

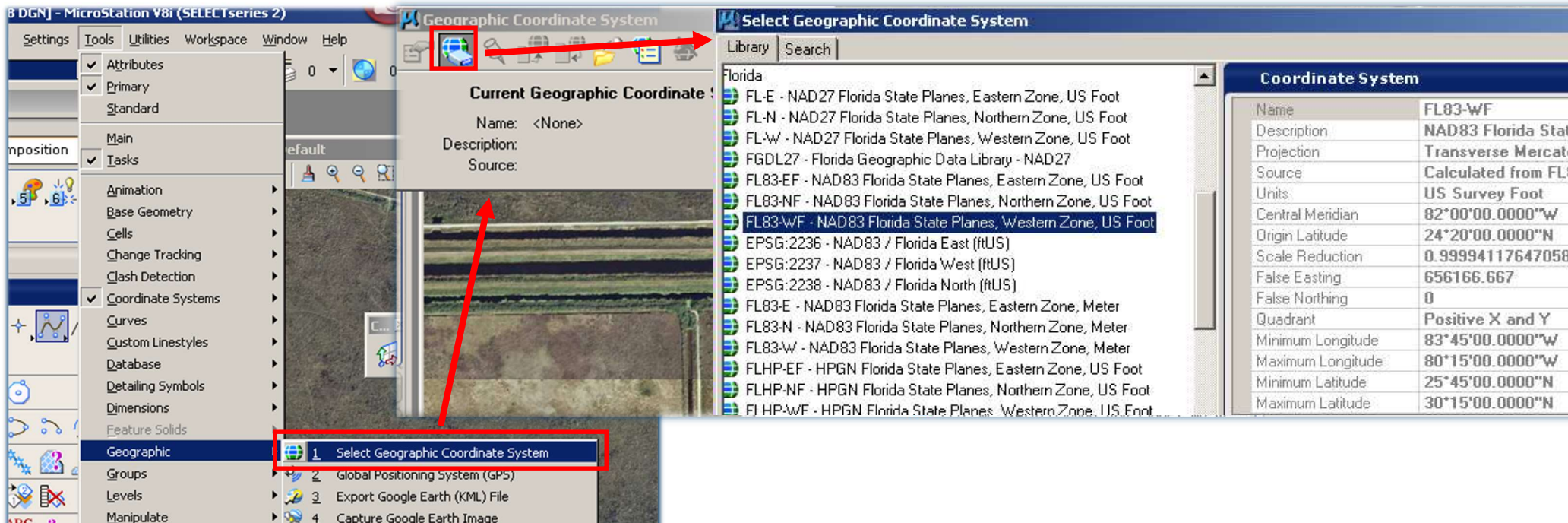
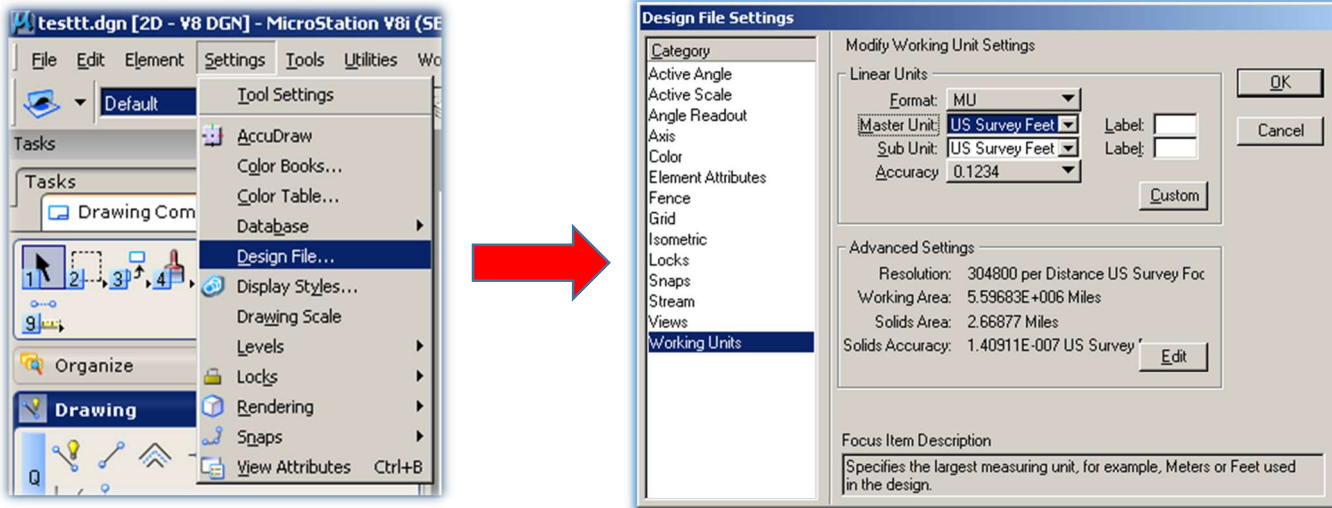
# Connecting to WMS Services with MicroStation and Civil 3D

## Contents

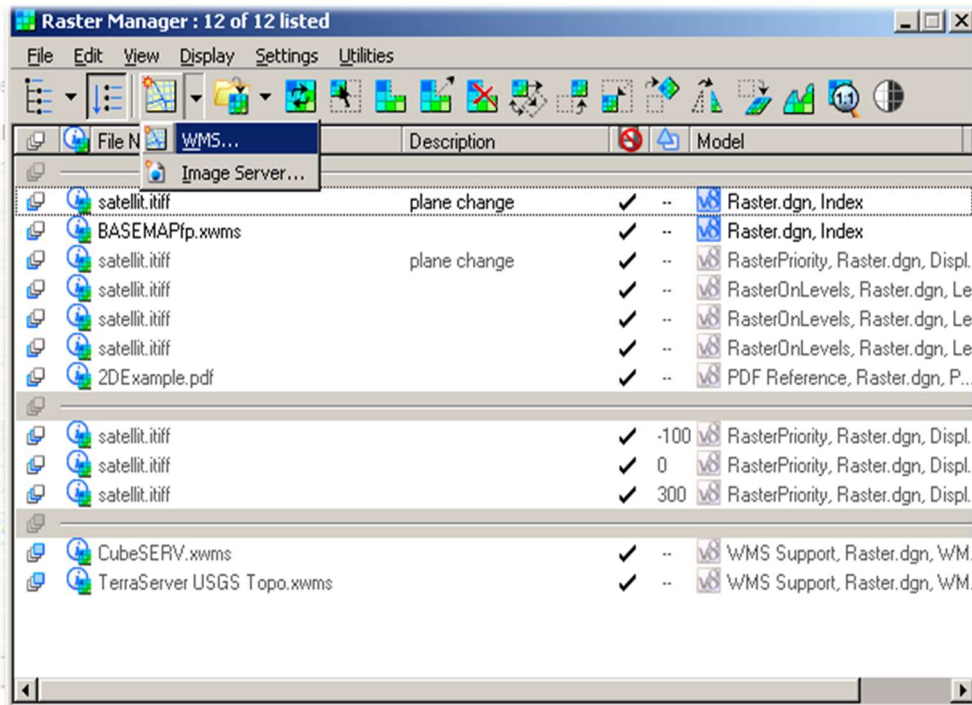
- Adding WMS layers in MicroStation ..... 2
  - Controlling the Map Extent of you WMS Layer ..... 7
- Adding a WMS layer in Civil 3D using a WMS Server Connection ..... 9
- Connecting to Services in Civil 3D using the ArcGIS for AutoCAD plugin ..... 13
- Tracking Down a Service’s Properties and WMS URLs ..... 15
- SMO’s Services ..... 16
- Please direct questions/comments to... ..... 16
- Appendix: Background/Ancillary Information ..... 17

## Adding WMS layers in MicroStation

1. Check and/or Set your DWG's units and coordinate system. Pay attention to the Min/Max Lat/Long of the Coordinate system (this effects the bounding box of the map you'll pull into your DWG) and the units so you can select the correct Coordinate System for the WMS later



2. Open Raster Manger > open the WMS dialog



### 3. Connect to the WMS Server using its WMS URL

Click on 'Servers...' to open the dialog for entering the URL:

[http://gisintra.dot.state.fl.us/ArcGIS/services/FL\\_DOT\\_Ortho\\_Imagery\\_ImageServer/MapServer/WMSServer](http://gisintra.dot.state.fl.us/ArcGIS/services/FL_DOT_Ortho_Imagery_ImageServer/MapServer/WMSServer)

Once connected, the 'Available Layers' will be populated. Select the layer you want and click 'Add to map'

The screenshot displays the WMS Map Editor interface. At the top, a 'Raster Manager' window shows a list of files, including 'gisintra.xwms' and 'Sumter\_S...'. The main window, titled 'WMS Map Editor - \\dotscosmo2\SMD\GeoMap\ImageServices\Projects\WMS\gisintra.xwms', has a URL field containing 'http://gisintra.dot.state.fl.us/ArcGIS/services/FL\_DOT\_Ortho\_Imagery\_ImageServer/MapServer/WMSServer'. A red box highlights the 'Servers...' button next to the URL field. To the right, a 'Servers Manager' dialog is open, showing a list of servers with a red box around the 'Create Server Definition' button. Below the 'Servers Manager' dialog, a 'URL' field is visible with a red box around it. The main window's 'Available Layers' section shows a tree view with 'Layers' expanded to reveal 'FL\_DOT\_Ortho\_Footprints', which is highlighted with a red box. Below this, an 'Add to map' button is also highlighted with a red box. A red arrow points from this button to the 'Map Layers' table. The 'Map Layers' table has the following data:

Layer Title	Layer Name	Style Title	Style Name
FL_DOT_Ortho_Footprints	0		

The right side of the main window shows the 'Settings' and 'Preview' tabs. The 'Settings' tab is active, displaying the following information:

**Server**

Title	FL_DOT_Ortho_Imagery_ImageServer
URL	http://gisintra.dot.state.fl.us/ArcGIS/se
Abstract	OGC:WMS

**Map Definition**

Layers	0
Range Method	Use range limits
Map Range Limits	<input type="checkbox"/>
Layer Ranges	Do not use as limit
Model Coordinate System	Use useful range as limit
Map Coordinate System	Use useful range as limit
Projected Coordinates	<input type="checkbox"/>
Maximum Y	2155065.22197368
Maximum X	1206519.17558097
Minimum Y	518620.080412101
Minimum X	82442.3251870021
Geo Coordinates	<input type="checkbox"/>
North	30°15'00.0000"N
East	80°15'25.4859"W
South	25°45'00.0000"N
West	83°44'34.5141"W
Coordinate System	EPSG:2237
Format	image/png
URL	http://gisintra.dot.state.fl.us/ArcGIS/services
Version	1.1.1

At the bottom of the main window, there are buttons for 'Save', 'Save and Attach...', and 'Cancel'.

- With the 'WMS Map Editor' dialog still open: Set the WMS Server connection's Settings  
 You'll typically want to specify the Coordinate System you want the WMS served in and the areal extent of the requested basemap . You may also want to choose a specific image format to receive the service in, such as JPEG or TIFF

*Setting the CS for the WMS*

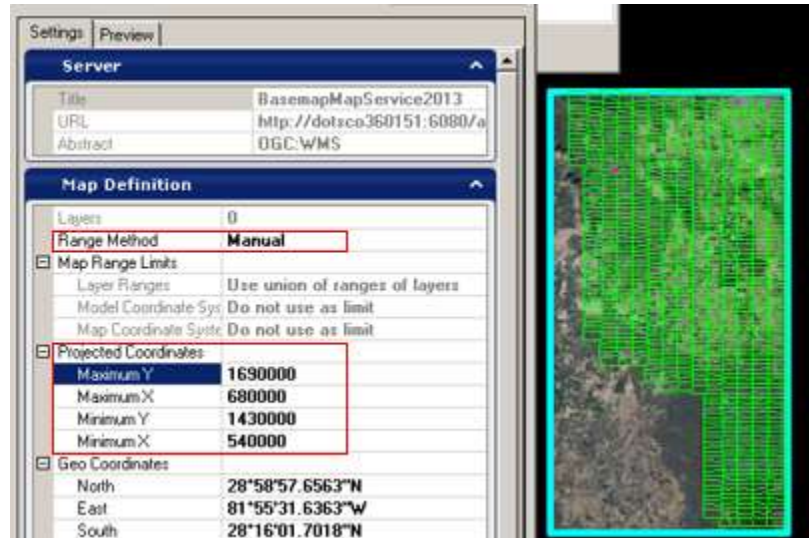
**Click here to open the 'Select Coordinate System' dialog**

Name	Description	Units	Minimum Latitude	Maximum Latitude	Minimum Longitude
EPSG:102660	NAD 1983 StatePlane Florida North FIPS 0903 Feet	US Survey Foot	29°00'00.0000"N	31°20'00.0000"N	94°30'00.0000"W
EPSG:2236	NAD83 / Florida East (NUS)	US Survey Foot	24°20'00.0000"N	90°00'00.0000"N	82°44'34.0000"W
EPSG:2237	NAD83 / Florida West (NUS)	US Survey Foot	24°20'00.0000"N	90°00'00.0000"N	83°44'34.0000"W
EPSG:2238	NAD83 / Florida North (NUS)	US Survey Foot	29°00'00.0000"N	31°20'00.0000"N	94°30'00.0000"W
EPSG:2777	NAD83(HARN) / Florida East	Meter	24°20'00.0000"N	90°00'00.0000"N	82°44'34.0000"W
EPSG:2778	NAD83(HARN) / Florida West	Meter	24°20'00.0000"N	90°00'00.0000"N	83°44'34.0000"W
EPSG:2779	NAD83(HARN) / Florida North	Meter	29°00'00.0000"N	31°20'00.0000"N	94°30'00.0000"W
EPSG:2881	NAD83(HARN) / Florida East (NUS)	US Survey Foot	24°20'00.0000"N	90°00'00.0000"N	82°44'34.0000"W

**Note EPSG ID and Name equivalences**

Key Name	EPSG Code	Description
FL83-EF	2236	NAD83 Florida State Planes, Eastern Zone, US Foot
FL83-NF	2238	NAD83 Florida State Planes, Northern Zone, US Foot
FL83-WF	2237	NAD83 Florida State Planes, Western Zone, US Foot
FL83-E	26368	NAD83 Florida State Planes, Eastern Zone, Meter
FL83-N	26360	NAD83 Florida State Planes, Northern Zone, Meter
FL83-W	26359	NAD83 Florida State Planes, Western Zone, Meter

*Setting the Extent of the requested WMS by manually entering Min/Max*



**Range Method= Use Range Limits**  
 Allows you to specify the requested map extent based on the Coordinate System range limits (their min/max lat/long)

Map Definition	
Layers	0
Range Method	Use range limits
Map Range Limits	
Layer Ranges	Use union of ranges
Model Coordinate System	Use useful range
Map Coordinate System	Use useful range

**Range Method = Manual**  
 Then: Enter the bounding Min/Max in the Projected Coordinates fields for your AOI

5. Click Save and Attach

This will save a .xwms file of this connection along with WMS Map Definition setting,

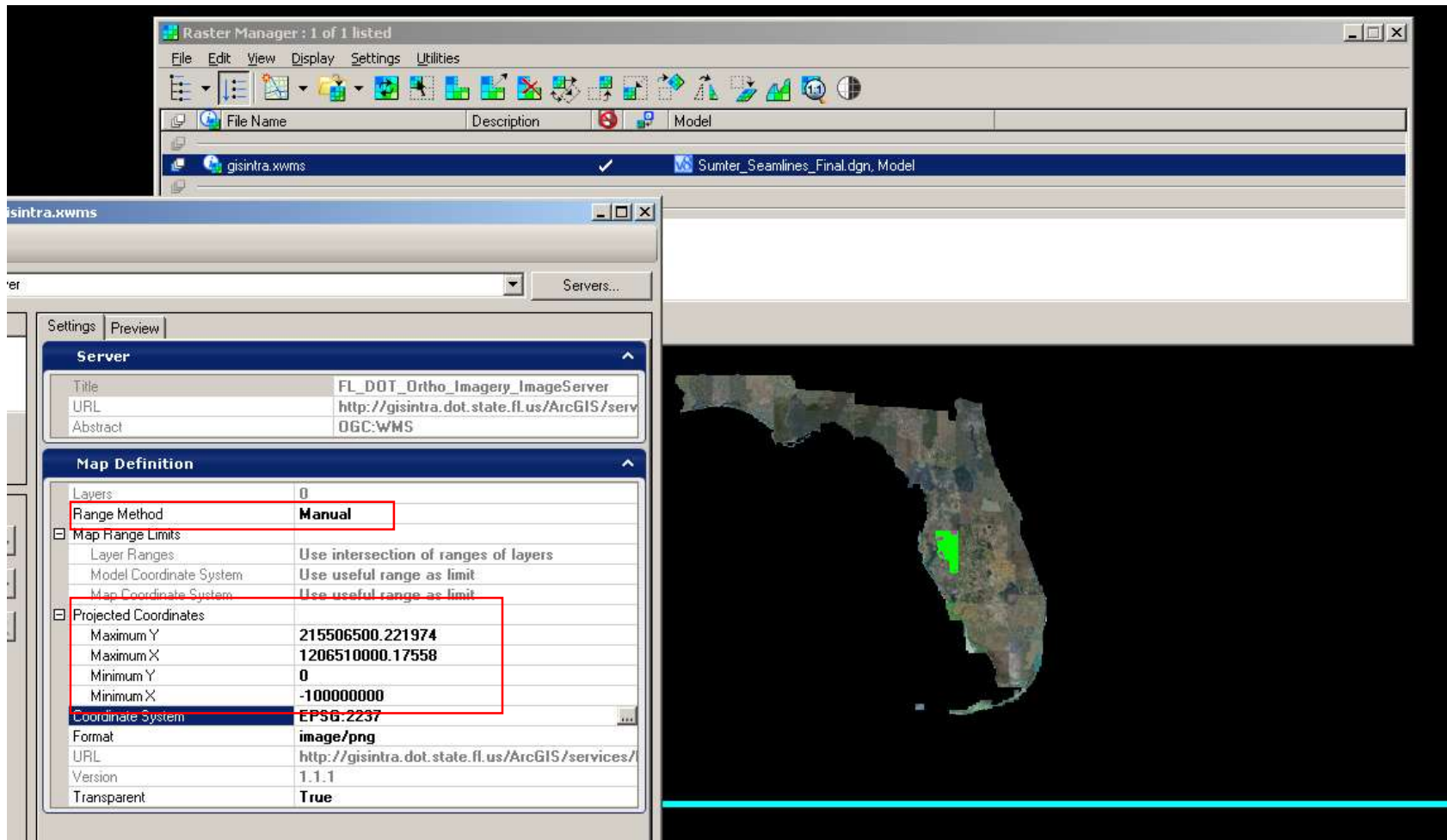
This .xwms file lets you simply attach the WMS to a DWG in the future, as you would with a typical raster. The .xwms file is essentially an XML file that stores the connection information and the Map Definitions settings you specified for the WMS.

The WMS layer should now be visible in your drawing. If not, double check your DWG/WMS connection's coordinate system & units

## Controlling the Map Extent of your WMS Layer

The default setting for a WMS' Map Definition Settings is **Range Method: Use Range Limits**. This will limit the basemap's extent according to the range limits of the coordinate systems involved (i.e. their areas of use). In every case when doing design work you'll want to limit the basemap according to these settings and ensure you are connecting to WMS with the right coordinate system for your project's area (i.e. the coordinate systems of the DGN and the WMS connection's settings have the same datum, units and state plane zone). The spatial alignment will degrade outside of the area of use. The basemap is served to you in the coordinate system you select, and in general, should be viewed in the corresponding state plane zone.

If this need for accuracy isn't necessary for your purposes for whatever reason, you can set the Range Method = Manual and then modify the Min/Max values of the Latitude and Longitude. E.g. below I've manually adjusted these values to show the entire statewide basemap... but again, for design purposes, you'll want to stick to the zone limits for accuracy.



The screenshot displays the ArcGIS interface with the 'Raster Manager' window open. The 'gisintra.xwms' layer is selected, and its settings are shown in the 'Settings' pane. The 'Map Definition' section is expanded, showing the following configuration:

Server	
Title	FL_DOT_Ortho_Imagery_ImageServer
URL	http://gisintra.dot.state.fl.us/ArcGIS/serv
Abstract	OGC:WMS

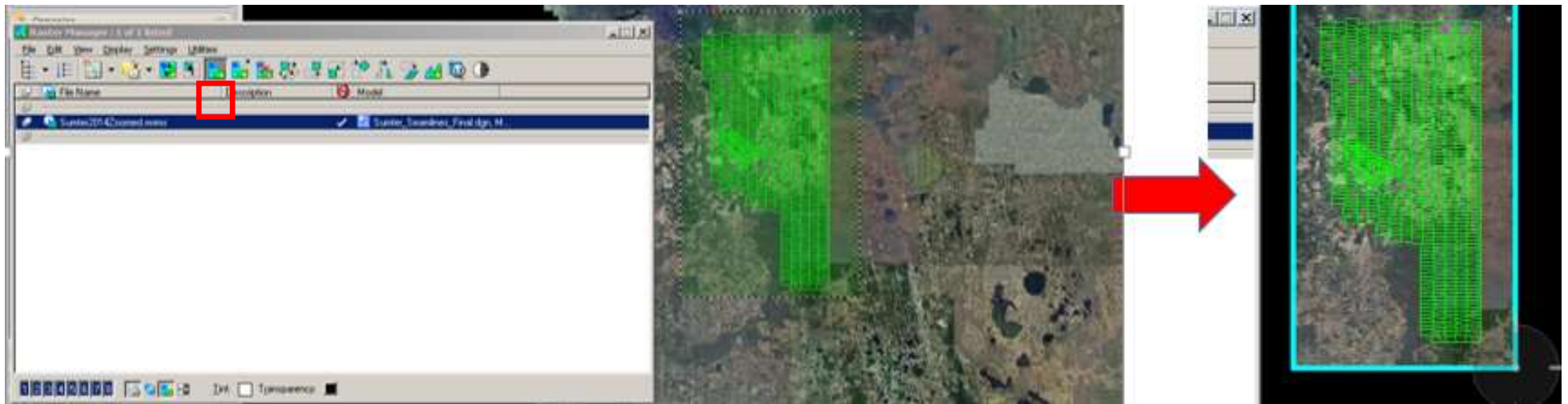
  

Map Definition	
Layers	0
Range Method	Manual
Map Range Limits	
Layer Ranges	Use intersection of ranges of layers
Model Coordinate System	Use useful range as limit
Map Coordinate System	Use useful range as limit
Projected Coordinates	
Maximum Y	215506500.221974
Maximum X	1206510000.17558
Minimum Y	0
Minimum X	-100000000
Coordinate System	EPSG:2237
Format	image/png
URL	http://gisintra.dot.state.fl.us/ArcGIS/services/
Version	1.1.1
Transparent	True

The background map shows the state of Florida with a green rectangular area highlighting a specific region in the central part of the state.

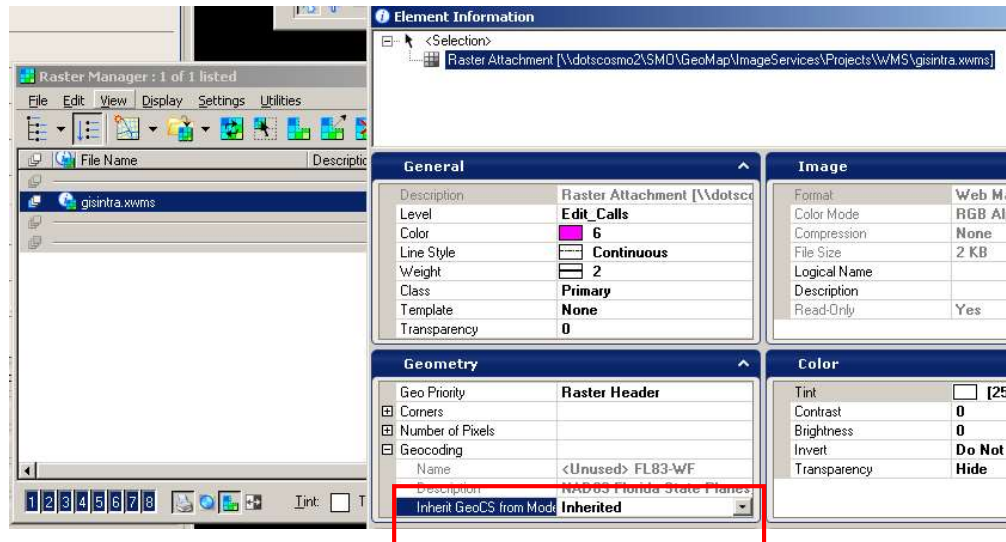
6. Optional: further refine the extent of the WMS layer by using the Raster Manager's Clip tool

Activate the Clip tool in Raster Manger > draw you bounding box in your DWG > *accept* the Clip to redefine the base map's extent



There's also a Modify Clip tool on the toolbar which lets you interactively redefine the extent, as well as a Remove Clip tool to undo the clip.

**\*Note:** for Clip to be functional you may need to first modify the properties in the .xwms by setting the Geometry to "Inherit GeoCS from Model". Double Click on the xwms file in Raster Manager to open the Element Information window > navigate to the Geometry tab and set Inherit GeoCS from Model = Inherited.





## Adding a WMS layer in Civil 3D using a WMS Server Connection

### 1. Set and/or check your coordinate system.

Ensure you've selected the coordinate system on the appropriate datum, in the correct state plane zone and uses the correct units.

Note the chosen coordinate system's EPSG Code for future reference

Command line:  
ADESETCRDSYS



**Assign Global Coordinate System**

Current Drawing  
Code: FL83-WF  
Description: NAD83 Florida State Planes, West Zone, US Foot

Source Drawings  
Code:   
Description:   
Number of selected source drawings: 0

Buttons: OK, Cancel, Help

**Coordinate System Library**

Show:  All  Projected  Geographic  Arbitrary  Datum  Ellipsoid  Geodetic Transformation Path  Geodetic Transformation

Status: Up to date Code type: Autodesk Category: No filter selected Unit: US Survey Foot

Search: FL

Status	Code	EPSG code	Description	Unit	Definition type	Referenced
✓	FL83-EF	2236	NAD83 Florida State Planes, East Zone, US Foot	US Survey Foot	(P)	NAD83
✓	FL83-NF	2238	NAD83 Florida State Planes, North Zone, US Foot	US Survey Foot	(P)	NAD83
✓	FL83-WF	2237	NAD83 Florida State Planes, West Zone, US Foot	US Survey Foot	(P)	NAD83
✓	FL-E	26758	NAD27 Florida State Planes, East Zone(901), US Foot	US Survey Foot	(P)	NAD27
✓	FLHP-EF	2881	Florida East Zone, US FT (or use HARN/FL.FL-EF)	US Survey Foot	(P)	HPGN
✓	FLHP-NF	2883	Florida North Zone, US FT (or use HARN/FL.FL-NF)	US Survey Foot	(P)	HPGN
✓	FLHP-WF	2882	Florida West Zone, US FT (or use HARN/FL.FL-WF)	US Survey Foot	(P)	HPGN
✓	FL-N	26760	NAD27 Florida State Planes, North Zone(903), US Foot	US Survey Foot	(P)	NAD27
✓	FlorenceWI-F	-	Wisconsin Florence, US FT (or use HARN/WI.Florence...)	US Survey Foot	(P)	HPGN
✓	FL-W	26759	NAD27 Florida State Planes, West Zone(902), US Foot	US Survey Foot	(P)	NAD27
✓	HARN/FL.FL-EF	2881	HARN/FL Florida State Planes, East Zone, US Foot	US Survey Foot	(P)	HARN/FL
✓	HARN/FL.FL-NF	2883	HARN/FL Florida State Planes, North Zone, US Foot	US Survey Foot	(P)	HARN/FL
✓	HARN/FL.FL-WF	2882	HARN/FL Florida State Planes, West Zone, US Foot	US Survey Foot	(P)	HARN/FL
✓	HARN/WI.Flore...	-	Wisconsin County Systems: Florence County, US Foot	US Survey Foot	(P)	HARN/WI

## 2. Establish a WMS Server connection

Open the Task Pane/Display Manger Tab > click the Data icon > 'Connect to Data...' > 'Add WMS Connection'

With the Add New Connection Dialog open, enter the URL of the WMS Server, provide a name for the connection and select the version of the WMS that the service is (If unsure, you can check the WMS version via a GetCapabilities URL request. Example shown below)

[http://gisintra.dot.state.fl.us/ArcGIS/services/FL\\_DOT\\_Ortho\\_Imagery\\_ImageServer/MapServer/WMSServer](http://gisintra.dot.state.fl.us/ArcGIS/services/FL_DOT_Ortho_Imagery_ImageServer/MapServer/WMSServer)

Note: secured services may prompt you for a login. Our services are hosted via our DOT intranet, so you can leave them blank

Workflow for connecting to a WMS

Command line: MAPWSPACE

Leave the UN and PW blank

Checking the WMS version of a Service: example of a GetCapabilities request via a Browser/URL

```
<?xml version="1.0" encoding="UTF-8" ?>
- <WMS_Capabilities version="1.3.0" xmlns="http://www.opengis.net/wms" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://schemas.opengis.net/wms/1.3.0/capabilities_1_3_0.xsd http://www.esri.com/wms http://dotsco360151-6080/arcgis/services/BasemapMapService2013/MapServer/WMSServer?request=GetSchemaExtension" ?>
- </Service ?>
```

### 3. Use the WMS Connection to add WMS layers to your drawing

Select from the list of available WMS layers, Select the Coordinate System you want for the WMS, adjust other options as desired

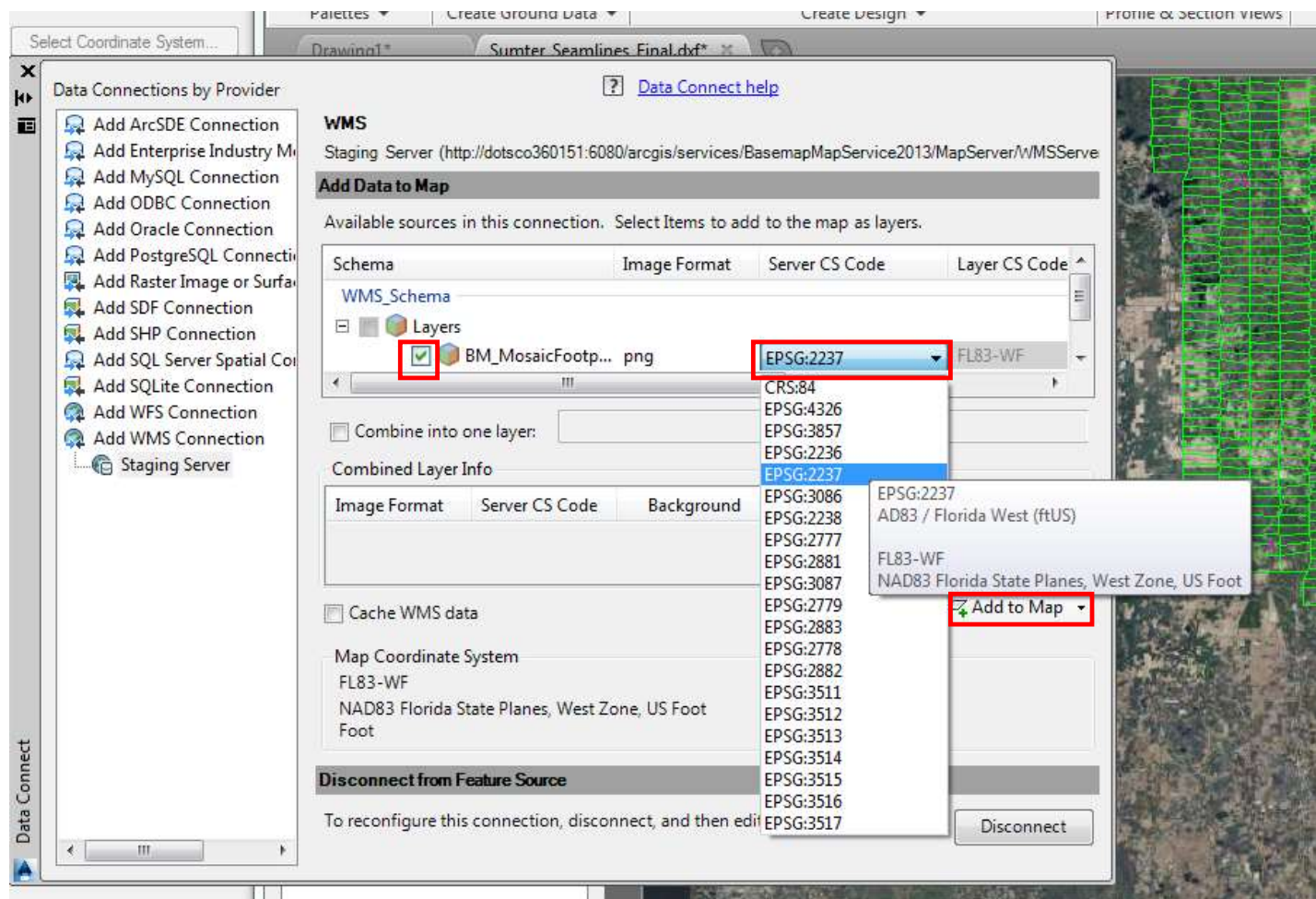
**Note:** You may select the Image Format for the WMS. PNG supports transparency for 'no data' areas, but also seems to read whites as 'no data'

Once the settings are selected > 'Add to Map'

Check the box for the Layer you want

Select the CS you want it in

> 'Add to Map'

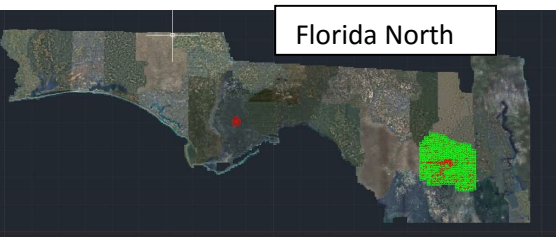
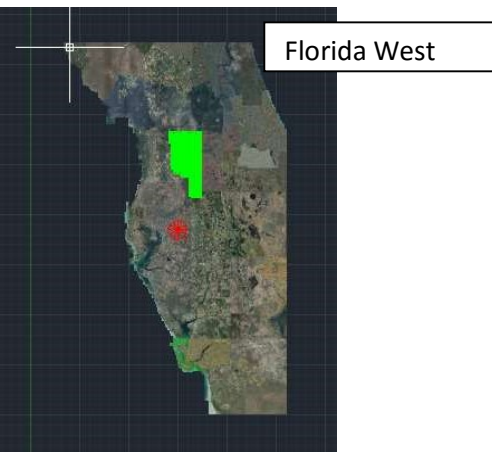


4. Adjust the display extent of the WMS if necessary

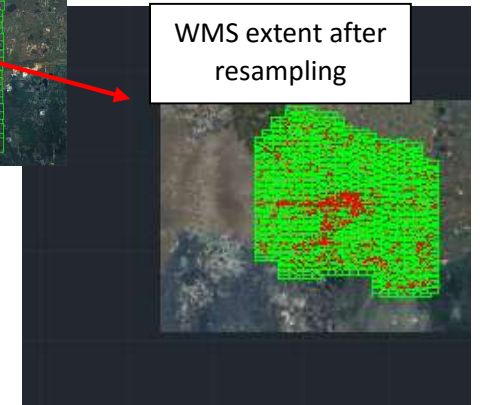
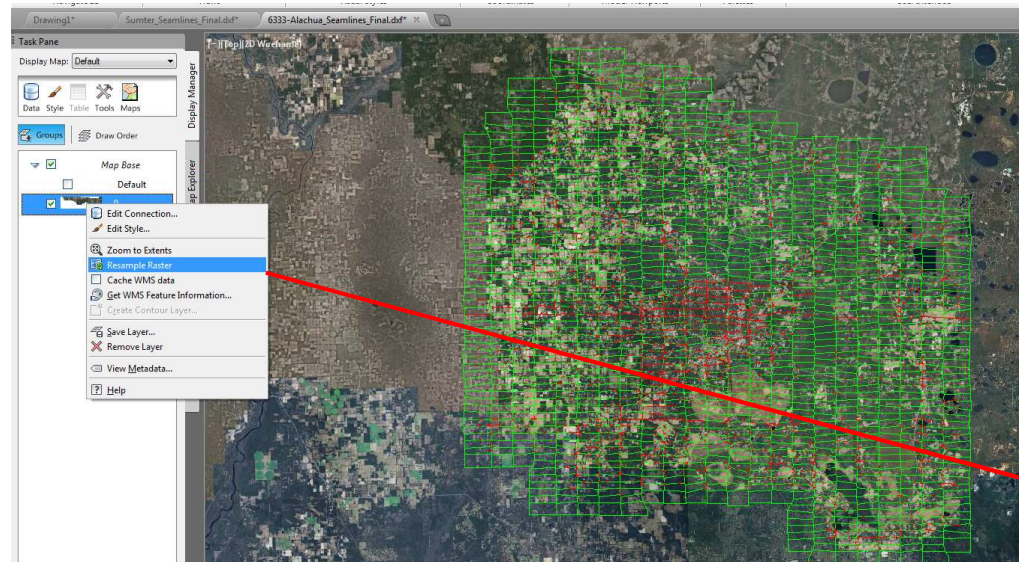
By default, Civil 3D limits the WMS request to the approximate area of use for the coordinate system specified in the connection settings

You can refine the display extent of the WMS by zooming to your AOI, then right-clicking on the WMS layer in the Pane > then using 'Resample Raster':

WMS extents are limited by the approx. area of use for the selected CS



'Resample Raster' will set the WMS extent to the current view



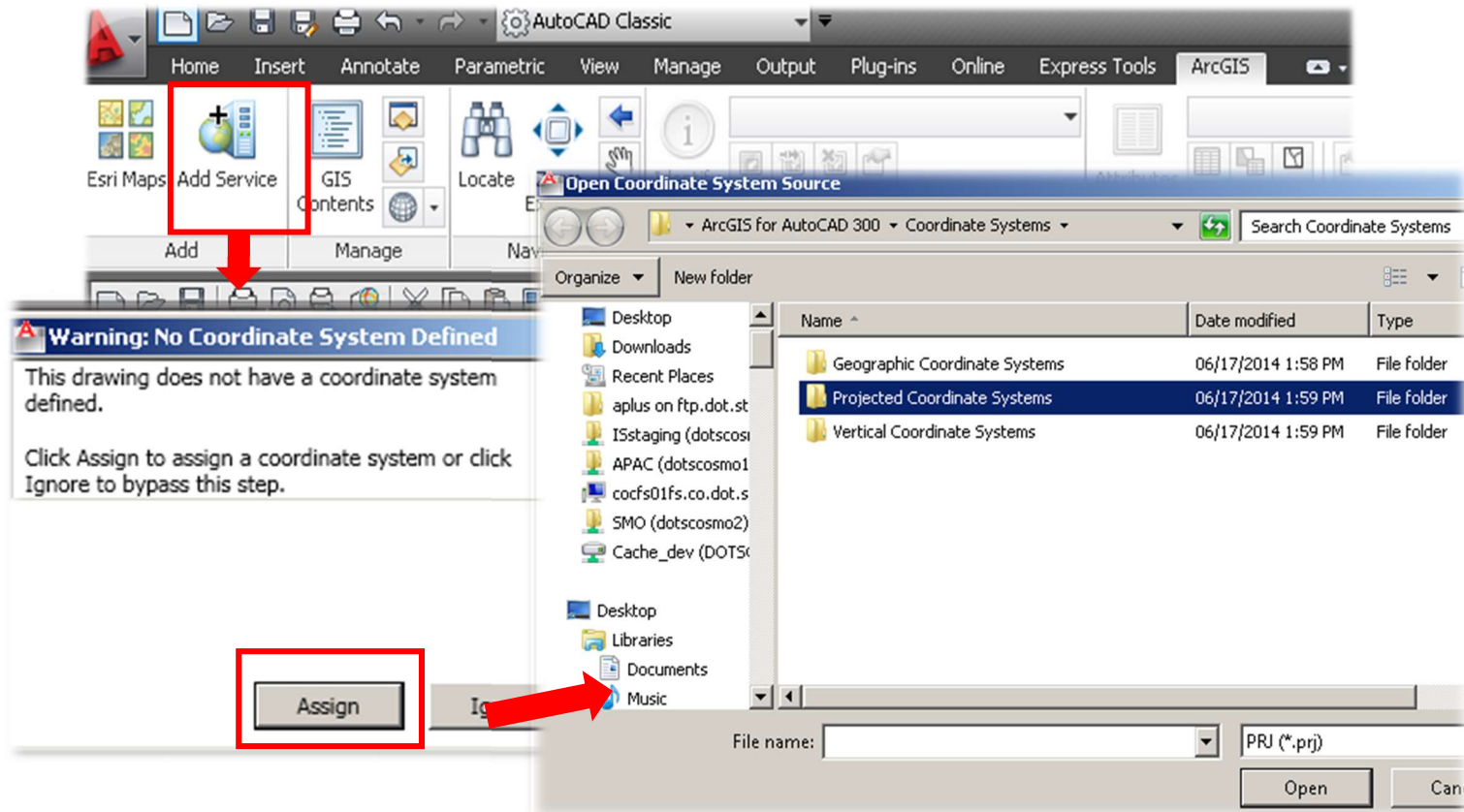
## Connecting to Services in Civil 3D using the ArcGIS for AutoCAD plugin



1. Download and install the plug-in: <http://www.esri.com/software/arcgis/arcgis-for-autocad>

Once installed, you'll have an ArcGIS menu added to your Civil 3D ribbon

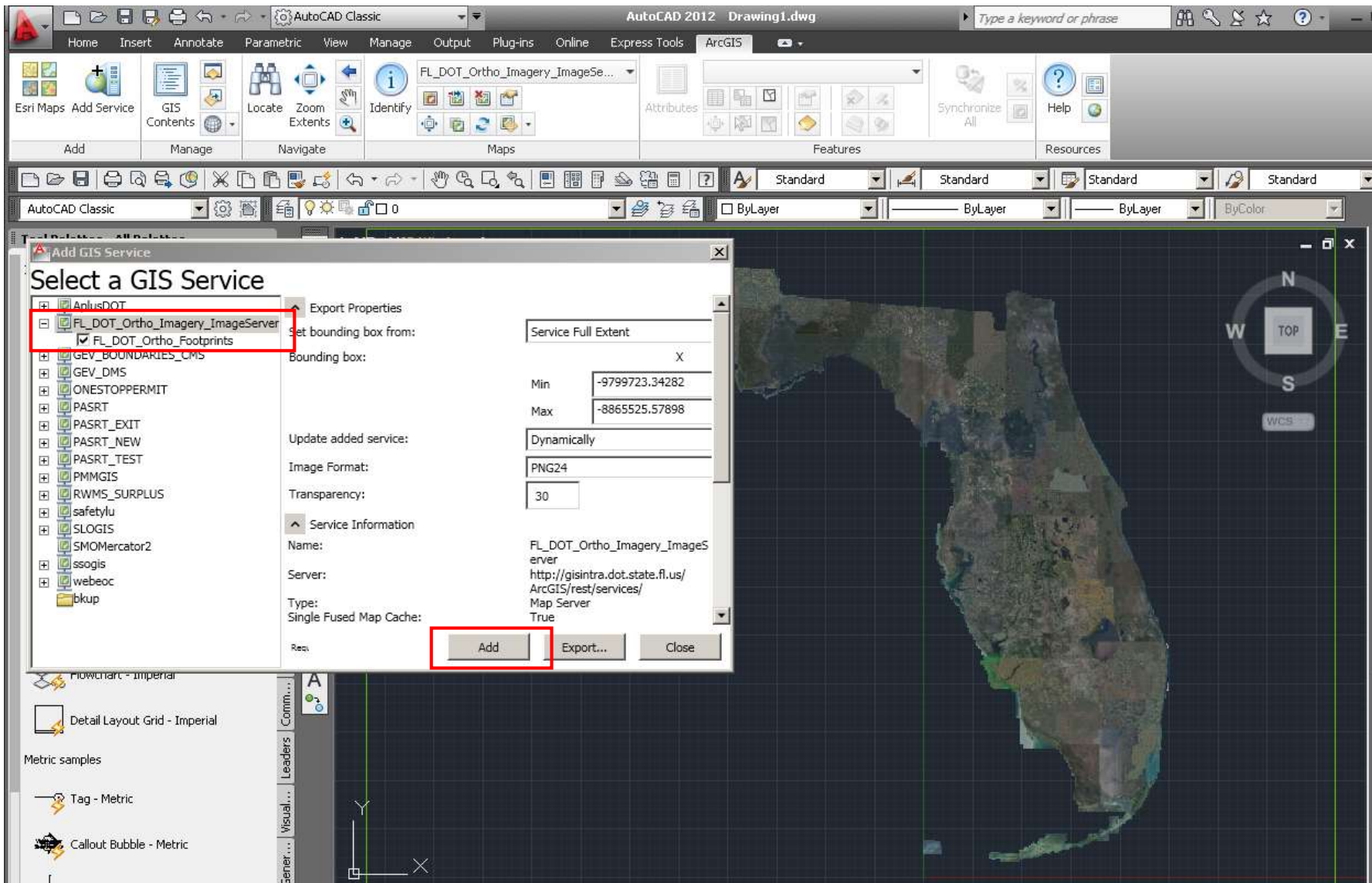
2. Use the ArcGIS ribbon menu to connect to a server via 'Add Service'. If there's no assigned coordinate system, you'll get a prompt (shown below) Follow the prompts to connect to and add the service



3. Connect to the Server using its root URL for the hosted services. E.g. <http://gisintra.dot.state.fl.us/ArcGIS/rest/services/>

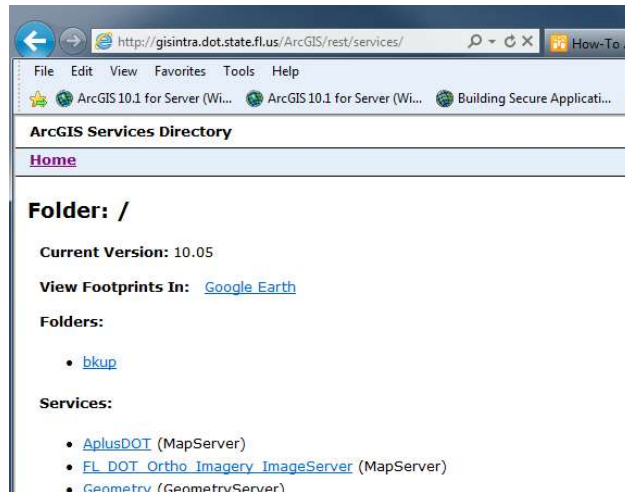
You'll then have access to the various types of GIS services provided, as well as more advanced settings for the service requests and limited GIS functionality (e.g. access to the attributes/database behind the service, this will vary depending on the service).

Add layers as desired

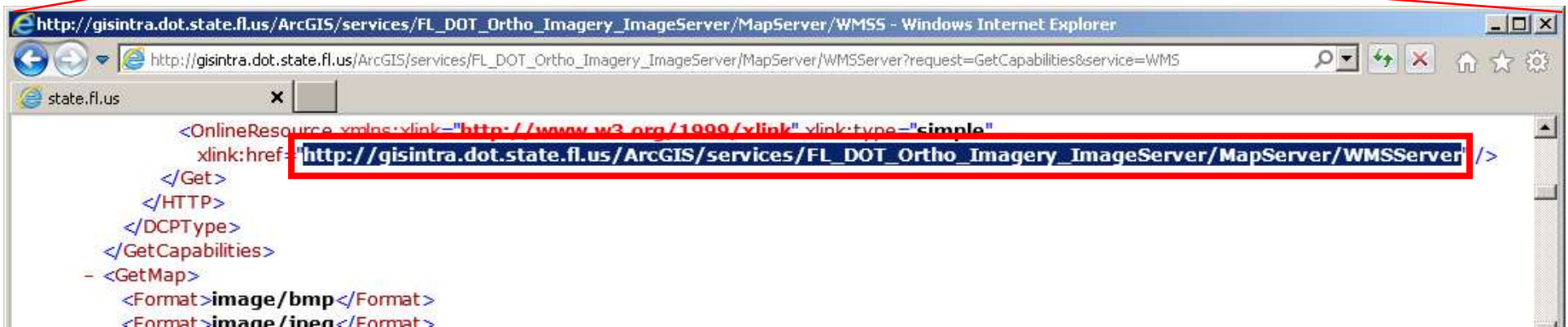
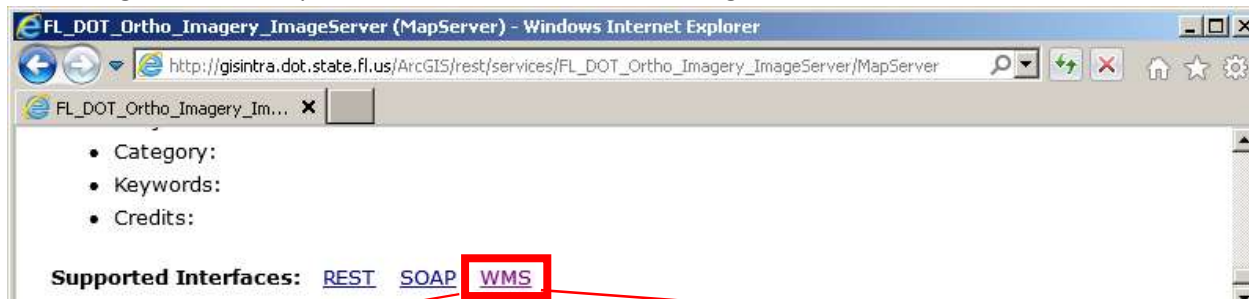


## Tracking Down a Service's Properties and WMS URLs

- Services produced with ESRI software will often have their service directories accessible via an internet browser. E.g. Our services' directory can be reached via <http://gisintra.dot.state.fl.us/ArcGIS/rest/services/>. You can browse the service links to see their properties.



- Services that have an accompanying WMS version of the service will have a WMS link in their service properties directory that will open a new window containing information specific to the WMS service, including the URL needed to connect to it:



## SMO's Services

- Our Main Production Server (Shared with other offices):

<http://gisintra.dot.state.fl.us/ArcGIS/rest/services/>

Access point for numerous types of services

- Our basemap/aerial orthophoto map service

[http://gisintra.dot.state.fl.us/ArcGIS/rest/services/FL\\_DOT\\_Ortho\\_Imagery\\_ImageServer/MapServer](http://gisintra.dot.state.fl.us/ArcGIS/rest/services/FL_DOT_Ortho_Imagery_ImageServer/MapServer)

- **WMS URL** for SMO's orthophoto basemap:

[http://gisintra.dot.state.fl.us/ArcGIS/services/FL\\_DOT\\_Ortho\\_Imagery\\_ImageServer/MapServer/WMServer](http://gisintra.dot.state.fl.us/ArcGIS/services/FL_DOT_Ortho_Imagery_ImageServer/MapServer/WMServer)

### Metadata about our basemap map service

- The basemap is created from an image mosaic that places our most recent imagery on top (there's overlap between datasets and each county is flown ~ every 3 years)
- The source imagery are the county datasets in our Aerial Photo Archive Collection  
[http://www.dot.state.fl.us/surveyingandmapping/documentsandpubs/aerial\\_years.pdf](http://www.dot.state.fl.us/surveyingandmapping/documentsandpubs/aerial_years.pdf)
- Scales available of our map service:
  - When we have recent 6 inch GSD (ground sampling distance) imagery available for an area, we will create the basemap down to a scale of 1:564
  - Otherwise, urban areas/areas around highways will have the basemap created down to a scale of 1:1128
  - Rural areas, not in close proximity to a major road, have their basemap created down to 1:4513

## Please direct questions/comments to...

/discovered errors/requests for service modifications, updates, improvements and future imagery-based services to:

Michael Nesius (current basemap administrator): [Michael.nesius@dot.state.fl.us](mailto:Michael.nesius@dot.state.fl.us) 850-414-4669 or

SMO's Image Services section: [imageservices@dot.state.fl.us](mailto:imageservices@dot.state.fl.us) 850-414-4111



## Appendix: Background/Ancillary Information

A **Web Mapping Service (WMS)** is a standard protocol for serving georeferenced maps. It is a widely used means of achieving interoperability between GIS and CAD software. This interoperability is achieved by making a map service accessible via URL requests that include information about the extent of the map requested, the coordinate system for the map, image format and a few other parameters. A WMS is essentially a bunch of snapshots/views of the underlying GIS map data. As such, a WMS loses the database related functionality that the map has in the native GIS, but it's great if you just need the visual of the basemap. One other important note, is that a WMS can only be reprojected to a coordinated system that has been added to the WMS' service properties (these supported coordinate systems show up in the drop down lists available when adding a WMS layer to your drawing). If you don't see the coordinate system you need on the list, let us know.

**Available Scale Levels for the WMS:** Because of limited resources, the basemap wasn't created for all scales in all areas. The default behavior of Civil 3D and MicroStation doesn't resample the WMS image when zooming in passed the available scale level (so the basemap will disappear when zoomed in too far).