR)	If this parameter setting exists, set it to 39.0
Minimum Positions	If this parameter setting exists, set it to the manufacturer's
For Point Features	At a minimum, allow the GPS data collected to achieve the JCSD's 1 meter standard.
Logging Intervals	Intervals for point features will be 1 second. Intervals for line and area features depend on the velocity at which the receiver will be traveling and the nature of the feature and the operating environment. Under normal circumstances (i.e., when the user is walking with the receiver) the interval for line and area features will be set to 1 second.
Logging of DOP (Position Dilution of Precision)	If the receiver allows, this parameter setting will be set to allow the logging of DOP data along with position fixes.

- As stated in deliverable section, JCSD prefers GIS Data submittals to be in either ESRI file geodatabase or shapefile formats. Therefore, all collected GPS data must undergo some post processing steps using GPS processing software before the data can be export to one of these formats.
- If the GPS processing software allows, the following generated attributes must be produced for exported features:

Point Features	Line and Polygon Features
Maximum PDOP	Maximum PDOP
Receiver type	Receiver type
Correction status	Correction status
Date of collection	Date of collection
Time of collection	Time of collection
Total positions	Total positions
Standard deviation	Standard deviation
Horizontal Precision	Worst horizontal precision
*Elevation (MSL in feet)	*Average vertical precision
*Vertical Position	*Worst vertical precision

**Only necessary if elevation data is required by project*

- If elevation data is required by the project, it will be referenced to the North American Vertical Datum of 1988 (NAVD 88) vertical geodetic datum.

V. Line, Point, Text and Labels (apply to AutoCAD and Shapefile)

- All line work shown on the hard copy map that is submitted to plan check must be shown on the digital drawing.
- All line features shall be of a continuous line-type, such that each individual line/pipe segment is only broken at the ends where a node/structure is located.
- All point features shall be entered using standard point/node symbols.
- All text and labels shown on the hard copy map that is submitted to plan check must be shown on the digital drawing as text layer or annotation layer

VI. Deliverables

- First CD will contain **ONE** full scaled (Arch D, 24"x36") .pdf plan and **ONE** of the following file format:
 - a) AutoCAD Drawing (.dwg)
 - b) ESRI Shapefiles format (.dbf, .shp, .shx, .prj, .sbn)
 - c) ESRI File Geodatabase format (.gdb)

NOTES: All GIS Data (ESRI file geodatabases or ESRI shapefiles) are encouraged to deliver within an ESRI ArcMap Map Package (.MPK) or a compress (for example, with WinZip) file with all related shapefile files (.SHP, .SHP, .XML, .SHX, .DBF, .SBN, .SBX, and .PRJ) AND any ArcMap Layer file (.LYR) and map document (.MXD) created to display the data as they intended in Windows Explorer.

- The second CD will contain the .pdf of Final As-built drawing and the GPS data collection as outlined above at completion of the project.

VII. Contact Information

All disc/USB submitted should be labeled and contain the following nine pieces of information:

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|----|------------------|--------------------------|
| 1. | DATE: | (Date submitted) |
| 2. | PROJECTNO: | (JCSD Project Number) |
| 3. | TRACT/PM NUMBER: | (TR, PM, PP, CUP #'s) |
| 4. | COMPANY NAME: | (Engineering Firm) |
| 5. | PROJECT CONTACT: | (Person Design) |
| 6. | PHONE NUMBER: | (999) 999-9999 |
| 7. | EMAIL ADDRESS: | ABC@gmail.com |
| 8. | FILE TYPE: | (.dwg, .shp, or .gdb) |
| 9. | PROJECT STATUS: | ("Design" or "As-built") |