Workflow IR 14 - Using InRoads Sight Visibility Tools

This document guides you through the use of the InRoads Sight Visibility Tools. There are two sight visibility tools available, Roadway Visibility and Surface Visibility. The Roadway Visibility tool analyzes sight distances along a roadway. The Surface Visibility tool evaluates the visibility from a given point on a surface.

The Roadway Visibility Tool

This tool is used to check sight distances along an alignment. The Roadway Visibility tool draws a line the length of the specified sight distance between two points of the alignment, at the specified elevation above the selected surface. It then checks the line against the surface to determine if it passes through the surface to reach its destination point.

Before using this tool, you will need an alignment and a surface created by merging the design surface to the existing surface. For help creating the merged surface, refer to CDOT Workflow Creating Combined Surfaces. The steps below describe Roadway Visibility tool's set-up and function.

Adding the Sight Visibility Tools to the Menu

By default, the sight visibility tools are not available on the InRoads menu bar. To add them to the menu, follow the steps below.

1. Select **Tools > Application Add-Ins** from the InRoads main menu. This displays the *Application Add-Ins* dialog box.
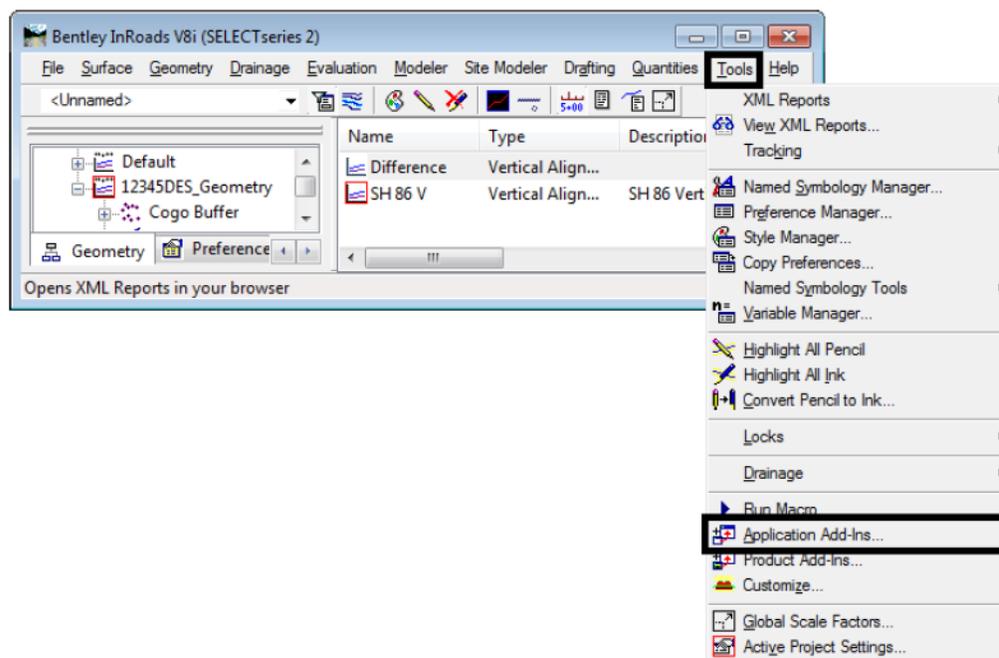
2. From the *Application Add-Ins* dialog box *Available* list, toggle on the **Sight Visibility Add-In**.

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3.   **<D> OK** to accept the change and dismiss the ***Application Add-Ins*** dialog box.
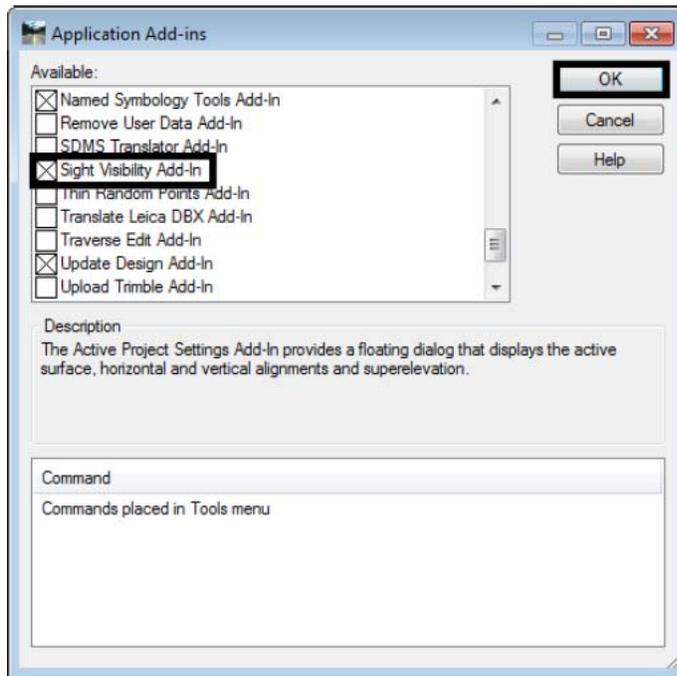
The ***Sight Visibility*** tools are added to the ***Evaluation*** menu.
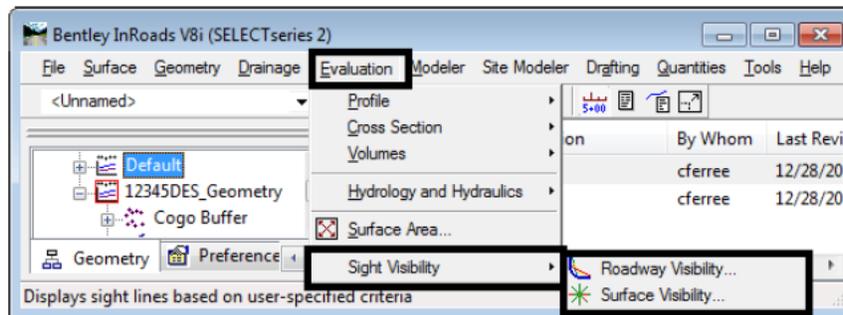
Using the Roadway Visibility Tool

1.   From the InRoads main menu, select **Evaluation > Sight Visibility > Roadway Visibility**. This
     displays the ***Roadway Visibility*** dialog box.
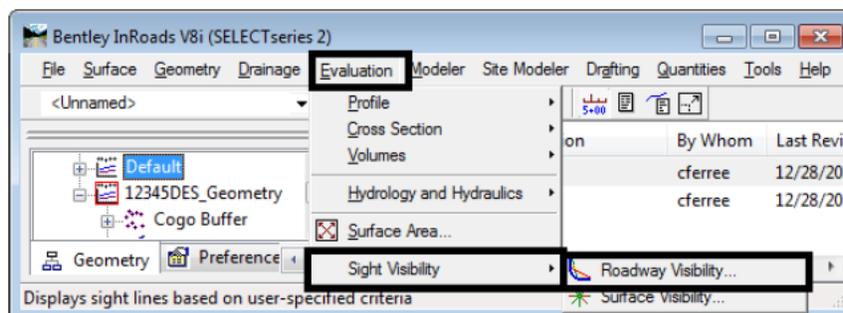
2. In the ***Roadway Visibility*** dialog box, select the **General** leaf.

3. In the ***Surfaces*** list, select the merged surface.

    Note: If two or more surfaces are selected, InRoads will use the highest surface to base eye height and object height from. This could result in inaccurate readings in areas of cut.

4. Using the ***Horizontal Alignment*** drop down menu, select the desired alignment.

5. Key in the desired **Start Station** and **Stop Station** in their respective fields.

6. If the alignment runs in the opposite direction as the flow of traffic, **<D>** the **Reverse** button. This will make the command check the sight distance in the same direction as the flow of traffic.

7. In the **Interval** field, key in the desired value.

8. In the ***Sight Distance*** field, key in the desired value. See Chapter 3 - Elements of Design of the ***CDOT Roadway Design Guide 2005*** for information on computing sight distances and sight distance look up tables.

9. In the ***Relaxed Distance*** field, key in the desired value. This is the minimum allowable distance. It can be the same value as used in the Sight Distance field.

10. Toggle on **Create XML Report** to create a textual copy of the sight distance data.
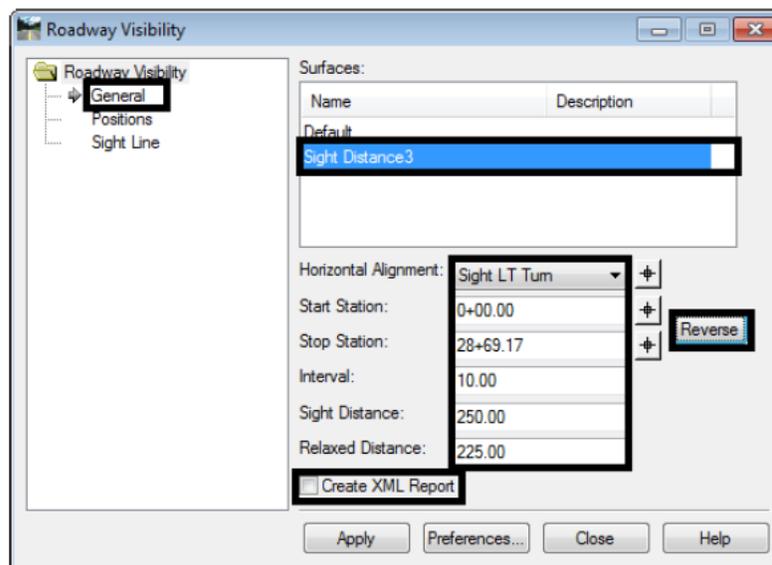

11. Select the **Position** leaf.

12. Set the **Offset** value in the ***Eye Position*** area so that it will be in the center of the driving lane to the inside of the curve.

13. Set the **Offset** value for the ***Object Position*** area so that it will be in the center of the driving lane to the inside of the curve.

    Note: On 4 lane roads the eye and object position offset will have to change depending on the direction of the curve. This may require a different run of the command for each curve.

14. **<D>** the **Apply** button to execute the command.
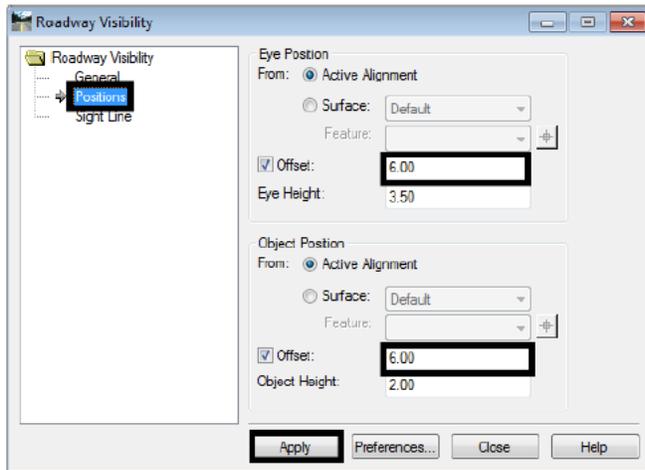
A sample of the results are shown below:
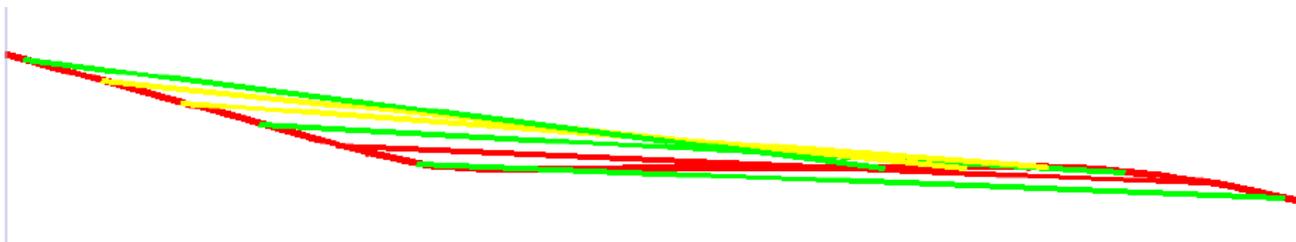
- A green line meets or exceeds the ***Sight Distance***.
- A yellow line meets or exceeds the ***Relaxed Distance***.
- A red line does not meet either the ***Sight Distance*** or the ***Relaxed Distance***.

Below is an example of the report created by the ***Roadway Visibility*** command:

```
Surface(s):  sd

Alignment Name:  SH 86
    Start Station:  223+00.00                    Sight Distance:  2135.00
    Stop Station:  234+00.00                 Relaxed Distance:  2000.00
        Interval:  200.00

    Eye Position:  From Alignment            Object Position:  From Alignment
      Eye Height:  3.50                        Object Height:  2.00
      Eye Offset:  2.00                        Object Offset:  2.00

 Input Grid Factor:  1.00000000    Note:  All units in this report are in feet unless specified otherwise.
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	Station	Offset	Elevation
Eye Position:	223+00.00	2.00	6630.73
Object Position:	244+52.27	2.00	6573.72
Obstruction:	No Obstruction		
Sight Distance:	3362.72		
Eye Position:	225+00.00	2.00	6628.83
Object Position:	246+51.23	2.00	6562.02
Obstruction:	245+89.44	-4.42	6563.96
Sight Distance:	2072.87		
Eye Position:	227+00.00	2.00	6625.96
Object Position:	248+48.84	2.00	6549.15
Obstruction:	247+84.92	-2.68	6551.46
Sight Distance:	2070.92		
Eye Position:	229+00.00	2.00	6622.13
Object Position:	250+45.00	2.00	6538.58
Obstruction:	No Obstruction		
Sight Distance:	Unlimited		
Eye Position:	231+00.00	2.00	6617.39
Object Position:	252+41.23	2.00	6536.78
Obstruction:	239+30.96	-19.86	6586.20
Sight Distance:	826.02		
Eye Position:	233+00.00	2.00	6611.72
Object Position:	254+40.08	2.00	6542.31
Obstruction:	No Obstruction		
Sight Distance:	2171.21		

The entries in the report correspond to a line drawn in MicroStation.

Using the Surface Visibility Tool

The Surface Visibility tool determines the visibility from a given point. There are three modes for this tool; Surface Points, Surface Regions, and Line of Sight. The Surface Points mode indicates what triangle vertices can be seen from the observation point. The Surface Regions mode draws lines radially from the observation point showing where sight is clear or blocked. The Line of Sight mode shows whether sight is clear or blocked between two points.

The steps below describe how to use the Surface Visibility tool.

1. From the InRoads main menu, select **Evaluation > Sight Visibility > Surface Visibility**. This displays the ***Surface Visibility*** dialog box.
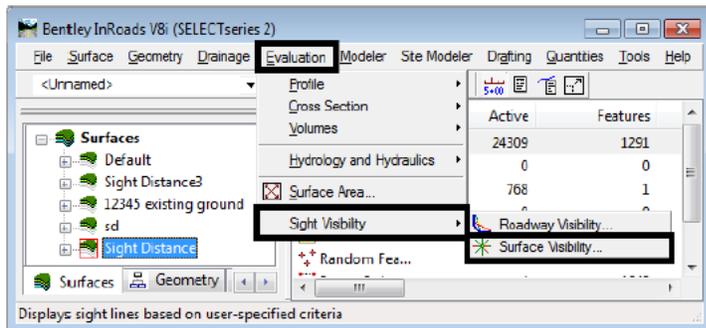
2. In the ***Surface Visibility*** dialog box ***General*** leaf, select the desired **Surface** to be evaluated.

3. Select the desired **Mode** using the drop down menu.

4. Toggle on or off **Drape Surface** as desired. If ***Drape Surface*** is on, the base ***Elevation*** for the ***Eye Position*** is set to that of the ***Surface*** at the specified location.

5. Set the **Northing** and **Easting** (and **Elevation** if ***Drape Surface*** is not used) for the ***Eye Position***. This can be done by key in or by using the locator button.

6. Key in the desired value for the **Eye Height**. This is the distance above the ***Elevation*** for the actual eye position.
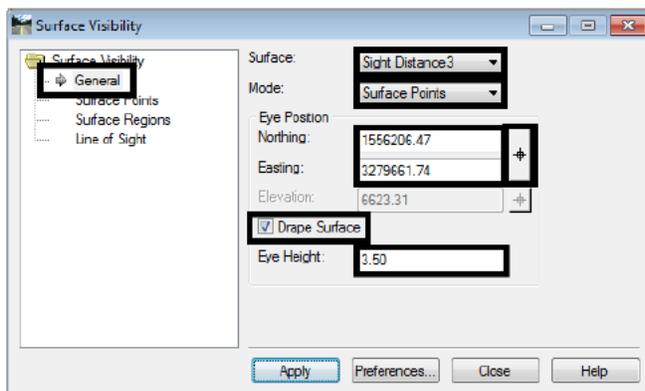

Surface Points Settings

These settings are only used when the Mode is set to Surface Points on the General Leaf.

1. **<D>** the **Surface Points** leaf from the dialog box explorer pane.

2. Toggle on or off the **Object Height** as desired. If toggled on, key in the desired value. This is an elevation adjustment above the surface at the target location and represents the height of an object sitting on the surface at that location.

3. Toggle on or off the **Sight Radius** as desired. If toggled on, key in the desired value. This is the distance from the *Eye Position* that data is collected. If toggled off, the entire surface is evaluated.
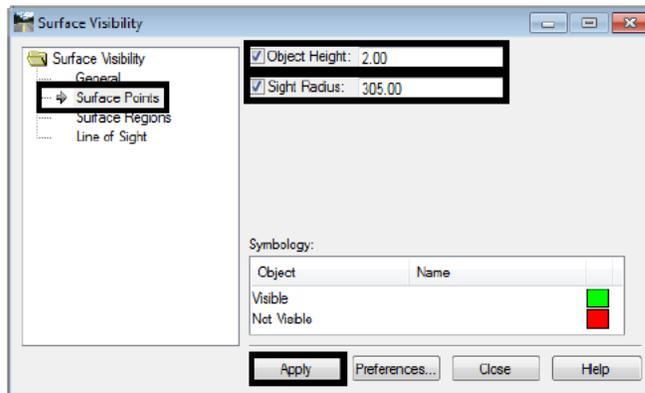
4. **<D>** the **Apply** button to execute the command. The data is displayed in the MicroStation view. An example of the data is displayed below.
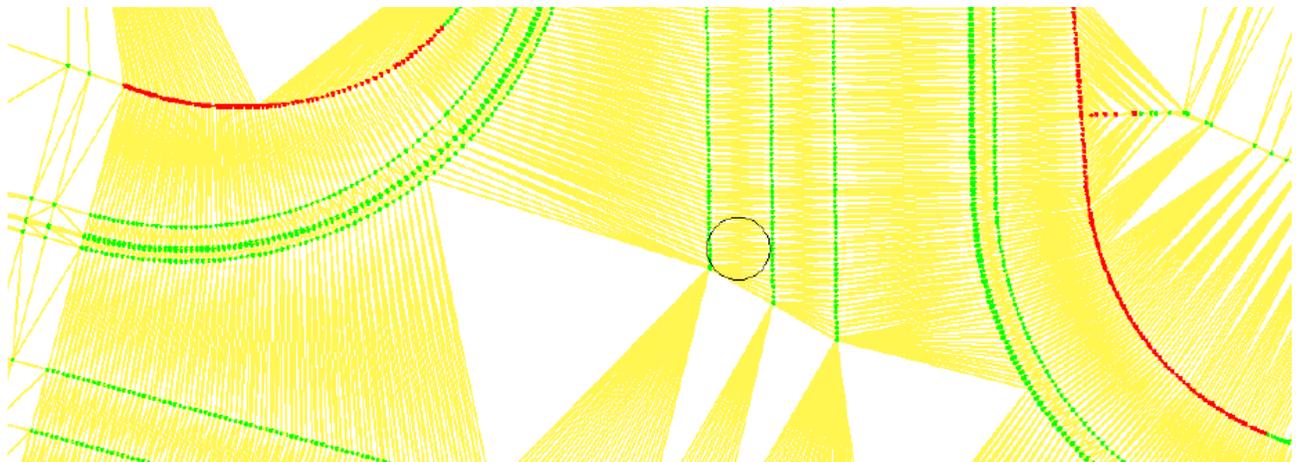
The green dots represent locations that can be seen from the *Eye Position*. Red dots represent locations that cannot be seen from the *Eye Position*. The locations evaluated are the triangle vertices of the selected surface that are within the *Sight Radius*.

Surface Region Settings

These settings are only used when the Mode is set to Surface Regions on the General Leaf.

1. **<D>** the **Surface Regions** leaf from the dialog box explorer pane.

2. In the *Method* area, select either **Radial Angle Interval** or **Number of Radials**. The *Radial Angle Interval* option places data lines radiating from the Eye Position in a circle at the specified angle interval. the *Number of Radials* option places data lines radiating from the Eye Position in a circle at angle intervals equal to 360/Number of Radials value. In each case, the first radial is

3. Toggle on or off the **Object Height** as desired. If toggled on, key in the desired value. This is an elevation adjustment above the surface at the target location and represents the height of an object sitting on the surface at that location. In each case, the first radial is placed at the MicroStation 0 angle (horizontally to the right from the *Eye Position* in a *Top* view).

4. Toggle on or off the **Sight Radius** as desired. If toggled on, key in the desired value. This is the distance from the *Eye Position* that data is collected. If toggled off, the entire surface is evaluated.
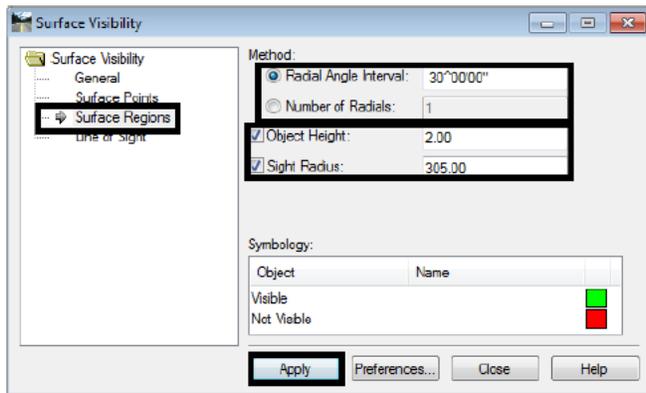
5. **<D>** the **Apply** button to execute the command. The data is displayed in the MicroStation view. An example of the data is displayed below.
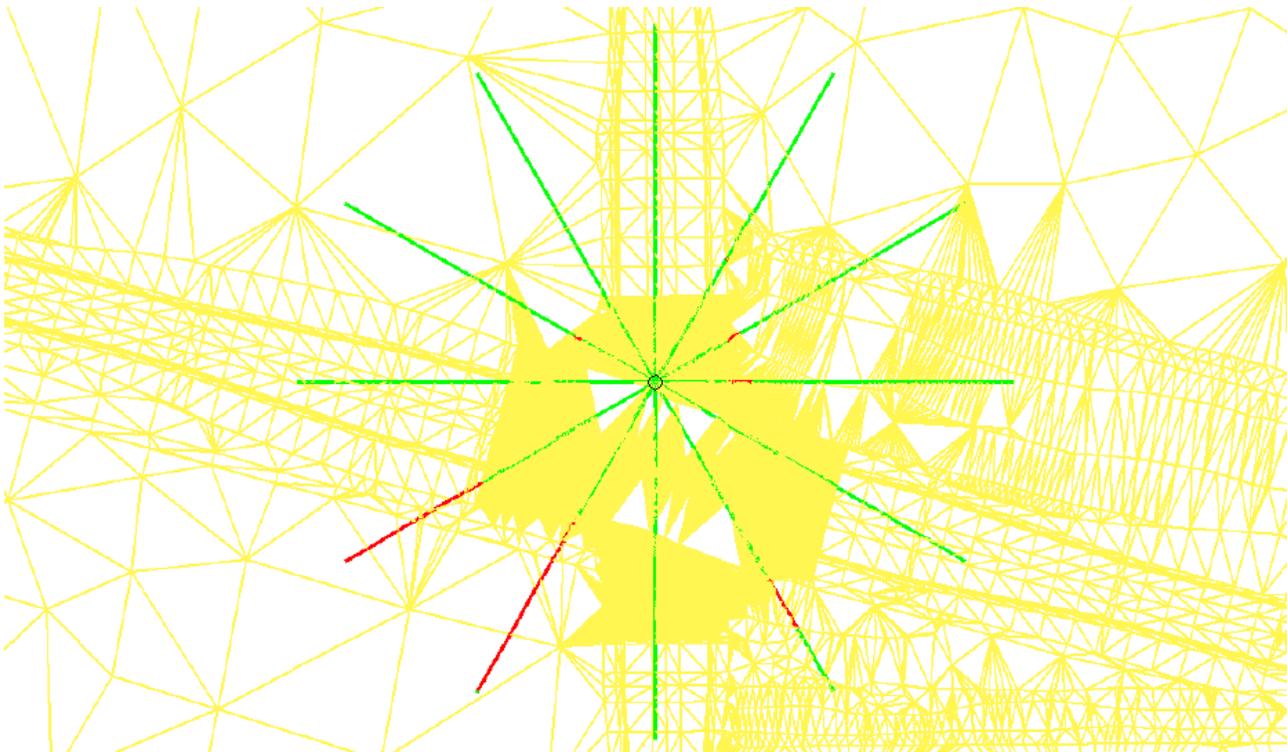
The green lines represent locations that can be seen from the *Eye Position*. Red lines represent locations that cannot be seen from the *Eye Position*. The locations evaluated are within the *Sight Radius*.

Line of Sight Settings

These settings are only used when the *Mode* is set to *Line of Sight* on the *General* Leaf.

1. **<D>** the **Line of Sight** leaf from the dialog box explorer pane.

2. Toggle on or off **Drape Surface** as desired. If ***Drape Surface*** is on, the base ***Elevation*** for the ***Object Position*** is set to that of the ***Surface*** (on the ***General*** leaf) at the specified location.

3. Set the **Northing** and **Easting** (and **Elevation** if ***Drape Surface*** is not used) for the ***Object Position***. This can be done by key in or by using the locator button.

4. 4. Key in the desired value for the **Object Height**. This is the distance above the ***Elevation*** for the actual object position.
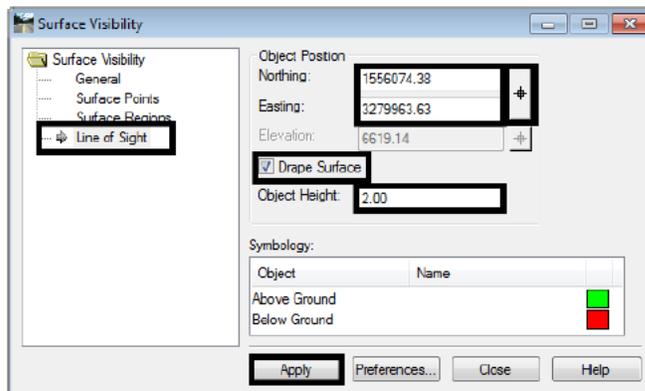
5. **<D>** the **Apply** button to execute the command. The data is displayed in the MicroStation view. An example of the data is displayed below.
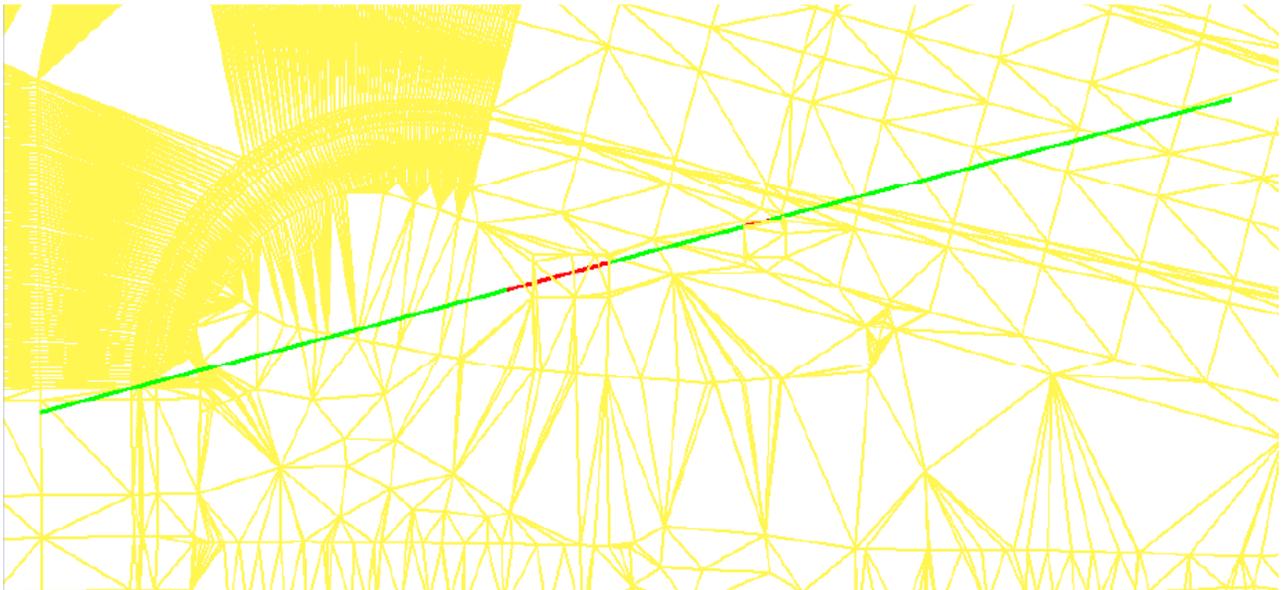
The green lines represent locations that are above the surface. Red lines represent locations that are below the surface.