

2008 Roads and Bridges User Conference - East

WS 08

Introduction to Bentley OnSite

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Introduction to Bentley OnSite

Module Overview

In this module you will take intelligent electronic design data and move it to a handheld device, to provide field personnel the use of the data to perform stakeouts and inspections. This workshop demonstrates the steps to automate the movement of inspection, stakeout, and data collection information into a Field Data Product Database to increase inspector productivity.

Module Prerequisites

- Understanding of surveying principles
- Understanding of inspecting principles
- General understanding of D&C Manager
- General understanding of Quantity Manager

Module Objectives

Upon completion of this module, you will be able to:

- Create a Design Archive from multiple sources
- Inspect the data created from the Design Archive
- Create stake points and stakeout multiple parts of the design
- Use the Diary command to document detailed site information
- Generate as-builts from the Field Product Database

Introductory Knowledge

Before you begin this module, let's define what you already know.

Questions

1. Is a design archive the same thing as a project?
2. Is a fence a linear feature?
3. When you stake out a curb and gutter, what offset do you use to set your hub and tack?
 - a. 2'
 - b. 3'
 - c. 4'
 - d. Whatever the contractor requires.
4. Have you ever written notes on a piece of paper and when you needed the information, couldn't find it?
5. Have you ever been on a job site and thought things just didn't look right?

Answers

1. Yes.

For InRoads users a project consists of Geometry files (*.alg), Drainage files (*.sdb), Quantity Manager files (*.mdb), Project Model Surfaces (*.dtm), Cad files (*.dgn or *.dwg)

For GEOPAK users a project could consist of Geometry files (*.xml), Drainage files (*.gdf), Quantity Manager files (*.mdb), Project Model Surfaces (*.gsf or *.tin), Cad files (*.dgn)

For Bentley MX users a project could consist of Cad Files (*.dgn), Geometry files, Drainage files, Quantities files, Surfaces files.

2. Yes

Inspection is broken up into 3 types: Each, Linear, and Area.

Features classified as Each typically include fire hydrant, power pole, mail box, light standard, and inlet.

Features classified as Linear typically include curb and gutter, striping for roads, piping, fencing.

Features classified as Area typically include sidewalks, concrete pads, asphalt, concrete ditches.

3. Whatever the contractor requires.

With Bentley OnSite you can stake points at any offset the contractor requires and if you need to change an offset at one station you can do it on the fly.

4. Probably yes.

With Bentley OnSite you can take notes, pictures, make a sketch, even make a short audio file. The information can be stored at the location where the notes apply.

5. I think everyone has.

Eyes can be deceiving. With Bentley Onsite you have the drawings on your laptop or Pocket PC and you can walk to the exact point North, East, and Elevation.

Design Archive Creation

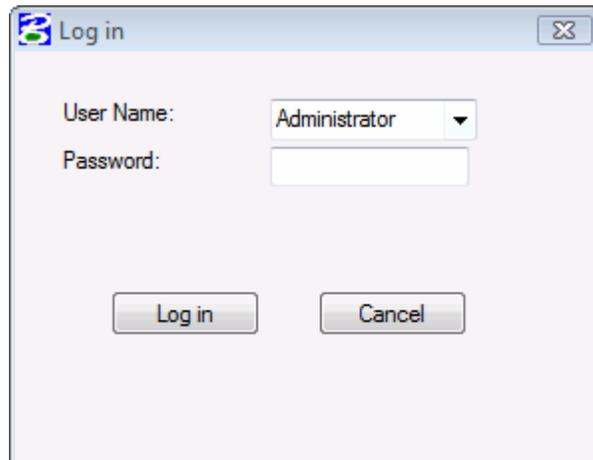
Bentley OnSite is broken up into two distinct applications: Bentley OnSite Administrator and Bentley Inspect/Stakeout. Bentley OnSite Administrator is used for creating the Design Archive, managing users, transferring projects, and creating reports. Bentley Inspect/Stakeout is used in the field for inspection, stakeout, data collection, and surface analysis.

The Design Archive is the common read-only format where design data is stored that enables you to Inspect and Stakeout those records in the field. Design Archives can be composed of one or multiple types of data. The following design data is supported: Geometry (from LandXML or InRoads .alg), Drainage (LandXML, GEOPAK.gdf, InRoads.sdb), Quantity Manager Databases (common format across Bentley Civil products), Surfaces (LandXML, GEOPAK.tin, GEOPAK.gsf, InRoads.dtm) CAD files (Microstation.dgn, AutoCad.dwg).

➔ **Exercise: In this exercise we will import at least one of each of the different types of data, create a Design Archive and review the data in Bentley OnSite Administrator.**

1. Start Bentley OnSite Administrator from either the shortcut on the desktop or from *Start > All Programs > Bentley > OnSite > Administrator*.

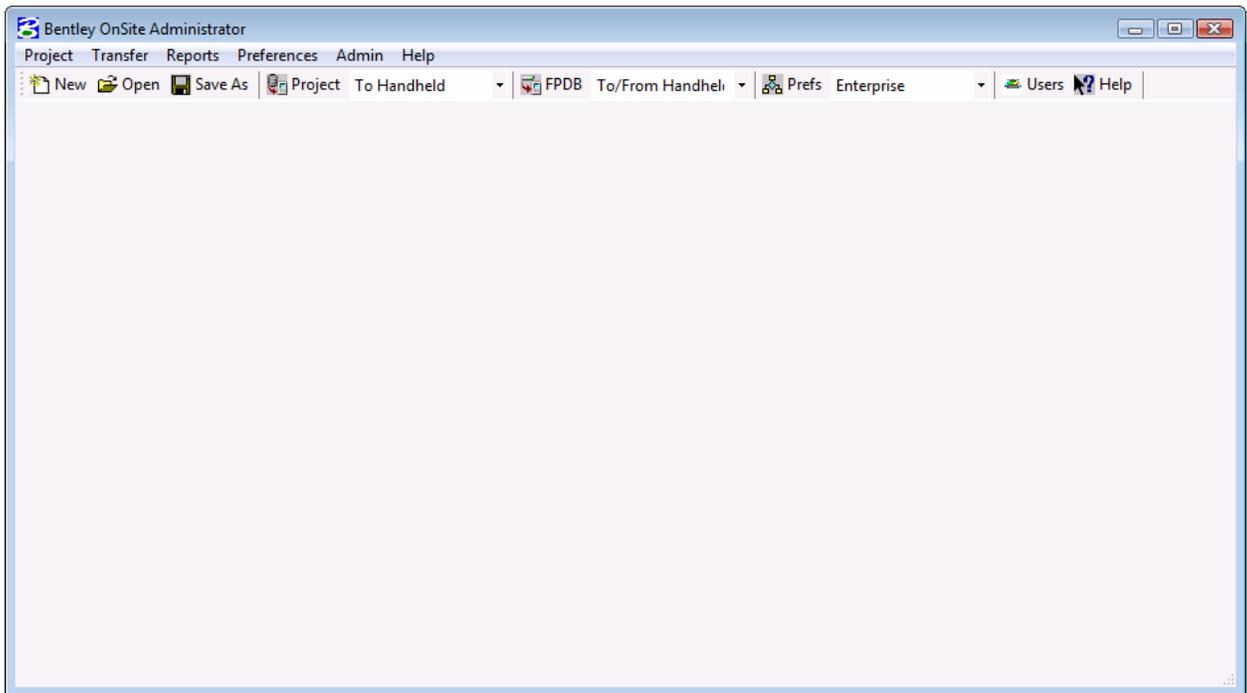
The Log in screen appears



2. The User Name should be left as Administrator and there is no Password. Select *Log In*.

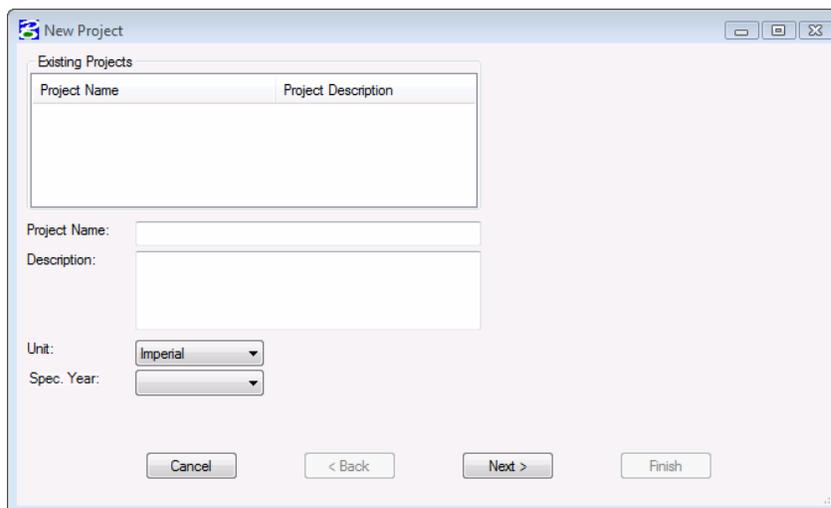
User Names are used to keep track of all changes in a project. Every time a change is made to a project a User Name and time stamp is stored. This is used for keeping track of who did what and when in the field. For this topic we will be using only Administrator.

The main Administrator dialog appears.



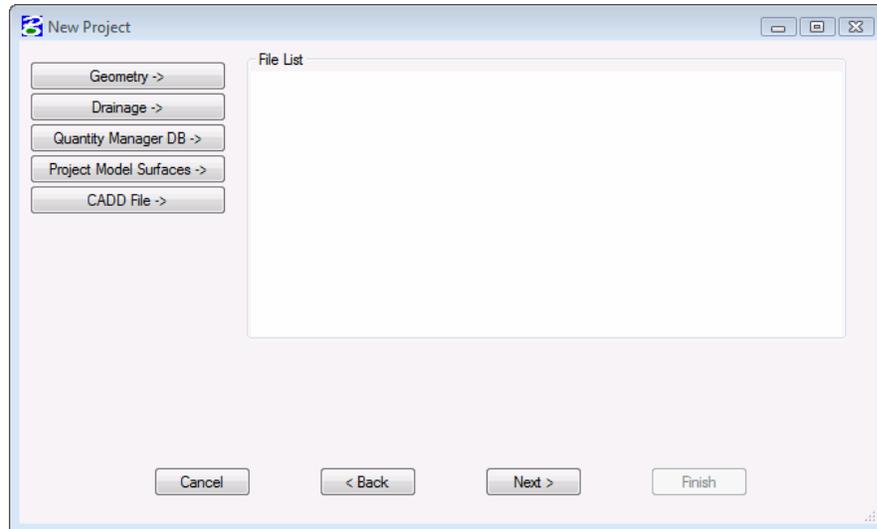
3. The project location needs to be set. Set the Project Data Location by selecting **Preferences > Project Data Location**, then browse and select the following directory *C:\2008 RBUC\Introduction to Bentley OnSite\Data\Projects*.
4. Select *OK*.
5. We now can begin creating a new project. Select *New* from the tool bar or select **Project > New** from the pull down menu.

The New Project dialog appears.



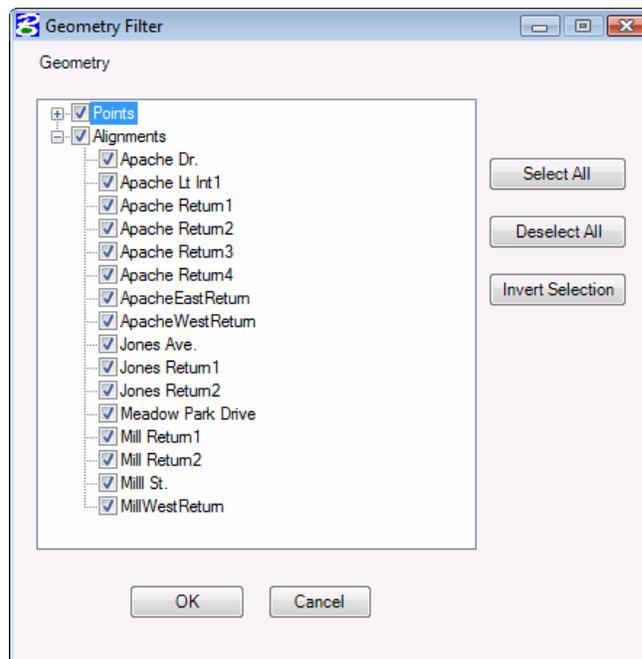
6. Enter *WS08* as the project name and *OnSite Training* as the Description. Select *Imperial* for the Unit and *2006* for the Spec Year.

7. Select *Next*.
8. Select the different types of design data to add to the Design Archive. On the New Project dialog select **Geometry**.



9. From the Select Geometry Files dialog set the files of type to InRoads Geometry files (*.alg), then browse to: **C:\2008 RBUC\Introduction to Bentley OnSite\Data\Design Data** and select **Meadow Park.alg**.

The Geometry Filter dialog appears, allowing you select some or all of the data contained in the geometry file.



10. Select **OK**.

The New Project dialog reappears. Notice that the Geometry file is added to the File List.

11. Select the *Drainage* button, set the files of type to *InRoads Storm and Sanitary (*.sdb)*, then select the *Meadow Park.sdb*. Select *Open*

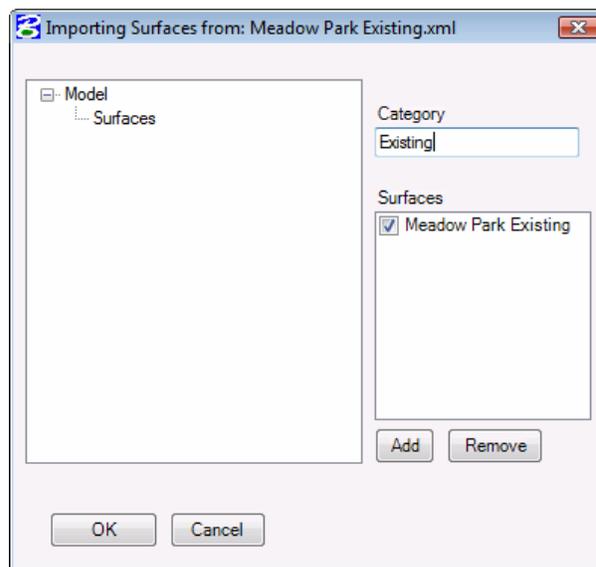
The Quantity Manager Database is next. Quantities can be extracted from Bentley GEOPAK, InRoads, and MX, through multiple tools.

12. Select *Quantity Manager DB*, then select the *Quantities.mdb* and select *Open*.

Surfaces are handled a little differently. Bentley Administrator allows you to create categories for the surfaces to reside in. These categories enable you to quickly identify and turn on and off multiple items.

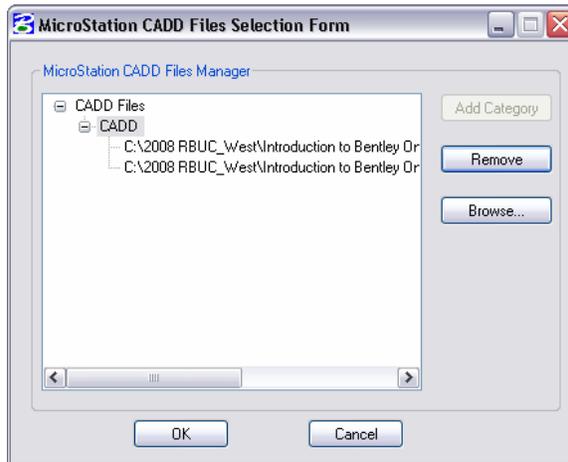
13. Select the **Project Model Surfaces** button, then set the files of type to *InRoads DTM (*.dtm)*, and select both the surfaces *Meadow Park Existing.dtm* and *Meadow Park Proposed.dtm*.

The Importing Surfaces from: dialog appears.

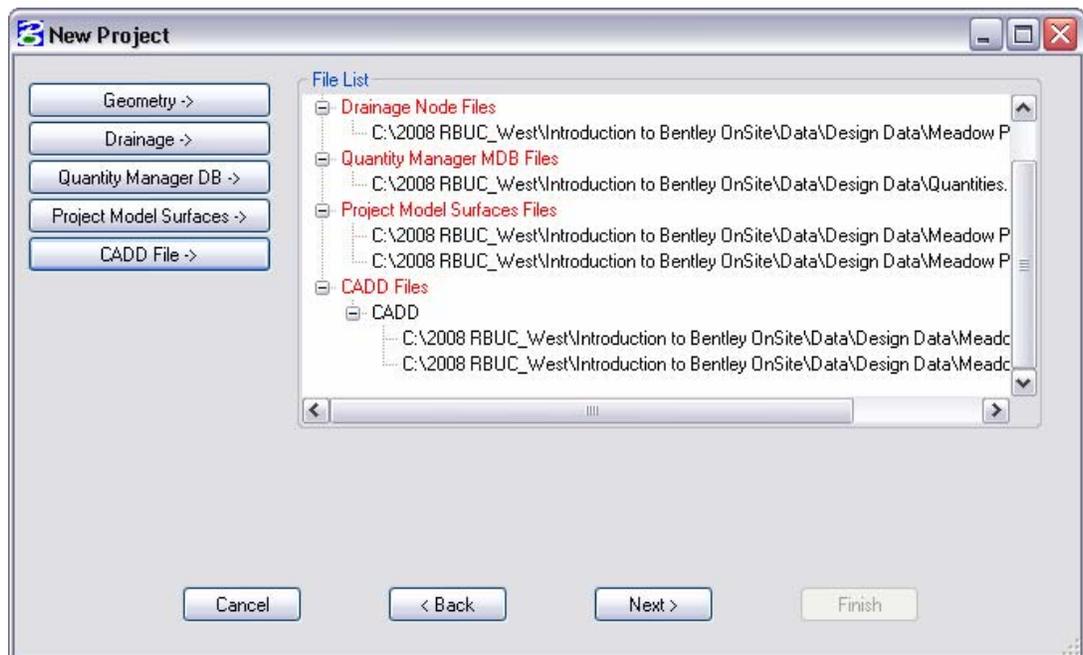


14. Key in Existing in the Category for the Meadow Park Existing surface. Select *Add* and *OK*.
15. Key in Proposed for the Meadow Park Proposed surface. Select *Add* and *OK*.

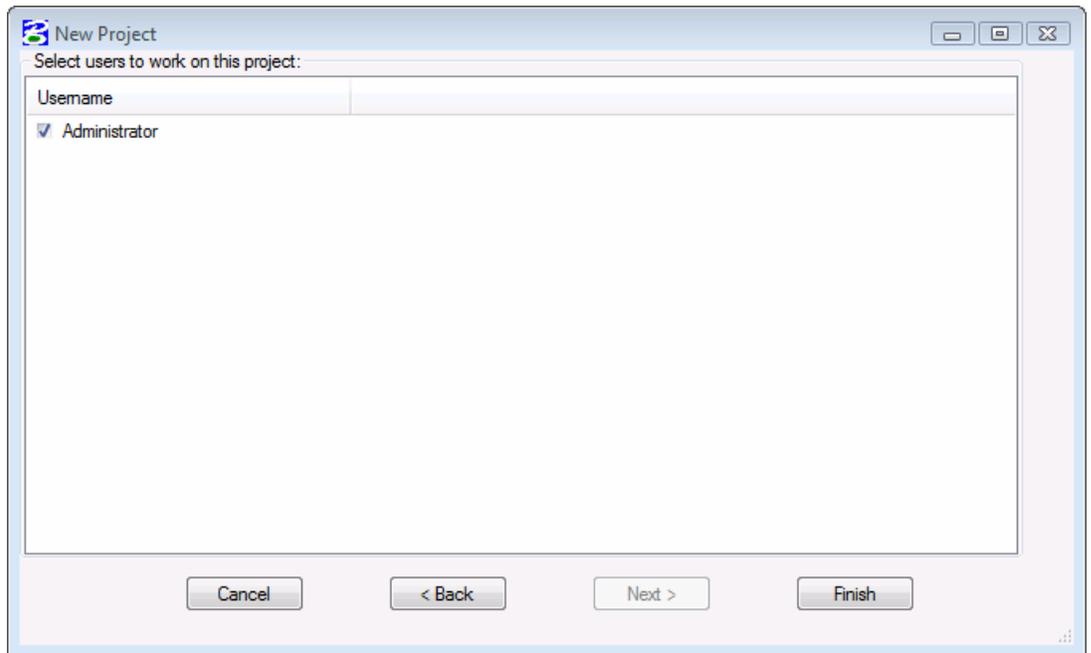
16. Next select **CADD File** on the New project dialog. Notice you can add categories here also.



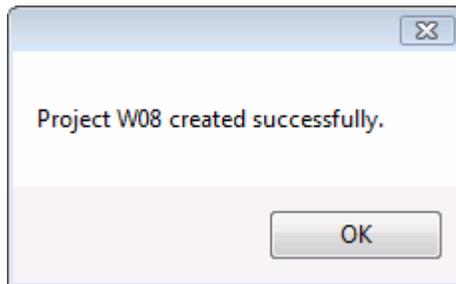
17. Select Browse then select the **Meadow Park Existing.dgn**, next select **Browse** again and select **Meadow Park Proposed.dgn** and select **OK**.
We are now finished adding data to the Design Archive and your File List should look like this.



18. Select *Next*, toggle on Administrator as the Username, and select *Finish*.



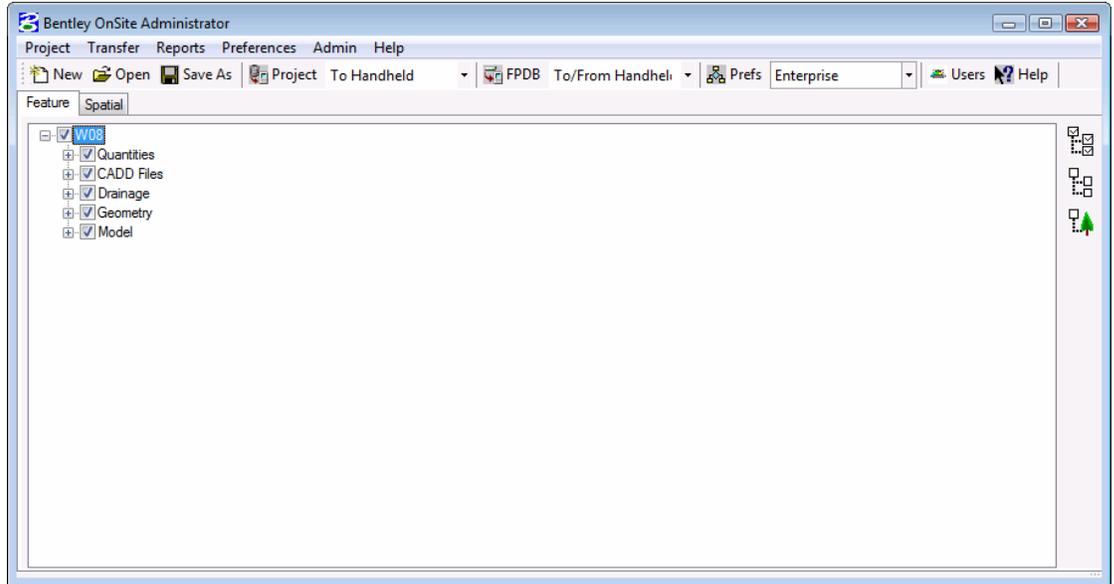
19. Select *OK* on the Successful dialog.



We have now completed creating the Design Archive.

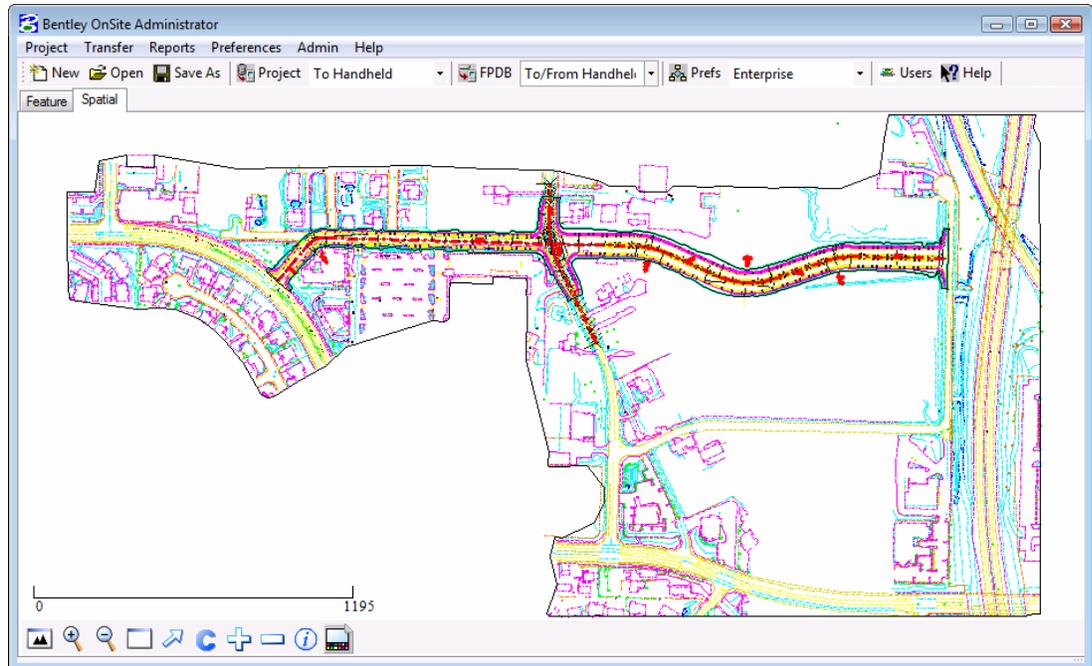
➔ **Exercise:** Now that we have created the Design Archive let's look at some of the common tools for navigating and review.

1. Select **Open** from the toolbar or from the pulldown menu select **Project > Open**, then select the newly created project and select **Open**.



Notice the dialog has two tabs **Feature** and **Spatial**, the feature tab is a list view of what can be viewed in the spatial tab, and the spatial tab is a graphical view of what is turned on in the feature tab. The feature tab can be equated to the level manager in MicroStation. Here you can also see the categories as described in the previous exercise.

2. Take a few minutes toggling different parts of the design on and off through the feature tab and see how the view in the spatial tab is affected.



Now that you have an understanding of how to modify the display, let's take a look at how to navigate. At the bottom of the spatial tab you will find a tool bar, this toolbar is standard across both applications in Bentley OnSite. The first five buttons from the left are used for navigating, much like in MicroStation. Take a moment a use these five navigation commands.

The next three buttons are used for selection; the *Plus* button adds to the current selection the *Minus* button removes items from the current selection, and the *C* button clears the current selection. Being able to accurately create a selection set is very important, as it is the main tool for identifying objects to act upon in Bentley Inspect/Stakeout.

3. Select one or more items and then select the Information button.

The Information button works much like the element information command in MicroStation giving you specific information about the current items in your selection set.

The last button is used to turn on and off the display of the Field Product Database, which is any field collected information. We will review this button in a different exercise.

4. Close Bentley Administrator by selecting ***Project > Exit.***

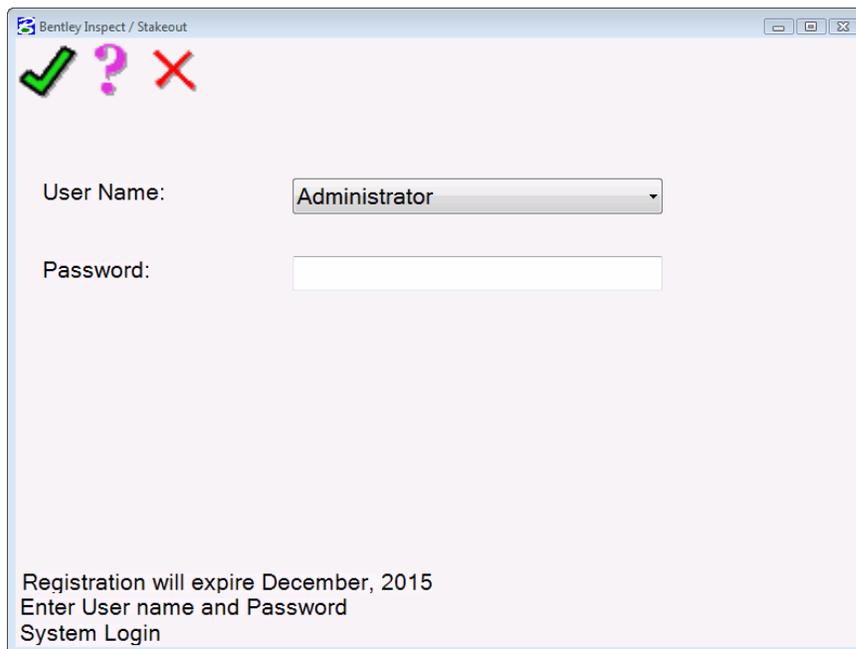
Inspection

Inspection can be broken up into three types: Each, Linear, and Area. Depending upon what kind of inspection is done some of the options will differ. We will start with the simplest (Each) from a quantity database. A quantity database is not required to use inspection, but is the simplest way to do an inspection. In the next exercise we will do an inspection from graphics.

Note: When you are in Bentley Inspect/Stakeout, hover the mouse pointer over a button to see the name of the command.

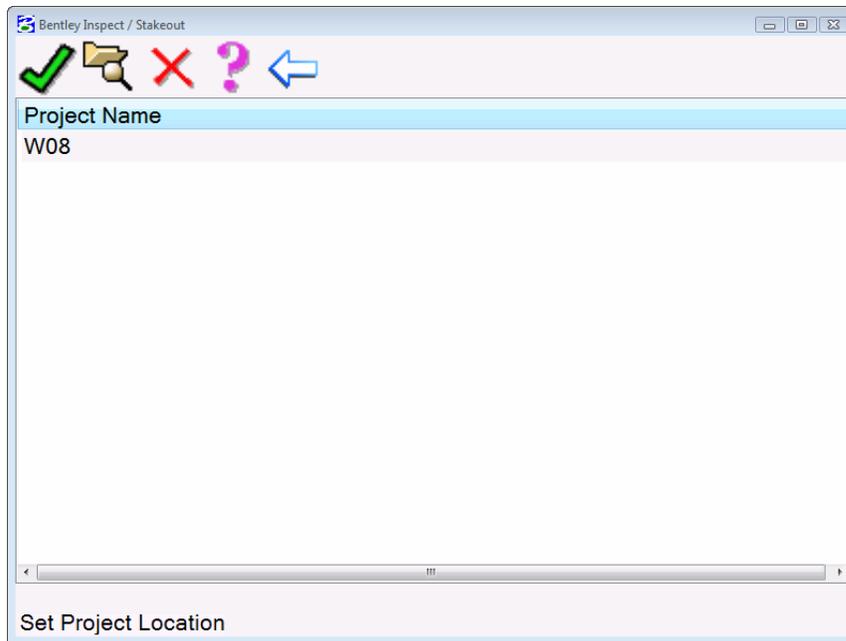
→ **Exercise: Now that we've created a Design Archive and used Bentley Administrator, let's take a look at the field software and how to do inspections.**

1. Start Bentley Inspect/Stakeout from the shortcut on the desktop or from *Start > All Programs > Bentley > OnSite > Inspect Stakeout*.



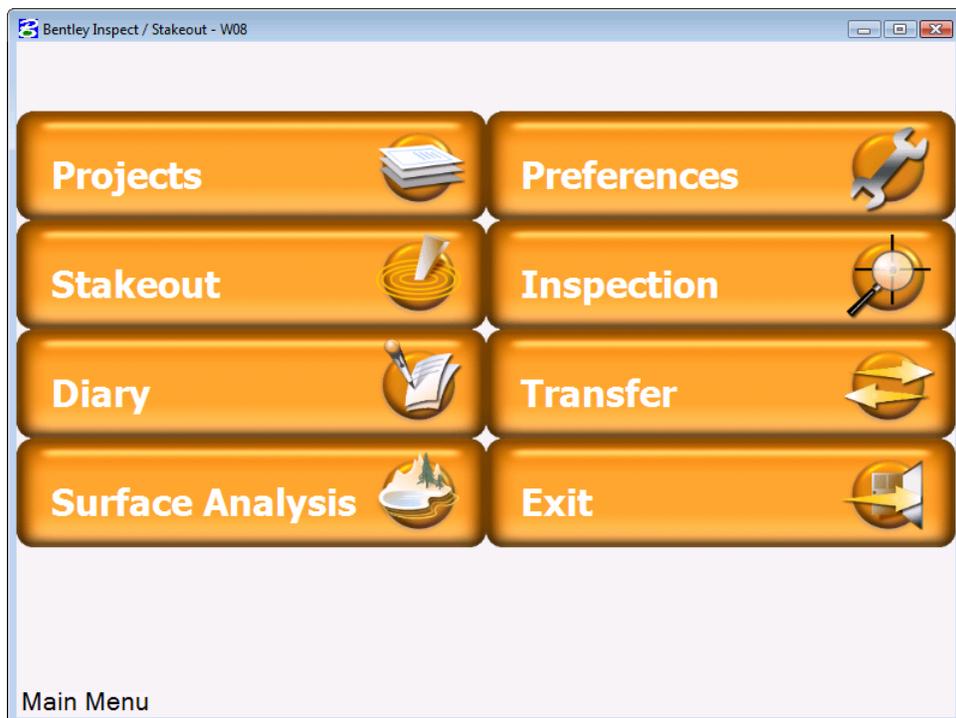
2. Select *Accept* (the green check). Just as with Bentley Administrator, we use the default User Name *Administrator* with no password.

Next we need to set the Project Directory.



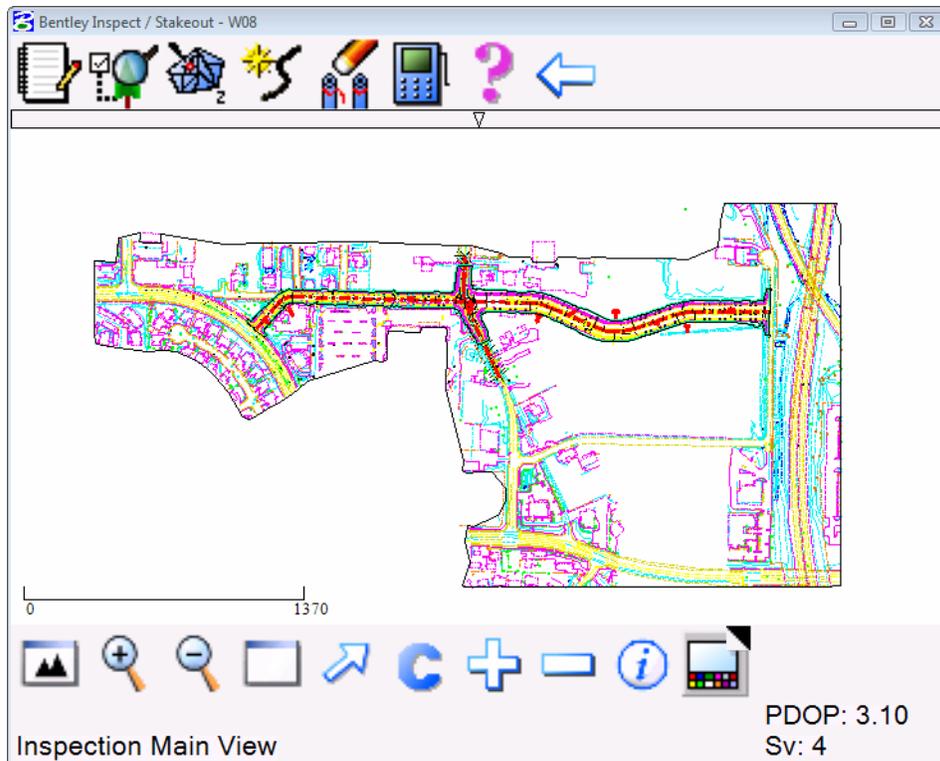
3. Use the Set Project Directory button to browse and select the following path: *C:\2008 RBUC_West\Data\Projects*. Select the *WS08* project and select *Accept*.

The Bentley Inspect/Stakeout Main Menu appears.



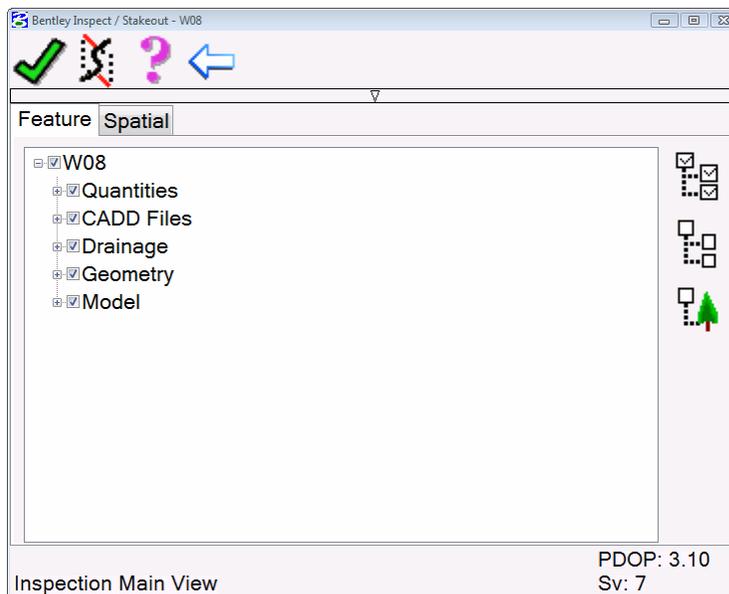
4. From the Main Menu you can access the core parts of the software. Select *Inspection*.

The Inspection Main View screen appears.

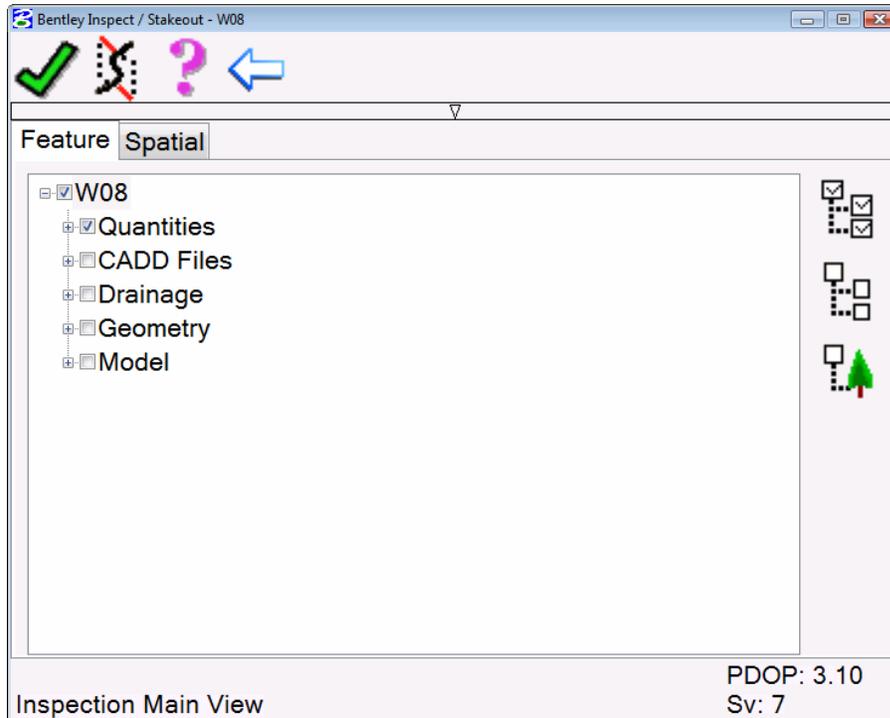


Notice the toolbar at the bottom is the same navigation toolbar as in Bentley Administrator. The toolbar at the top will dynamically change depending upon what command you are in.

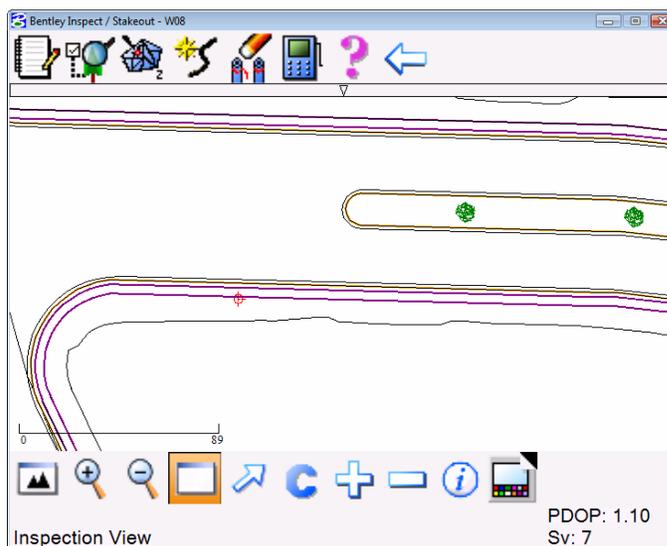
5. Hover the mouse pointer over the second button from the left to see the tool tip description. This is *Feature/Spatial Query*. It works much like the Feature/Spatial tab in Bentley Administrator.
6. Select *Feature/Spatial Query*.



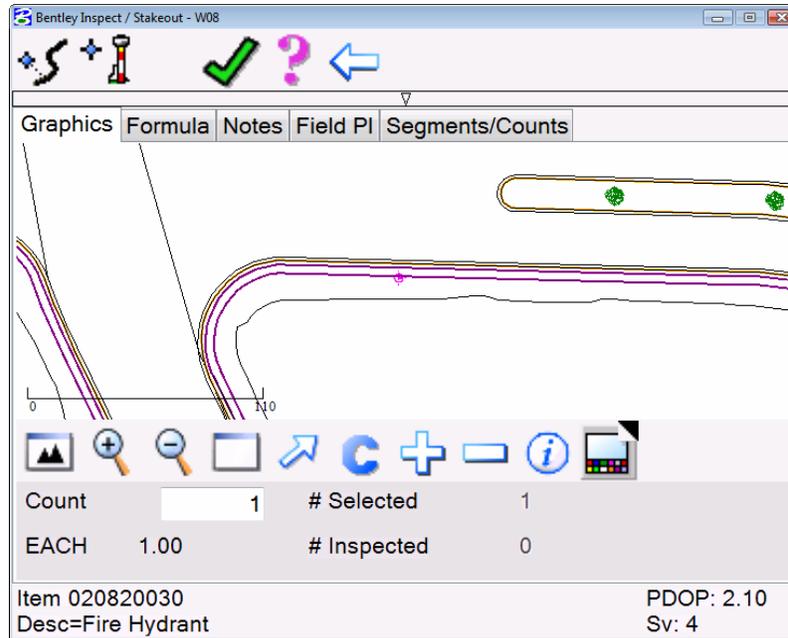
7. Under the Feature tab select the main category of *WS08*.
8. Select *Unselect All* (middle button on the right side), then toggle *Quantities* back on. Your feature tree should look like the one below.



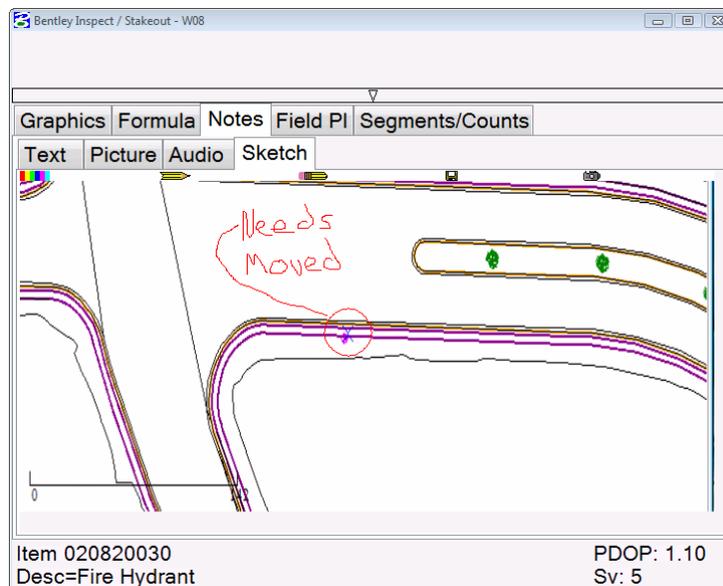
9. Select *Accept* to return to the Inspection Main View.
10. Window into the intersection in the center of the design, then using the selection tools add the Fire Hydrant in the SE quadrant of the intersection to your selection.
11. Select *Inspection* (first button on the left on the upper toolbar).



Notice the dialog dynamically changes with the command. Select the GPS Shot button (second button from the left on the upper toolbar), and data point close to the fire hydrant. This simulates taking a shot on the hydrant as if you were in the field.



12. Select the **Notes** tab. This allows you to add pictures, audio comments, sketches, and notes about the inspection. Then select the **Sketch Tab**, next select the camera button in the sketch, this will take a snapshot of what is currently on the screen, allowing you to do a markup. After taking a snapshot, take a moment and markup the sketch.



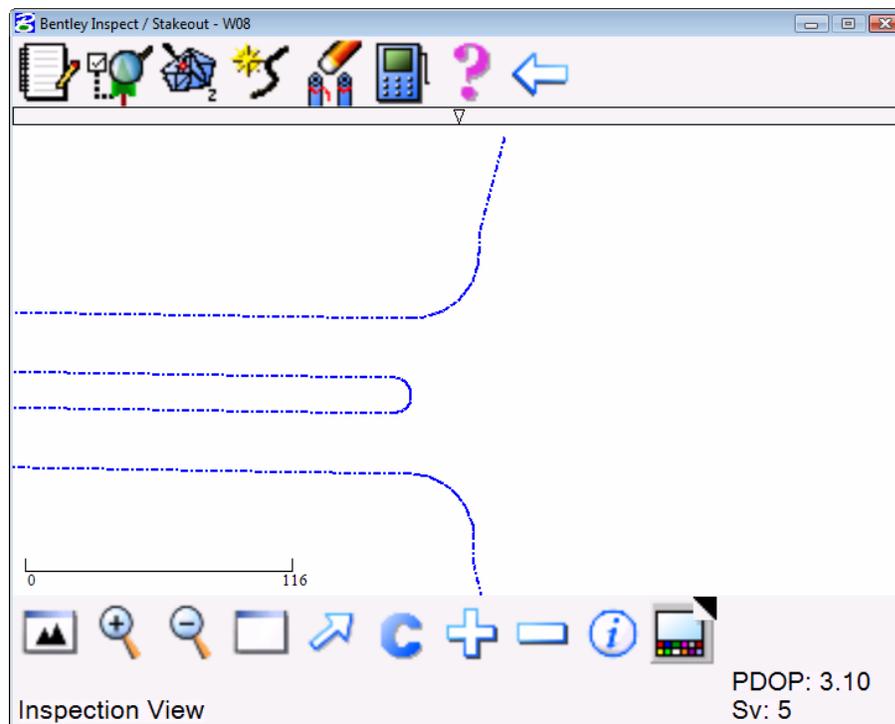
13. After making your sketch, select the Graphics tab and select *Accept*. You have now completed your first inspection.
14. Select *Back* until you are back to the Inspection Main View.

→ **Exercise: Now that you have done a QM inspection let's move on to inspecting cad graphics. In order to inspect graphics you must have a Master Pay Item list attached to your project. A Master Pay Item list had been previously assigned to your preferences, so your project already has one attached**

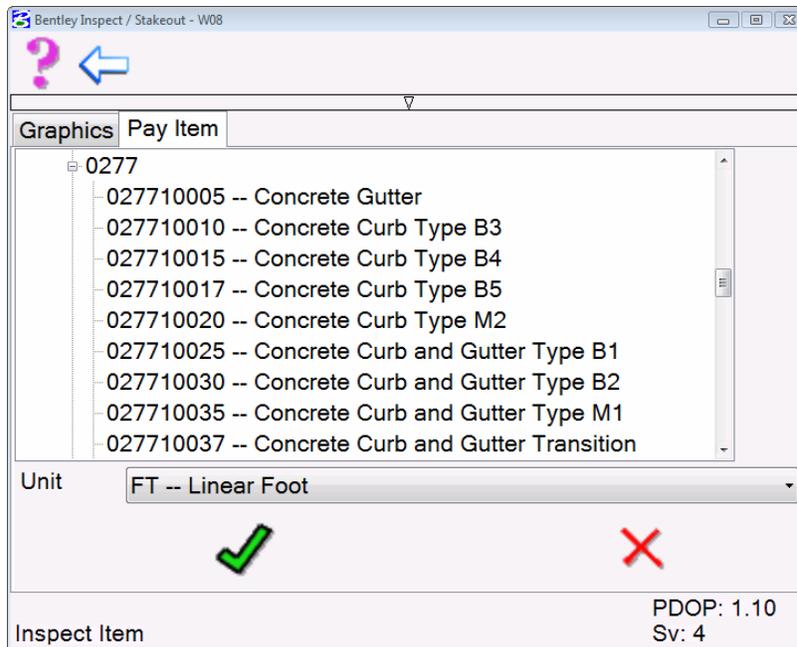
1. Select *Feature/Spatial Query* and toggle off **Quantities**, Toggle on the **CADD**, then under the **CADD** category toggle off the **Meadow Park Existing.cad** file.

We are now left with only the Meadow Park Proposed.cad, but we want all the levels under that file turned off except **P_ROAD_CURB-BACK**. Once you have finished isolating that level select *Accept*.

2. We now want to navigate to the east end of the project and inspect some of the Curb & Gutter on that end of the project.

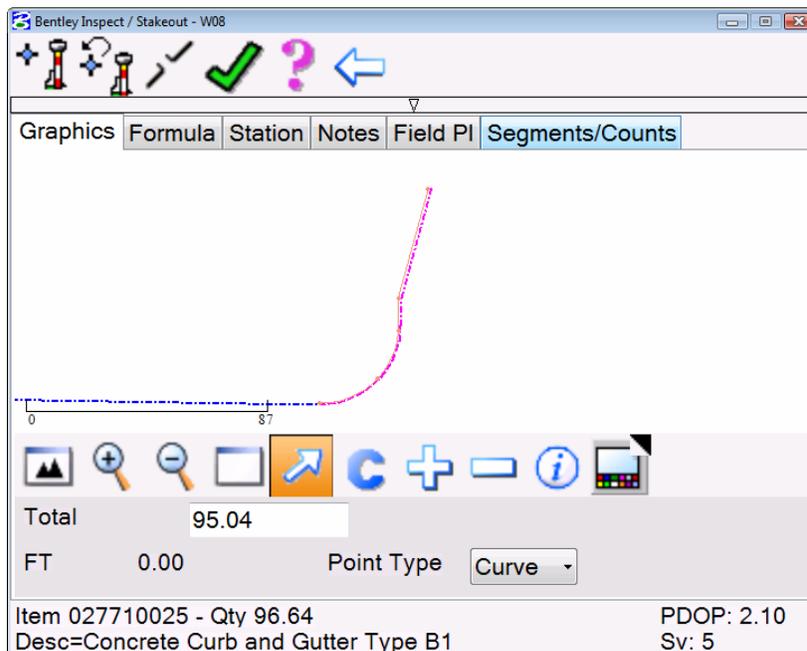


3. Select the curb line to the north that consists of the transition and the turnout.
4. Select *Inspection*.
5. The dialog will change to the *PayItem/Feature* tab, this is where we will assign a payitem to the graphics.
6. Select the *All Records* button to the right, this will load the entire payitem list.
7. Navigate to payitem **027710025**, select the payitem, and select *Accept*.



8. We are now ready to take simulated GPS shots on the selected curb. Ensure your point type is set to Line, then starting from the north end of the curb, take a GPS shot on the beginning of the transition and the end.
9. While still inspecting, change your point type to Curve and take three shots – one on the PC, one on the mid point, and one on the PT.

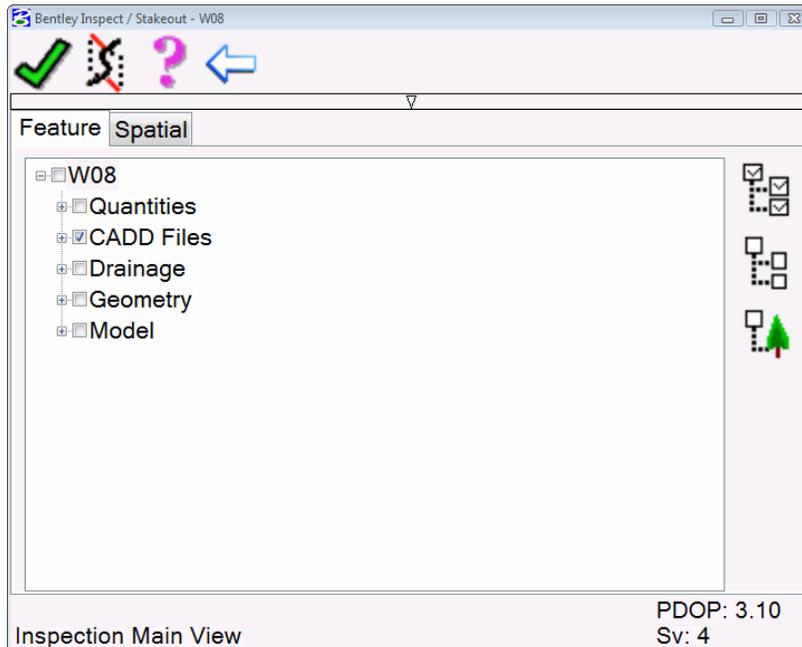
Notice as you take a GPS shot your amount of Curb is being totaled, also the design amount is displayed at the bottom.



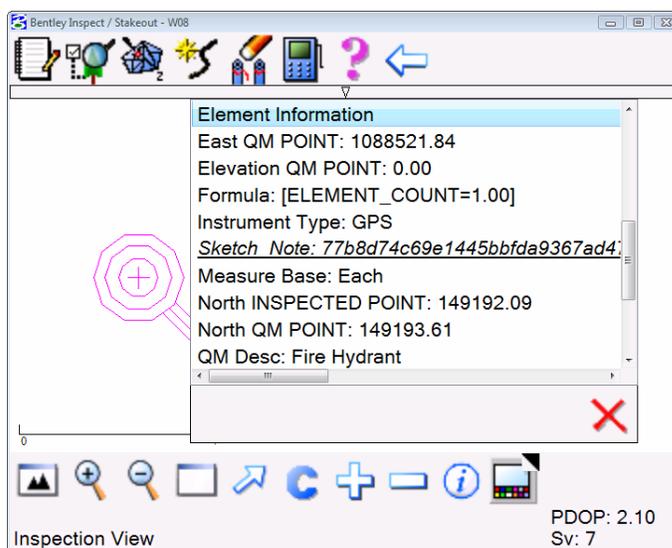
10. Select *Accept*, then select the *Back* button to return to the main inspection view.

➔ **Exercise: Now that you have done a few inspections, let's review the data.**

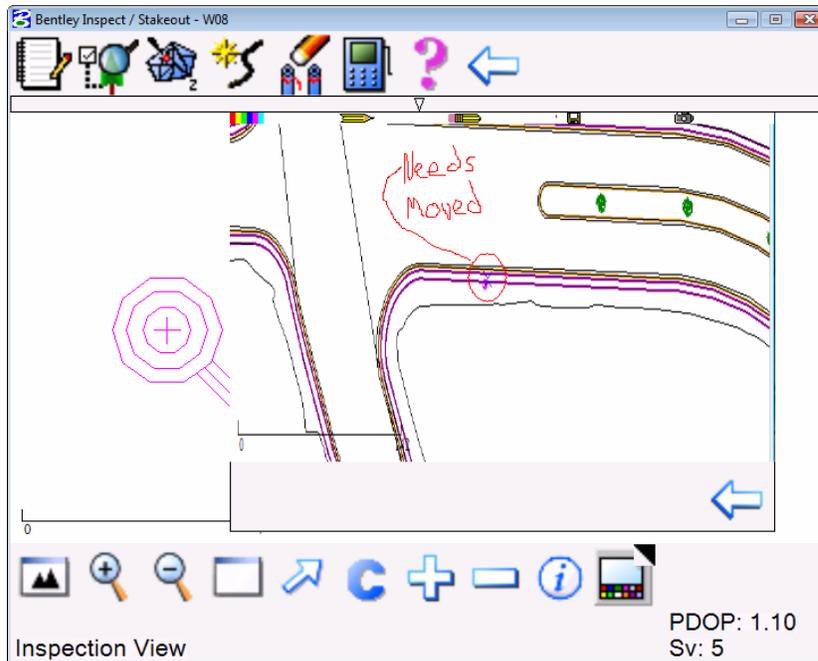
1. Select *Feature/Spatial Query*, turn off the entire project category and select *Accept*. This will turn everything off except the field collected information.



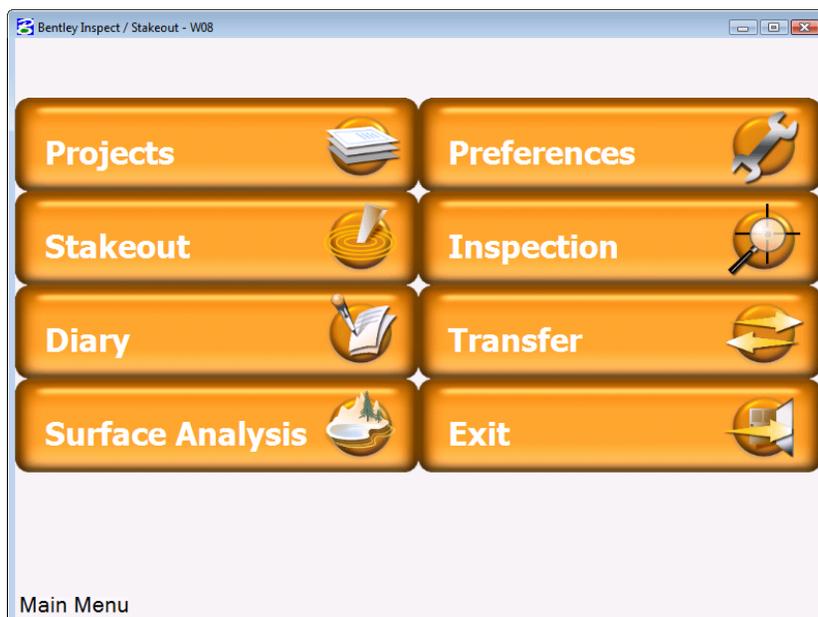
2. Window in on the **Fire Hydrant** we inspected earlier.
3. Select the Inspection record, and then select the *Info* button. This will display all the information pertaining to this inspection record.



4. Scroll down until you see the underlined information about the sketch that you did earlier. The underline indicates a link. Select the link and a picture of the sketch will appear.



5. Select the **Back** button, dismiss the Info dialog and review your other inspection record.
6. Once you are finished, review the data select the **Back** button until you have returned to the Main Inspect/Stakeout menu.

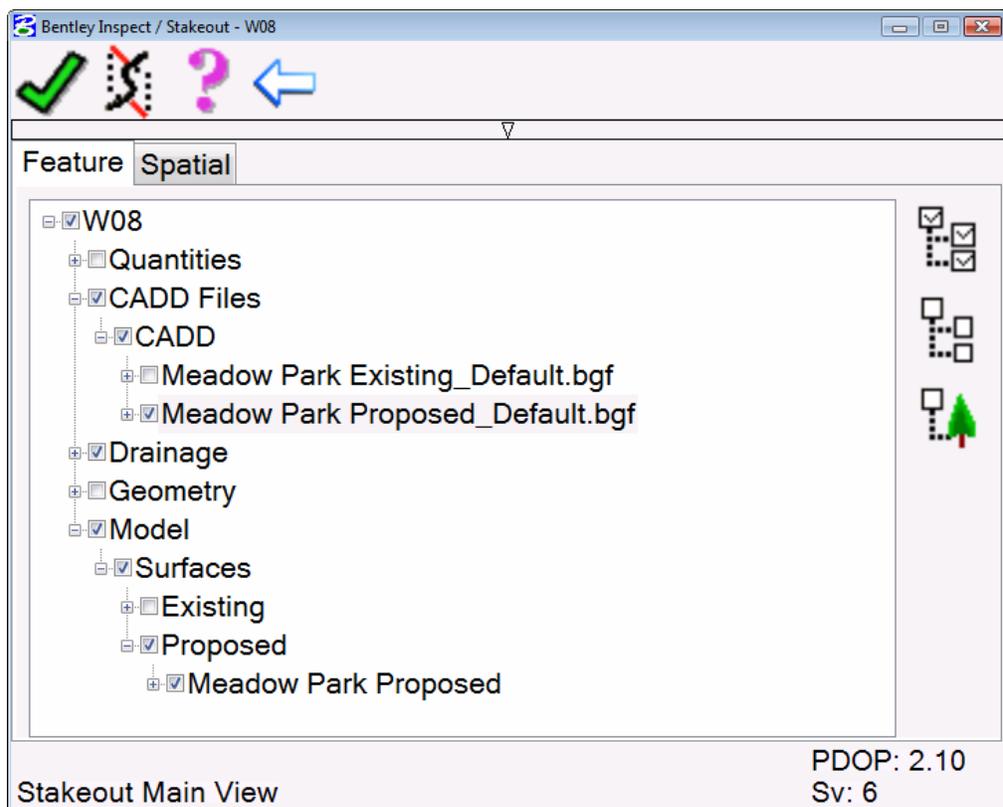


Stakeout

We've done a few inspection records; let's now take a look at the other side of the product, Stakeout.

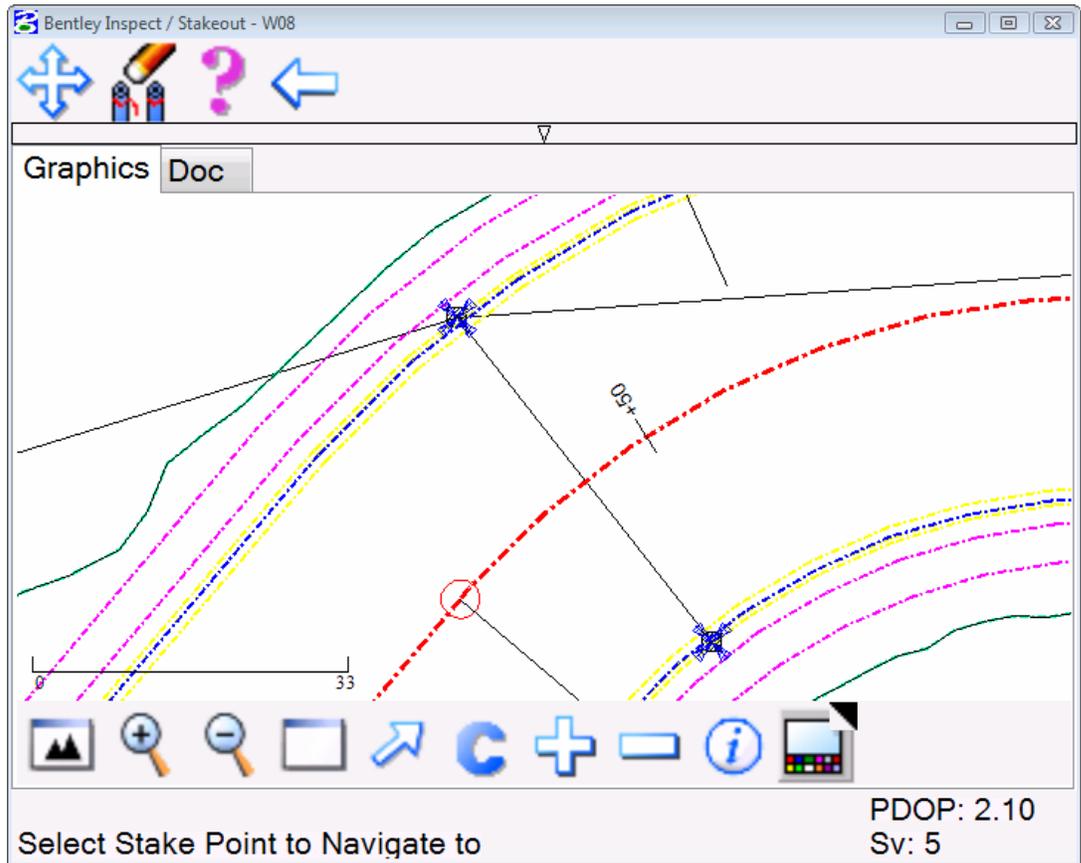
→ **Exercise:** When creating stake points, care must be taken that the preferences are set up for the type of stakes to be created, including staking interval, offset, and point types to be staked. Another consideration is what surfaces are active. For every surface that is active you will get a cut/fill to that surface for each point staked.

1. Select *Stakeout* from the Main Inspect/Stakeout menu.
2. Select *Feature/Spatial Query*. Turn on the project category, **Drainage, Meadow Park Proposed.cad** with all the levels, and **Meadow Park Proposed Surface**.
3. Select *Accept*.

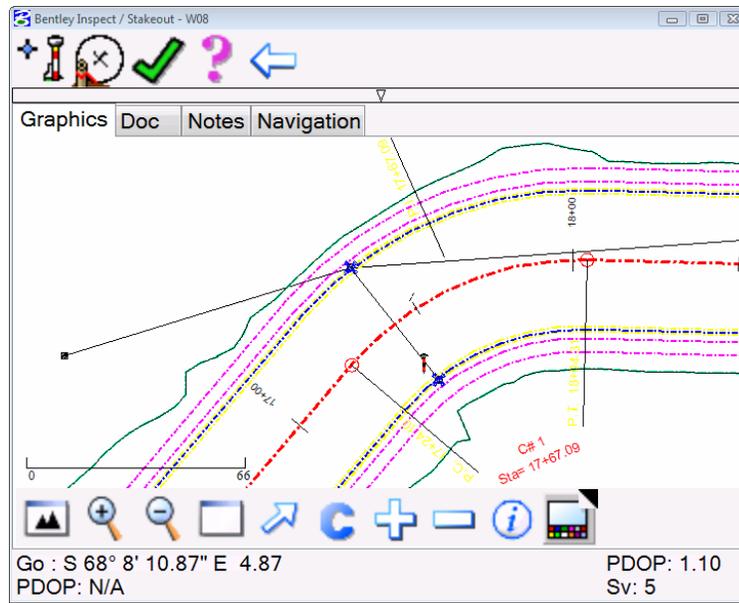


4. Navigate and zoom into the East portion of the project, where the first curve is around station **17+50**.
5. Select *Stakeout* (first button on the left on the upper toolbar).
6. Add the pipe that is crossing the roadway at about station **17+40** to your selection set.

7. Select **Stakeout**. This will create blue X's at each end of the pipe, these are the points to be staked.

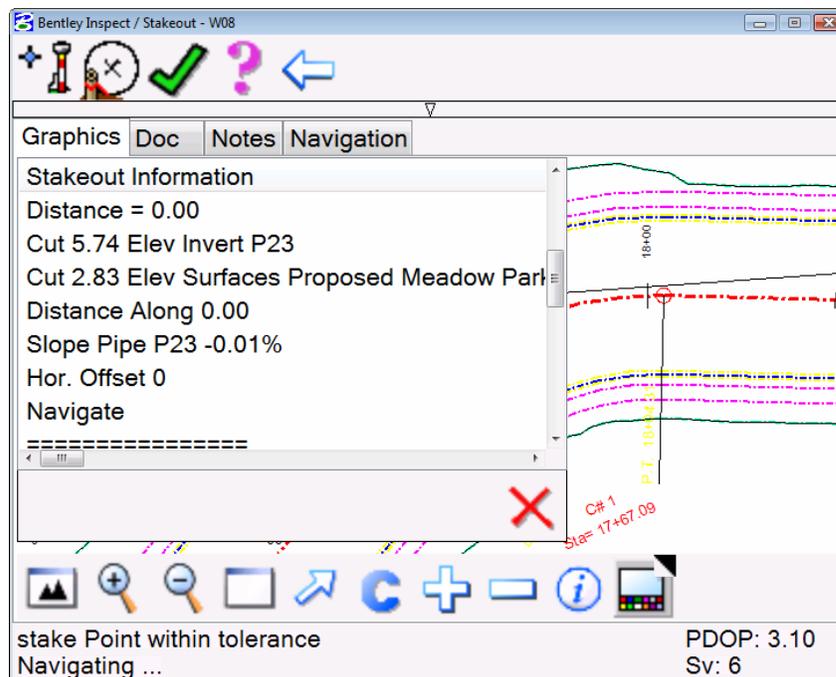


8. Add the pipe to your selection set again, this time both the stake points will highlight. We are now ready to navigate to the points.
9. Select **Navigate to Stake Point** (first button on the left on the upper toolbar).
10. Notice the dialog changes to the Navigation screen. Since we are in the class room, we are using the GPS simulator and you will have to select the GPS shot multiple times until you get to the point. In the field, once you select navigate, your position constantly updates. Select the *GPS shot* button. The bottom portion of the dialog will tell you what direction and how far until you've reached your stake point.



11. Continue to select the *GPS shot* button until the information screen opens. This indicates you are within acceptable tolerance. Select *Accept*. The information screen updates.

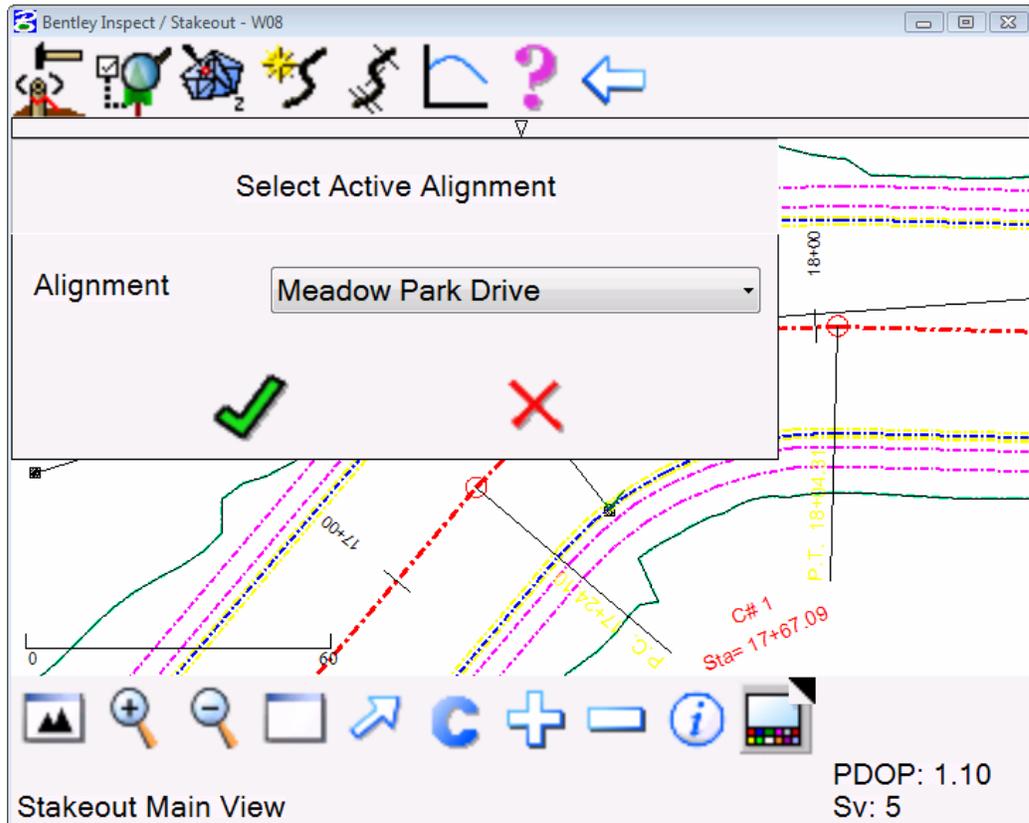
Notice the information given. You are given the cut/fill to any surfaces active and also to the pipe inverts.



12. Since you selected both points to stakeout, continue to select the *GPS shot* button until you have completed staking out the other point.
13. Select the *Back* button until you have returned to the main Stakeout menu.

➔ **Exercise: Bentley Inspect/Stakeout allows you to select an alignment, provide an interval, and create stake points perpendicularly at every surface vertex.**

1. Select **Active Alignment** (fourth button from the left on the upper toolbar) and set the active alignment to **Meadow Park Drive**. Select **Accept**.



2. Select **XSections** (fifth button from the left on the upper toolbar).
The screen changes to Cross Section Options.
3. Select **Alignment Based** (first button on the left on the upper toolbar). This allows us to specify the interval and offset used to create cross sections.

Bentley Inspect / Stakeout - W08

Alignment: Meadow Park Drive

Beg STA: 1600

End STA: 50+25.40 R 2

Station Interval: 50

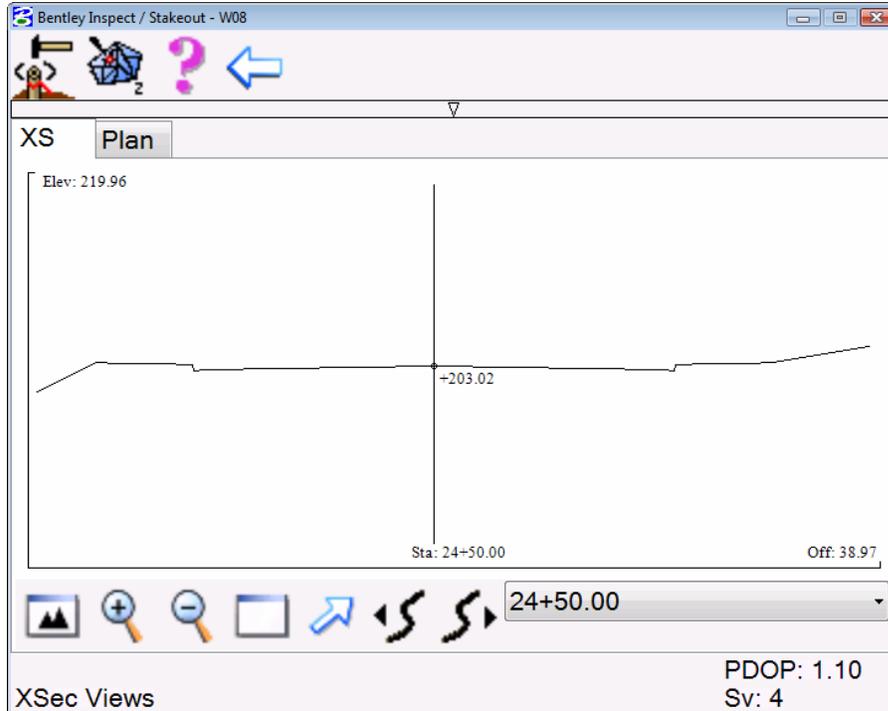
Offset LT: 100 Offset RT: 100

Scale Offset (x:1): 1 Scale Elev (x:1): 1

Extra Stations:

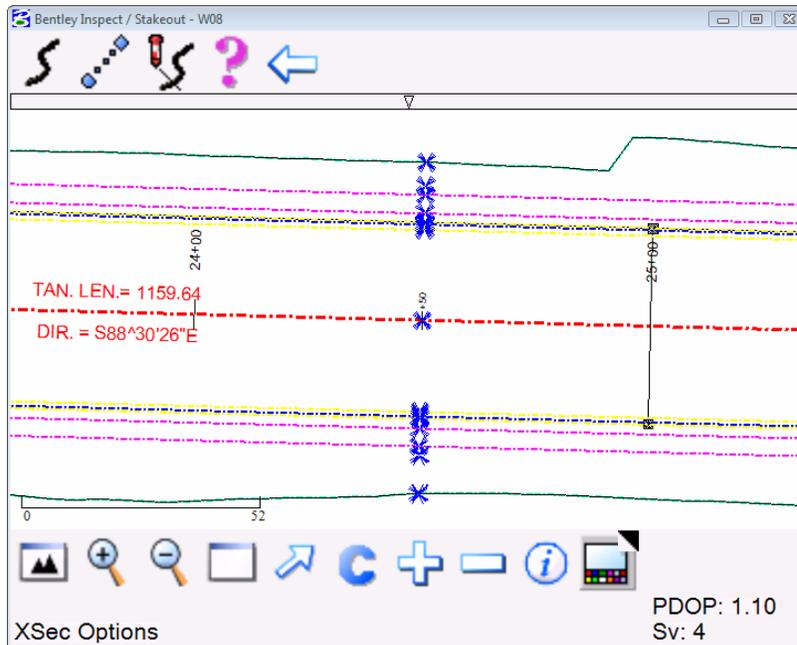
XSec Settings PDOP: 2.10
Sv: 6

4. Set the beginning station to **16+00** and the interval to **50**. Select *Accept*.
5. Navigate to station **24+50**.

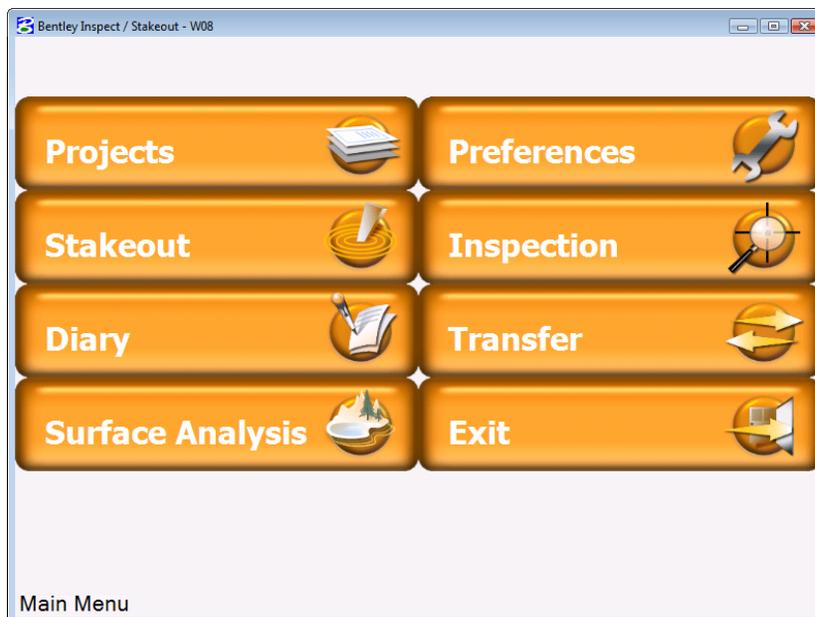


6. Select *Stakeout XSection* (first button on the left on the upper toolbar). This generates stake points for every vertex the cross section line crosses.

7. Select **Back** until you return to the Stakeout Main View.
8. Navigate to station **24+50**. You should see the stake points you've created. Select **Stakeout** (first button from the left on the upper toolbar) twice until you are at the navigation screen, then select one or more of your newly created points,
9. Select **Navigate to Stake Point** (first button on the left on the upper toolbar) and take a moment to stake out a few of these points.



10. Select **Back** until you return to the Bentley Inspect/Stakeout Main Menu.



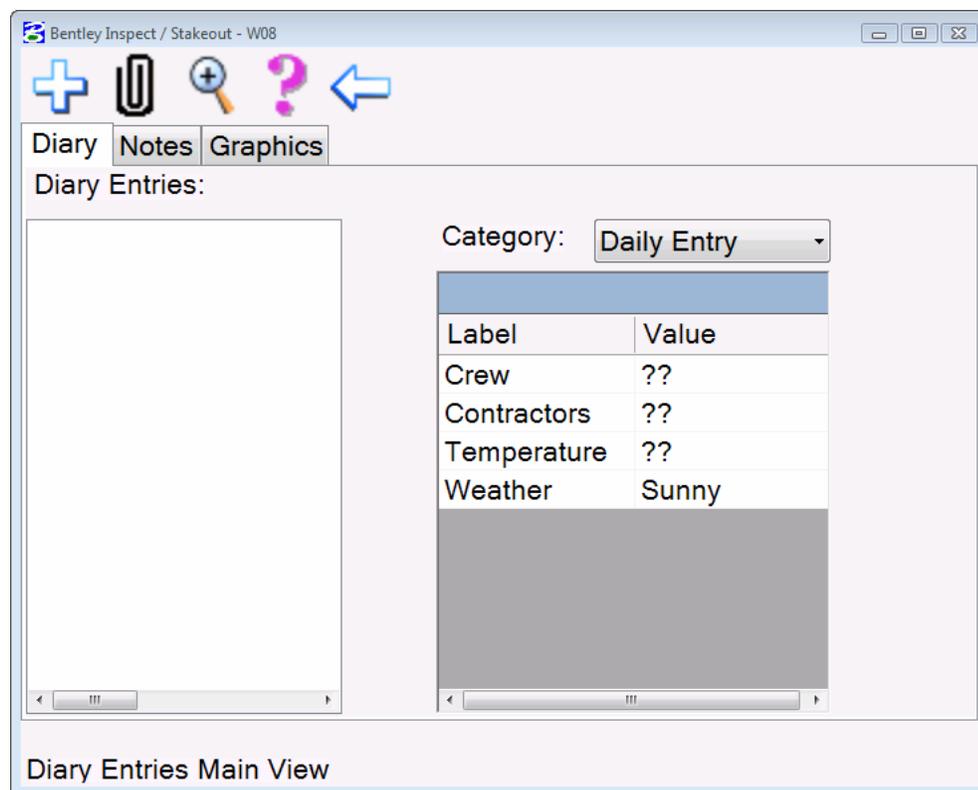
Diary Entry

Diary Entries can be used to capture detailed information about the site that might otherwise not have a place to be stored.

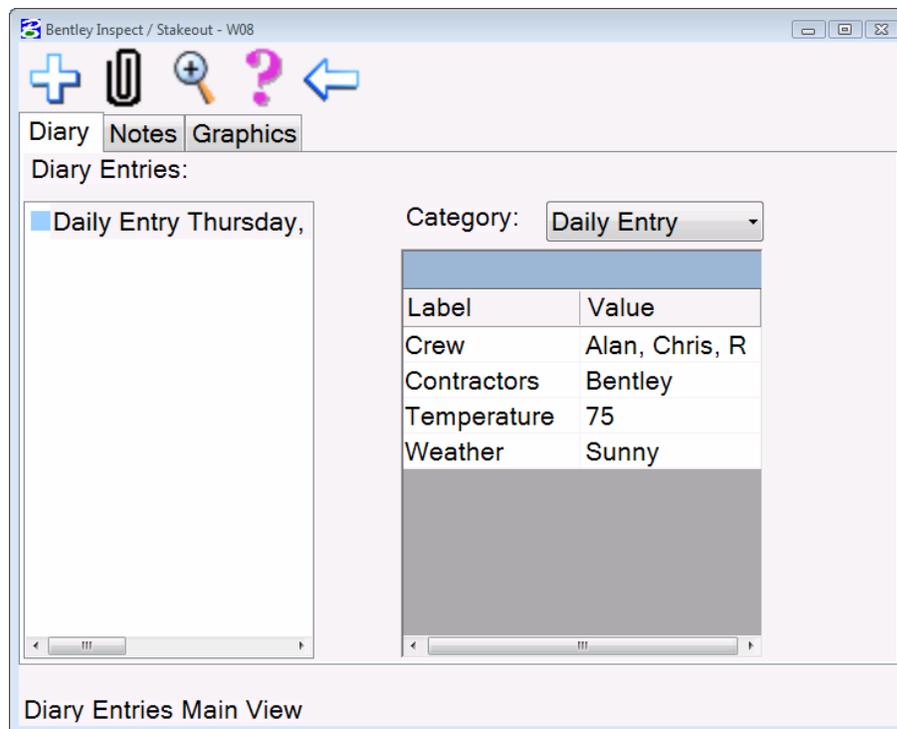
→ **Exercise: Entries can be broken down into two categories, non-graphical and graphical. Just as in Inspection and Stakeout you can attach notes, sketches, pictures, and audio clips.**

1. Select *Diary* from the Main Menu.

The screen changes to the Diary Entries Main View. On the right is a pull down menu with the different types of diary entries that have previously been created in the preferences.



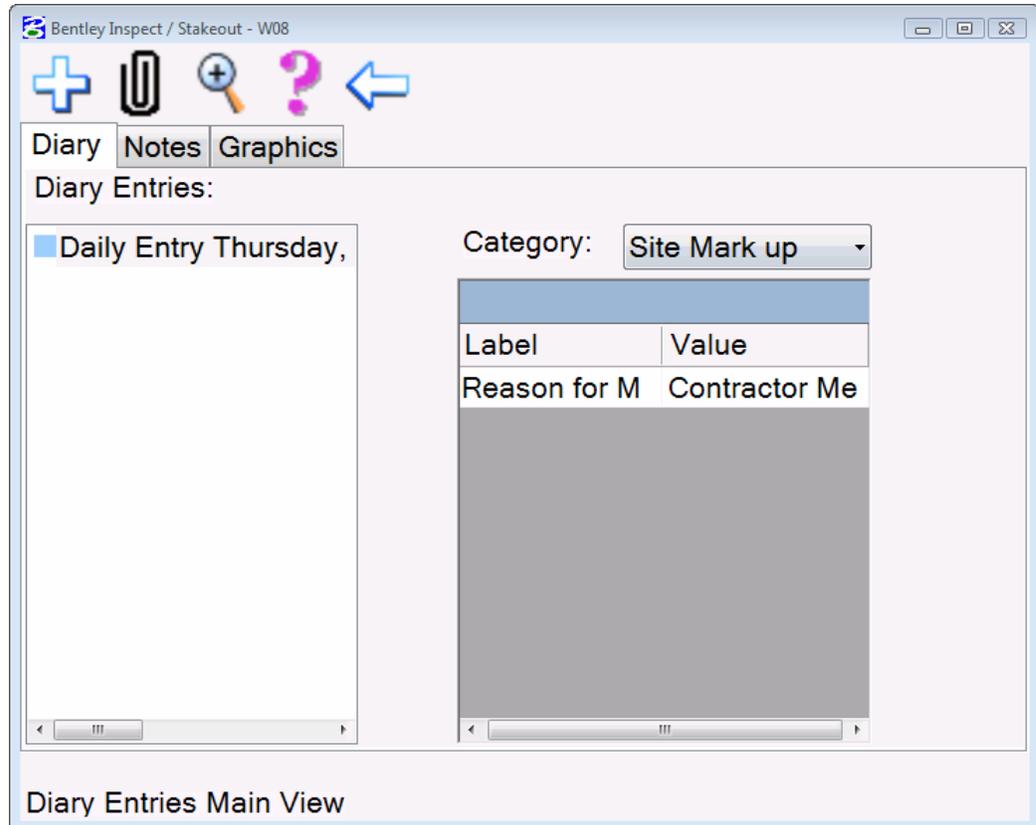
2. Select the *Daily Entry* Category.
3. Fill in the four values. Notice the last has a pull down menu limiting your options.
4. Once the data is filled in select *New Diary Entry* (first button on the left on the upper toolbar).



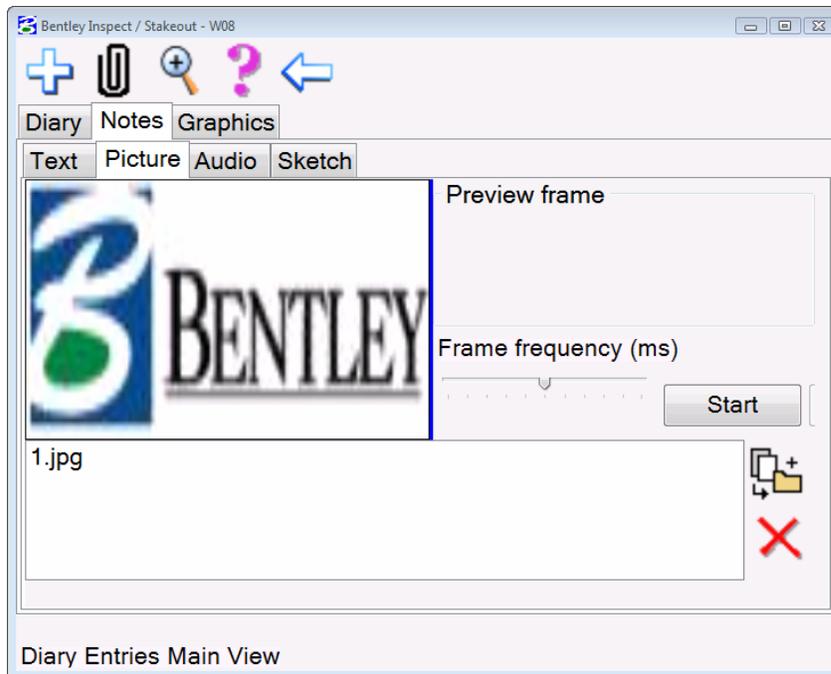
5. Select the entry and then select the *Notes* tab, then select the *Text* tab. Here you can enter more detailed information about the Daily Entry.
6. Once finished entering the data select the *Diary* tab.

➔ **Exercise: Graphical diary entry.**

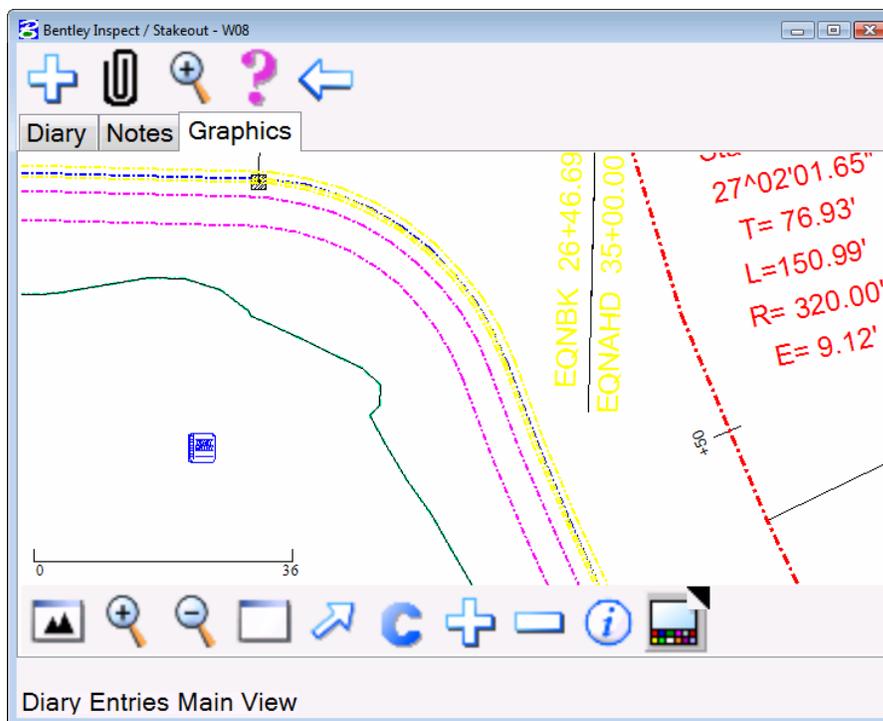
1. Select *Diary* from the Diary Entries Main View.
2. Change the Category to **Site Mark up**.



3. Enter a reason for the markup.
4. Select *New Diary Entry* (first button on the left on the upper toolbar).
5. Select the entry and then select the *Notes* tab.
6. Select the *Picture* tab, then select the *Select* button, brows to *C:\2008 RBUC_West\Introduction to Bentley OnSite\Data\Design Data* and select the **Bentley.bmp** picture. This will attach the picture to the diary record. You can preview the picture by selecting the image in the list.



7. Select the **Graphics** tab, and then select **Attach Diary** (second button from the left on the upper toolbar).
8. Data point anywhere inside the graphics. This will geospatially locate your Diary entry.



9. Select **Back**, then select **Exit**.

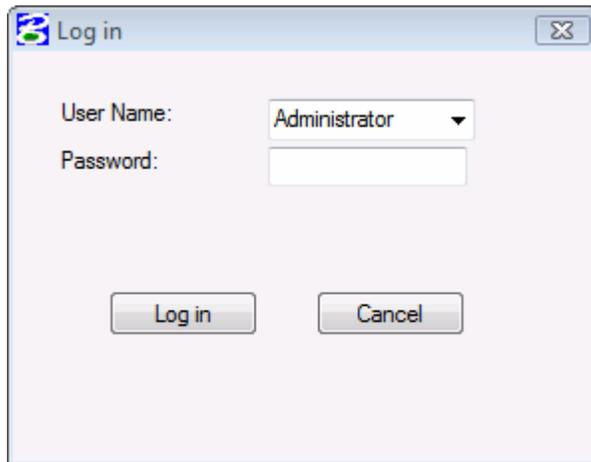
Project Review

Now that we've done some field inspection and stakeout, we'll take that data back into Bentley Administrator.

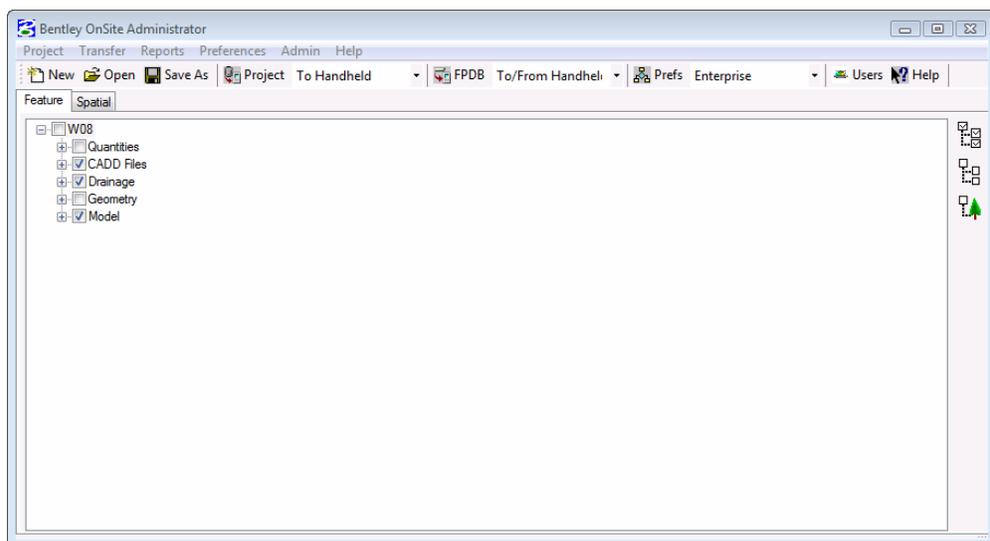
➔ **Exercise: Review, report, and generate as-built drawings.**

1. Start Bentley OnSite Administrator from either the shortcut on the desktop or from *Start > All Programs > Bentley > OnSite > Administrator*.

The Log In screen appears. The User Name should be left as *Administrator* and there is no Password.

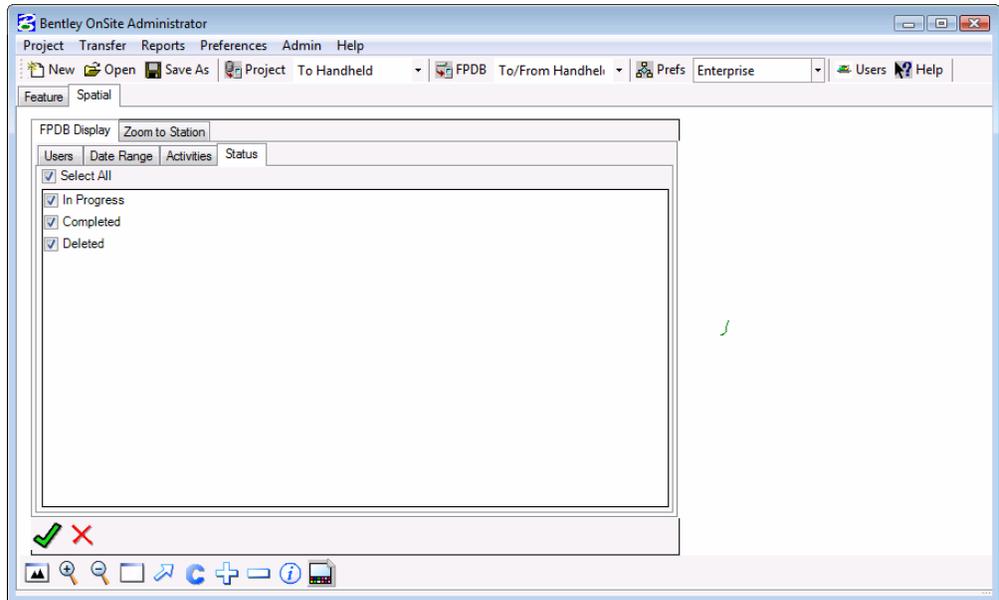


2. Select **Log In**.
3. Select **Project > Open**, and select project **WS08**.
4. Turn on the Main Project Category under the **Feature** tab.

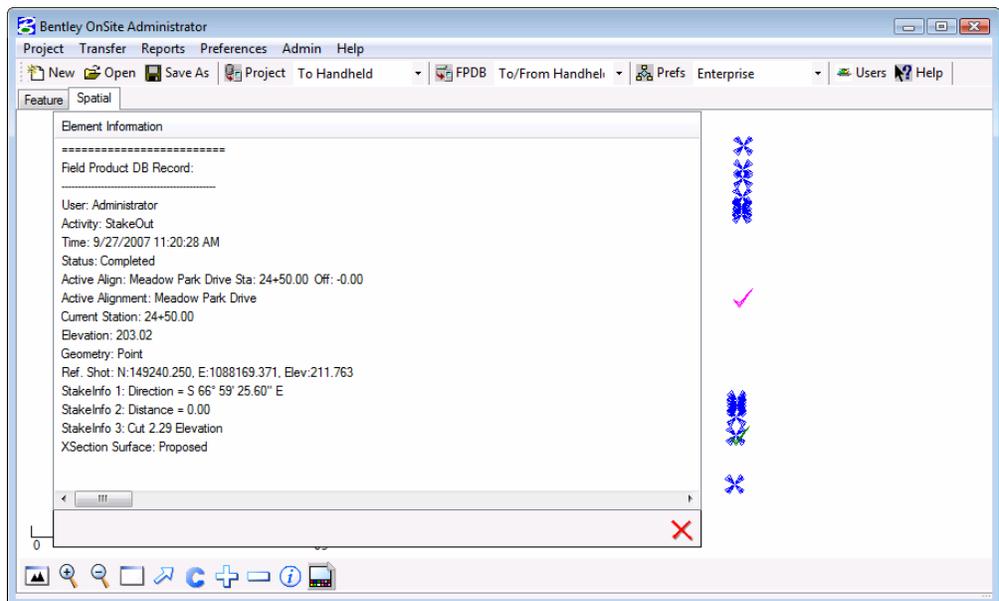


5. Select the **Spatial** tab. The screen should be blank.

6. Select **FPDB Display** (last button on the right on the lower toolbar).
7. Under the Users, Activities, and Status tabs select **Select All**. Select **Accept**. This will turn on everything that you have done in the field.

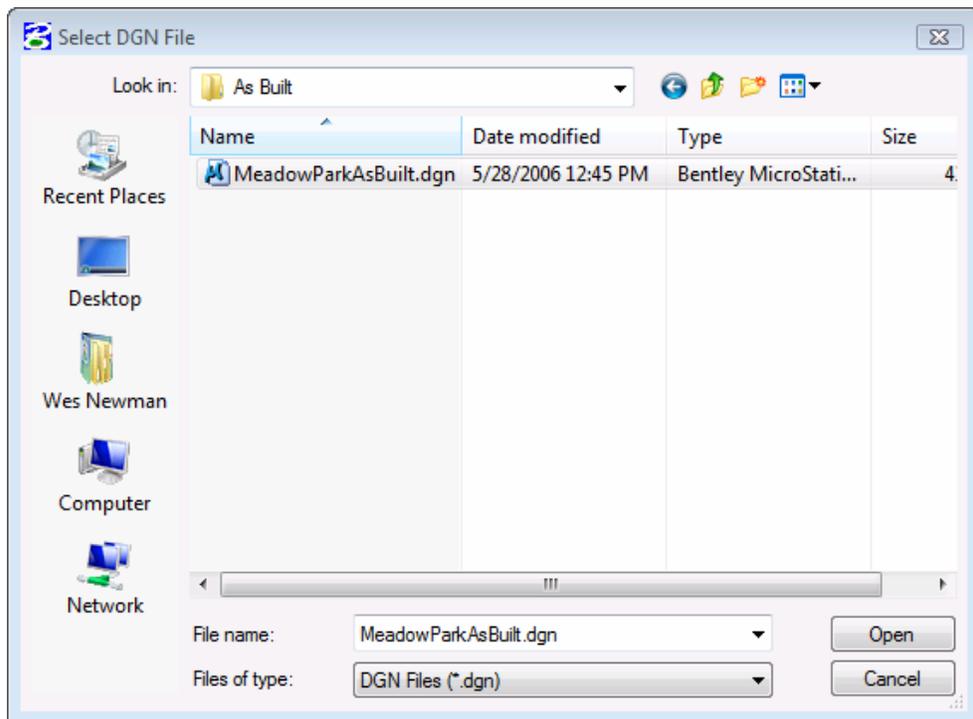


8. Take a moment to review a few of the activities.

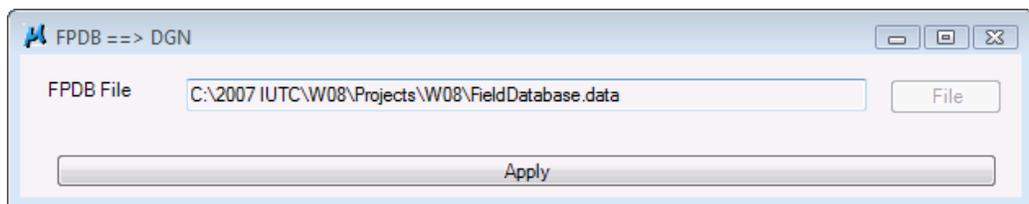


➔ **Exercise: As Built Creation**

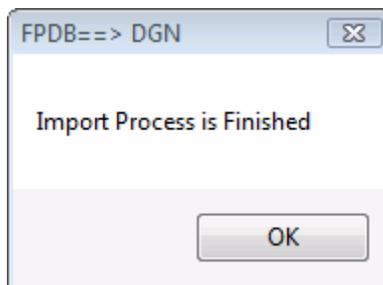
1. Select **Reports > Field Data > FPDB -> DGN**.



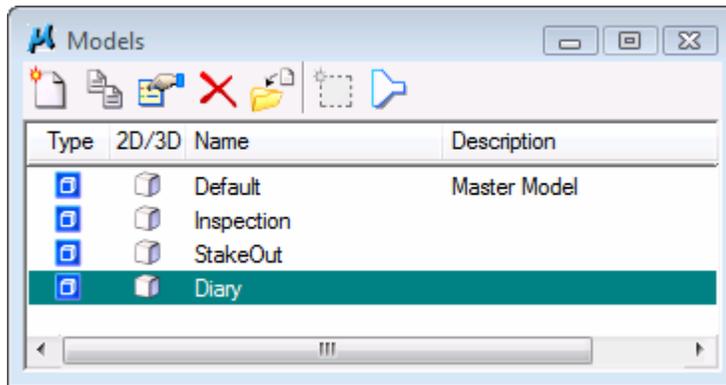
2. The Select DGN File dialog opens. Browse to **C:\2008 RBUC_West\Introduction to Bentley OnSite\Data\As Built** and select **MeadowParkAsBuilt.dgn**.
3. After the Drawing file opens, you will see the **FPDB -> DGN** dialog. Select **Apply**.



4. Select **OK** on the Import Complete dialog.



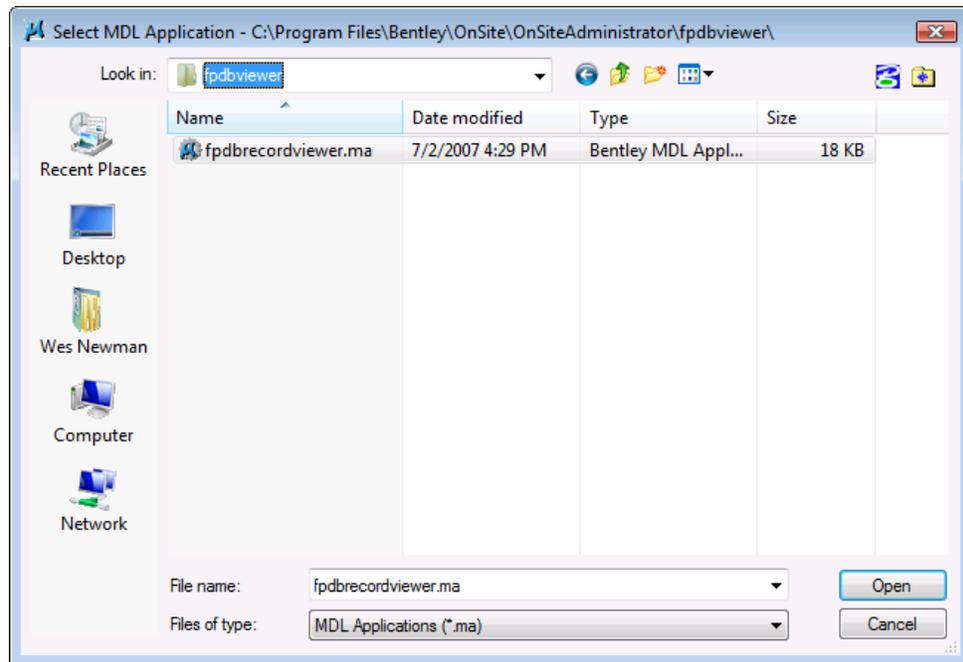
5. Select **File -> Models**.



6. Notice the three models in addition to the Default. These models were created at import and each corresponding activity has its own model. Double click on the Diary model.
7. Select the **MicroStation Fit View** command. You should see a single Diary Entry.



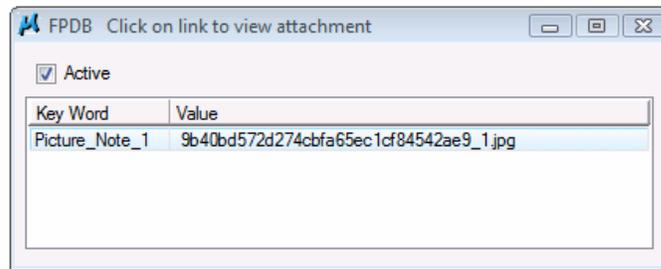
8. Select **Utilities -> MDL Applications**. Select the **Browse** button and browse and select the following MDL Application: **C:\Program Files\Bentley\OnSite\OnSiteAdministrator\fpdbviewer\fpdbrecordviewer.ma**.



9. Select *Open*
10. Close the **MDL** and **FPDB** -> **DGN** dialogs.
11. The FPDB Record Viewer dialog should now be open. Toggle on *Active*.

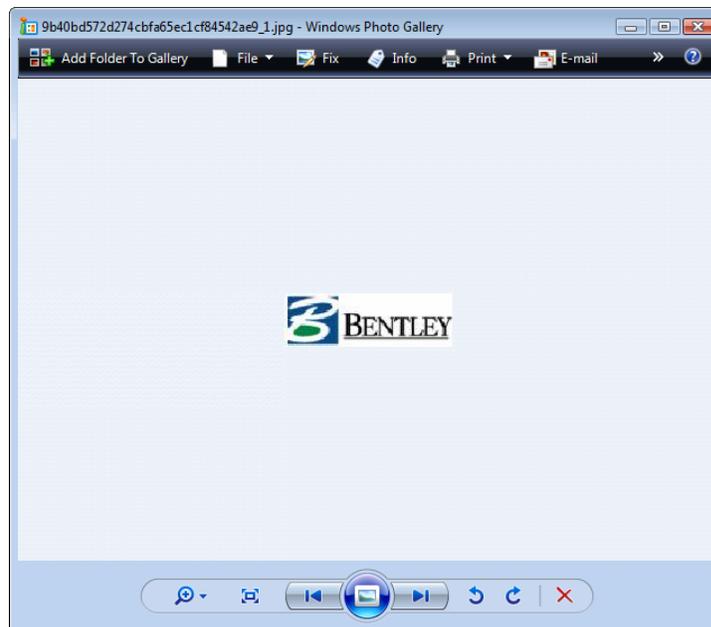


12. Hover over the Diary Entry and notice the MicroStation Tooltip. All the collected information about this item appears in the tooltip. Also any pictures or audio clips will open in the *FPDB Links* dialog.



Cell: FPDB_Diary \ Line, Level: Default
Activity: = DiaryEntry
Status: = InProgress
Time: = 9/27/2007 11:24:27 AM
User: = Administrator
Category = Site Mark up
Geometry = Point
Label_1 = Reason for Markup
Name = Site Mark up Thursday, September 27, 2007 11:24 AM
Value_1 = Contractor Meeting

13. Single click on the picture in the FPDB Links dialog. The attached picture will open.



14. Take a few minutes to switch to the other models and review that data.

Module Review

Now that you have completed this module, let's measure what you have learned:

Questions

1. When you create a project using Bentley OnSite Administrator can you perform a feature/spatial query just like in Bentley Inspect/Stakeout?
2. Can you use curves and lines while inspecting a curb and gutter in Bentley Inspect/Stakeout?
3. When you draw a cross section in Stakeout are the stakeout points placed every ten feet?
4. Once you attach a diary to graphics can you add to the selection and get information on the diary symbol?

Answers

1. Yes

You can look at all the features in the project you just created. You can also turn features on and off as in Bentley Inspect/Stakeout.

2. Yes

You select line when drawing a line. You select curve when drawing a curve, but you must have at least three points for a curve.

3. No

Stakeout points are placed at every vertex the cross section line crosses.

4. Yes

You can add the diary entry in the graphics to a selection set and select Information to review your diary entry.

Module Summary

You are now able to:

- Create a Design Archive from multiple sources
- Inspect the data created from the Design Archive
- Create stake points and stakeout multiple parts of the design
- Use the Diary command to document detailed site information
- Generate as-builts from the Field Product Database