

AutoCAD Civil 3D 2011

# Subassembly Reference

Autodesk®

April 2010

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Published By:  
Autodesk, Inc.  
111 McInnis Parkway  
San Rafael, CA 94903, USA

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# Subassembly Reference

# 1

These topics describe the construction and behavior for each subassembly included in the AutoCAD® Civil 3D® Corridor Modeling catalogs. For more information on subassemblies, see *Assemblies and Subassemblies* in the AutoCAD Civil 3D Help.

The subassemblies in this subassembly reference are organized alphabetically into the following sections:

- Subassembly Reference - BasicBarrier through LaneTowardCrown (this section)
- [Subassembly Reference \(continued\) - LinkMulti through OverlayWidenWithSuper1](#) (page 257)
- [Subassembly Reference \(continued\) - RailSingle through UrbanSidewalk](#) (page 407)

## Introduction to Subassemblies

AutoCAD Civil 3D subassemblies are preconfigured AutoCAD drawing objects that let you design three-dimensional sections of roadways and other corridor-type structures.

These Help topics contain detailed information about the construction and behavior of each subassembly included in the AutoCAD Civil 3D Corridor Modeling catalogs. Lists and descriptions of input parameters, output parameters, target parameters, and coding diagrams for each subassembly are also included.

For more information on how to use subassemblies for corridor design, refer to the *Understanding Subassemblies* section of the AutoCAD Civil 3D Help.

## Subassemblies at a Glance

Review this topic to determine which subassemblies you may want to use in your designs when building corridor assemblies.

When you build assemblies in AutoCAD Civil 3D, you must use subassemblies that exist on a tool palette.

Some but not all of the subassemblies that are provided with AutoCAD Civil 3D are located on a tool palettes by default. However, the Content Browser does contain the entire set of subassemblies that are provided with AutoCAD Civil 3D by default.

You can add subassemblies that you use frequently to a tool palette for easy access.

Review the information in the following “at a glance” tables to help you find the subassemblies with the behavior you are looking for. In addition to providing a brief description of the use-cases for each subassembly, you will also find the name of the default tool palette each subassembly can be accessed from.

## Channel and Retaining Wall Subassemblies

Use these subassemblies to design channels, trenches, and retaining walls.

Image	Subassembly	Common Uses
	<b>Channel</b> (page 53): Trapezoidal channel with optional lining and backslope links. Marked points are placed at the ends of the backslopes so that other corridor components can be tied to them. <b>Default Tool Palette:</b> Trench Pipes Subassemblies	Roadside channels
	<b>ChannelParabolicBottom</b> (page 58): Similar to Channel except that the bottom is parabolic in shape. <b>Default Tool Palette:</b> Trench Pipes Subassemblies	Roadside channels
	<b>Ditch</b> (page 176): Flat or V-shaped ditch with user-defined horizontal and vertical control parameters and an optional lining material depth. A parameter can control whether the ditch is inserted in cut, fill, or either condition. <b>Default Tool Palette:</b> Trench Pipes Subassemblies	Roadside ditches
	<b>SideDitch</b> (page 490): Simple ditch with parameters for bottom width, sideslopes, and optional foreslope. You can also specify a ditch wall depth for lined ditches. <b>Default Tool Palette:</b> Trench Pipes Subassemblies	Roadside ditches

Image	Subassembly	Common Uses
	<p><b>SideDitchUShape</b> (page 493): U shaped ditch with variable wall thicknesses. Benches can be specified inside and outside the ditch as well as an optional foreslope link.</p> <p><b>Default Tool Palette:</b> Trench Pipes Subassemblies</p>	Concrete-lined ditches or channels
	<p><b>SideDitchWithLid</b> (page 497): Similar to SideDitchUShape except that a lid can be included and the side slopes of the ditch controlled through input parameters.</p> <p><b>Default Tool Palette:</b> Trench Pipes Subassemblies</p>	Concrete-lined ditches or channels with grates or lids
Image	Subassembly	Common Uses
	<p><b>RetainWallTapered</b> (page 411): Retaining wall with one tapered side and an optional key. The vertical side is always faced to the low side and the elevation of the footing is based on a target surface and specified cover requirement.</p> <p><b>Default Tool Palette:</b> Retaining Wall Subassemblies</p>	Retaining walls
	<p><b>RetainWallTaperedWide</b> (page 416): Similar to RetainWall-Tapered but typically used for high retaining walls (18 ft or higher).</p> <p><b>Default Tool Palette:</b> Retaining Wall Subassemblies</p>	High retaining walls
	<p><b>RetainWallTieToDitch</b> (page 420): Retaining wall with optional barrier, shoulder, walk area, and the ability to tie to an existing ditch.</p> <p><b>Default Tool Palette:</b> Retaining Wall Subassemblies</p>	Urban areas where the retaining wall is adjacent to a ditch or walk
	<p><b>RetainWallToLowSide</b> (page 426): Similar to RetainWall-Tapered except that all of the footing is located under the high fill side.</p> <p><b>Default Tool Palette:</b> Retaining Wall Subassemblies</p>	Retaining wall where there is limited space on the low fill side for the footing
	<p><b>RetainWallVertical</b> (page 430): Similar to RetainWall-Tapered except that both sides of the wall are vertical.</p> <p><b>Default Tool Palette:</b> Retaining Wall Subassemblies</p>	Vertical retaining walls

Image	Subassembly	Common Uses
	<b>SimpleNoiseBarrier</b> (page 502): Creates a trapezoidal nose barrier with the ability to tie the back of the barrier into an existing surface. A topsoil thickness may be applied. <b>Default Tool Palette:</b> Retaining Wall Subassemblies	Noise barriers or berms

## Generic Subassemblies

Use these generic subassemblies to build assemblies.

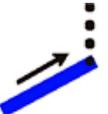
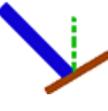
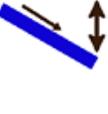
Image	Subassembly	Common Uses
	<b>LinkMulti</b> (page 257): General purpose subassembly to add a series of connected links. <b>Default Tool Palette:</b> Generic Subassemblies	Medians, curbs, other irregular structures
	<b>LinkOffsetAndElevation</b> (page 259): Creates a link from the attachment point to a user specified offset (from the baseline) and elevation. Offset and elevation can be controlled by target parameters. <b>Default Tool Palette:</b> Generic Subassemblies	General purpose
	<b>LinkOffsetAndSlope</b> (page 262): Creates a link from the attachment point to a user specified offset (from the baseline) at a given slope. <b>Default Tool Palette:</b> Generic Subassemblies	General purpose
	<b>LinkOffsetOnSurface</b> (page 265): Creates a link from the attachment point to a target surface at a given offset (from the baseline). <b>Default Tool Palette:</b> Generic Subassemblies	General purpose
	<b>LinkSlopeAndVerticalDeflection</b> (page 267): Creates a link from the attachment point to a given vertical direction along a given slope. <b>Default Tool Palette:</b> Generic Subassemblies	General purpose

Image	Subassembly	Common Uses
	<p><b>LinkSlopesBetweenPoints</b> (page 270): Creates intersecting links between the attachment point and a marked point. An optional ditch width can be assigned to create a flat link in the middle.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	Ditch between adjacent or merging roadways
	<p><b>LinkSlopeToElevation</b> (page 272): Creates a link from the attachment point to a given elevation along a given slope.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	General purpose
	<p><b>LinkSlopeToSurface</b> (page 275): Creates a link from the attachment point to a given surface along a given slope.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	Simple daylighting.
	<p><b>LinkToLaneMarker</b> (page 278): Marks a point on a lane subassembly from the attachment point to a specified width and slope.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	General purpose
	<p><b>LinkToMarkedPoint</b> (page 282): Creates a link from the attachment point to a marked point.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	General purpose
	<p><b>LinkVertical</b> (page 287): Creates a vertical link from the attachment point to a given vertical deflection or profile.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	General purpose
	<p><b>LinkWidthAndSlope</b> (page 289): Creates a link from the attachment point to a given width along a given slope.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	General purpose
	<p><b>LotGrade</b> (page 292): Creates different lot grading variations based on whether the general slope of the lot is up or down.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	Lot grading

Image	Subassembly	Common Uses
	<p><b>MarkPoint</b> (page 295): Creates a marked point which can be targeted by certain subassemblies.</p> <p><b>Default Tool Palette:</b> Generic Subassemblies</p>	General purpose

## Basic Subassemblies

Use these basic subassemblies to design assemblies.

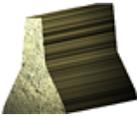
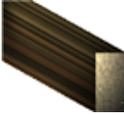
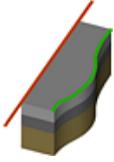
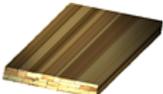
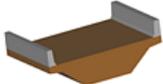
Image	Subassembly	Common Uses
	<p><b>BasicBarrier</b> (page 18): A simple jersey barrier which can be adjusted in size and shape through a number of parameters.</p> <p><b>Default Tool Palette:</b> Basic Subassemblies</p>	Highway medians, traffic control during construction
	<p><b>BasicCurb</b> (page 21): Simple rectangular curb.</p> <p><b>Default Tool Palette:</b> Basic Subassemblies</p>	Any road design
	<p><b>BasicCurbAndGutter</b> (page 23): A simple curb and gutter in which the height and width of the curb and gutter can be adjusted through a number of parameters. The gutter slope can also be set. It is a "rigid" shape with no target parameters.</p> <p><b>Default Tool Palette:</b> Basic Subassemblies</p>	All road and parking lot curbing
	<p><b>BasicGuardrail</b> (page 26): Simple guardrail structure.</p> <p><b>Default Tool Palette:</b> Basic Subassemblies</p>	Any road design
	<p><b>BasicLane</b> (page 27): A simple lane with no subsurface courses. Available parameters control width, depth, and slope. It is a "rigid" shape with no target parameters.</p> <p><b>Default Tool Palette:</b> Basic Subassemblies</p>	Any road design where there is a constant lane width and no material volumes are needed

Image	Subassembly	Common Uses
	<b>BasicLaneTransition</b> (page 30): Simple lane in which the width and outside elevation can be controlled through target parameters. <b>Default Tool Palette:</b> Basic Subassemblies	Turning lanes
	<b>BasicShoulder</b> (page 33): A simple shoulder with no sub-surface courses. Available parameters control width, depth, and slope. It is a "rigid" shape with no target parameters. <b>Default Tool Palette:</b> Basic Subassemblies	Any road design where there is a constant shoulder width and no material volumes are needed
	<b>BasicSideSlopeCutDitch</b> (page 35): Daylighting that creates an optional flat or v-shaped ditch in a cut condition and a simple fill slope in a fill condition. <b>Default Tool Palette:</b> Basic Subassemblies	Simple daylighting
	<b>BasicSideWalk</b> (page 41): Simple rectangular sidewalk section with optional buffer areas on either side. <b>Default Tool Palette:</b> Basic Subassemblies	Residential and urban roads with sidewalks

## Bridge and Rail Subassemblies

Use these subassemblies to design bridge and rail structures.

Image	Subassembly	Common Uses
	<b>BridgeBoxGirder1</b> (page 43): Box girder bridge section with optional half-barriers. <b>Default Tool Palette:</b> Bridge and Rail Subassemblies	Small bridges and over-passes
	<b>BridgeBoxGirder2</b> (page 48): Two-chamber box girder bridge section with optional half-barriers. <b>Default Tool Palette:</b> Bridge and Rail Subassemblies	Small bridges and over-passes
	<b>RailSingle</b> (page 407): Railroad section including rails, ballast, and sub-ballast. <b>Default Tool Palette:</b> Bridge and Rail Subassemblies	Railroads

## Daylight Subassemblies

Use these subassemblies to add daylight to road assemblies.

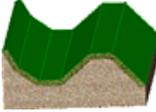
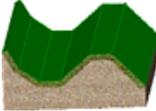
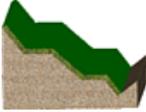
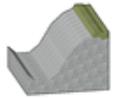
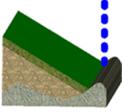
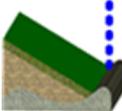
Image	Subassembly	Common Uses
	<b>DaylightBasin</b> (page 79): Creates a basin in a cut situation or a basin, berm, and fill slope for a fill situation. Basin walls are comprised of two slope segments whereas ditches only contain one. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting where a basin or ditch is required
	<b>DaylightBasin2</b> (page 85): Similar to DaylightBasin except that the berm is optional in a fill condition and the berm and basin widths can be controlled by an alignment. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting where a basin or ditch is required
	<b>DaylightBench</b> (page 92): Creates cut or fill slopes with repeating benches as needed. <b>Default Tool Palette:</b> Daylight Subassemblies	Large cut or fill slopes where benching is required
	<b>DaylightGeneral</b> (page 99): Generalized daylight solution providing many parameters to create a basin, ditch, or simple daylight condition. It also includes an optional guardrail. <b>Default Tool Palette:</b> Daylight Subassemblies	General purpose daylighting
	<b>DaylightMultipleSurface</b> (page 145): Allows varying cut slopes depending on the material type being excavated. Up to three surfaces can be specified (i.e. topsoil, clay, rock). <b>Default Tool Palette:</b> Daylight Subassemblies	Deep cuts where multiple material types are encountered
	<b>DaylightRockCut</b> (page 149): Daylights using two target surfaces (existing ground and rock) with varied slope and ditch solutions based on conditions encountered. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting for deep cuts

Image	Subassembly	Common Uses
	<b>DaylightStandard</b> (page 156): Daylighting which applies one of 3 preset slopes (Flat, Medium, and Steep) based on conditions. It creates a ditch in cut situations and an optional guardrail for widening or steep fill conditions. <b>Default Tool Palette:</b> Daylight Subassemblies	General purpose daylighting
Image	Subassembly	Common Uses
	<b>DaylightInsideROW</b> (page 111): Daylights using a typical slope as long as the daylight is within the ROW limits. If the daylight falls outside the ROW, the slope can be steepened or held based on other parameters. <b>Default Tool Palette:</b> Daylight Subassemblies	Subdivision road daylighting
	<b>DaylightMaxOffset</b> (page 117): Typical slope is applied unless a steeper slope is needed to stay within a maximum offset from the baseline. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting within a boundary or obstacle
	<b>DaylightMaxWidth</b> (page 123): Similar to DaylightMaxOffset except that the width of the daylight area is used instead of an offset from the baseline. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting within a boundary or obstacle
	<b>DaylightMinOffset</b> (page 129): Typical slope is applied unless a less steep slope is needed to stay outside of a minimum offset from the baseline. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting outside of a boundary or obstacle
	<b>DaylightMinWidth</b> (page 134): Similar to DaylightMinOffset except that the width of the daylight area is used instead of an offset from the baseline. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting outside of a boundary or obstacle
	<b>DaylightMultiIntercept</b> (page 140): Daylighting that forces the cut or fill slope to pass through the surface multiple times to intersect at a more distant location. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting in "rough" terrain where a different intercept point may be needed

Image	Subassembly	Common Uses
	<b>DaylightToOffset</b> (page 166): Daylights from the attachment point to a given offset from the baseline. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting directly to a boundary or feature
	<b>DaylightToROW</b> (page 171): Similar to DaylightToOffset except that an offset adjustment can be applied so that daylighting occurs a given distance within or beyond the ROW offset. <b>Default Tool Palette:</b> Daylight Subassemblies	Daylighting directly to a boundary or feature

## Lane Subassemblies

Use these subassemblies to design various types of lanes for road assemblies.

Image	Subassembly	Common Uses
	<b>CrownedLane</b> (page 74): A crowned lane with separate subbase slope control and the ability to control the location of the subbase crown. <b>Default Tool Palette:</b> Lane Subassemblies	Crowned road where subgrade slope and crown needs to be controlled independently
	<b>GenericPavementStructure</b> (page 181): A simple pavement structure with user-definable point, link, and shape codes. <b>Default Tool Palette:</b> Lane Subassemblies	Any pavement course
	<b>LaneBrokenBack</b> (page 185): Two travel lanes with independent cross-slopes. <b>Default Tool Palette:</b> Lane Subassemblies	Highways with multiple lanes in one travel direction
	<b>LaneInsideSuper</b> (page 203): Lane that responds to Inside Lane superelevation value. <b>Default Tool Palette:</b> Lane Subassemblies	Multi-lane roads with superelevation

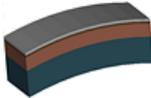
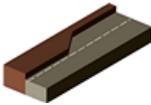
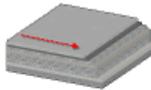
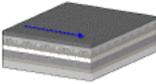
Image	Subassembly	Common Uses
	<b>LaneOutsideSuper</b> (page 222): Lane that responds to Outside Lane superelevation value. This subassembly is commonly used for general-purpose lane creation. <b>Default Tool Palette:</b> Lane Subassemblies	All road lanes
	<b>LaneParabolic</b> (page 247): Creates a simple parabolic shape where the crown height, width, and slope can be adjusted. Slope is calculated using a "string line" attached to left ETW and right ETW. <b>Default Tool Palette:</b> Lane Subassemblies	Any road design where parabolic lane is required
	<b>LaneTowardCrown</b> (page 251): Creates a lane that slopes downward from the crown to the centerline by applying the negative of the outside lane superelevation value from the opposite side of the road. <b>Default Tool Palette:</b> Lane Subassemblies	Multi-lane roads with superelevation
	<b>ShapeTrapezoidal</b> (page 435): Generic shape with user-defined geometry and codes. <b>Default Tool Palette:</b> Lane Subassemblies	Irregular-shaped pavement courses and other structures
Image	Subassembly	Common Uses
	<b>LaneFromTaperedMedian1</b> (page 189): Maintains the cross slope of the lane while extending it inward to create a left turn lane. Works in conjunction with an alignment defining the median edge. <b>Default Tool Palette:</b> Lane Subassemblies	Medians with left turn lanes
	<b>LaneFromTaperedMedian2</b> (page 195): Similar to LaneFromTaperedMedian1 except that it allows for two lanes outside the median. <b>Default Tool Palette:</b> Lane Subassemblies	Medians with left turn lanes - multiple lanes in one travel direction
	<b>LaneInsideSuperLayerVaryingWidth</b> (page 208): Lane that responds to Inside Lane superelevation value and allows independent widths for each pavement course. Up to 10 different courses can be specified. <b>Default Tool Palette:</b> Lane Subassemblies	Pavement structures requiring more than four courses with varying widths

Image	Subassembly	Common Uses
	<b>LaneInsideSuperMultiLayer</b> (page 216): Similar to LaneInsideSuper except that there are additional available pavement courses. <b>Default Tool Palette:</b> Lane Subassemblies	Pavement structures requiring more than four courses
	<b>LaneOutsideSuperLayerVaryingWidth</b> (page 226): Lane that responds to Outside Lane superelevation value and allows independent widths for each pavement course. Up to 10 different courses can be specified. <b>Default Tool Palette:</b> Lane Subassemblies	Pavement structures requiring more than four courses with varying widths
	<b>LaneOutsideSuperMultiLayer</b> (page 235): Similar to LaneOutsideSuper except that there are additional available pavement courses. <b>Default Tool Palette:</b> Lane Subassemblies	Pavement structures requiring more than four courses
	<b>LaneOutsideSuperWithWidening</b> (page 241): Automatically widens lane in superelevated regions using a formula based on the radius of the curve and the length of the wheelbase. <b>Default Tool Palette:</b> Lane Subassemblies	Highways where lane widening is required when in superelevation

## Median Subassemblies

Use these subassemblies to add medians to road assemblies.

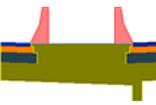
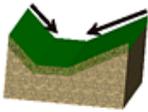
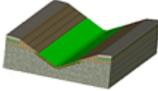
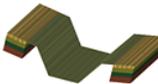
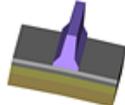
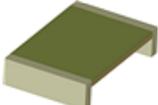
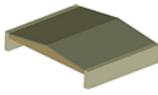
Image	Subassembly	Common Uses
	<b>MedianConstantSlopeWithBarrier</b> (page 297): Flush median with independent left and right jersey barriers and subsurface courses that can be set to match the structure of abutting lanes. <b>Default Tool Palette:</b> Medians Subassemblies	Divided roads or highways where asymmetric barriers are needed
	<b>MedianDepressed</b> (page 305): Depressed median between an attachment point and marked point with various parameters to control ditch geometry. <b>Default Tool Palette:</b> Medians Subassemblies	Divided roads or highways requiring a depressed median

Image	Subassembly	Common Uses
	<b>MedianDepressedShoulderExt</b> (page 309): Depressed Median with various options for superelevation rotation and subgrade extension. <b>Default Tool Palette:</b> Medians Subassemblies	Divided roads or highways requiring a depressed median
	<b>MedianDepressedShoulderVert</b> (page 316): Similar to MedianDepressedShoulderExt except that shoulder termination is vertical rather than extending under the ditch slope. There is also a parameter to incorporate interior turn lanes. <b>Default Tool Palette:</b> Medians Subassemblies	Divided roads or highways requiring a depressed median
	<b>MedianFlushWithBarrier</b> (page 323): Creates a median that is flush with adjacent lanes and can include an optional jersey barrier. Subsurface courses that can be set to match the structure of abutting lanes. <b>Default Tool Palette:</b> Medians Subassemblies	Divided roads or highways
	<b>MedianRaisedConstantSlope</b> (page 329): Creates a cap for a raised median between the attachment point and a marked point. The cross slope of the top of the median is constant at a given section. <b>Default Tool Palette:</b> Medians Subassemblies	Divided roads or highways where curbs define the edges of the median
	<b>MedianRaisedWithCrown</b> (page 330): Similar to MedianRaisedConstantSlope except that the median cap is crowned by applying slope values either manually or through superelevation. <b>Default Tool Palette:</b> Medians Subassemblies	Divided roads or highways where curbs define the edges of the median

## Overlay and Stripping Subassemblies

Use these subassemblies to add overlay and tripping to road assemblies.

Image	Subassembly	Common Uses
	<b>OverlayBrokenBackBetweenEdges</b> (page 333): Creates a four-lane crowned overlay between existing gutter flange points on either side. <b>Default Tool Palette:</b> Rehab Subassemblies	Overlay of four-lane road

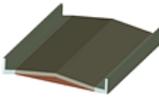
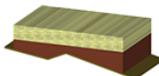
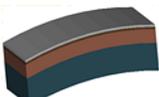
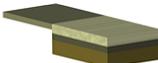
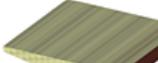
Image	Subassembly	Common Uses
	<p><b>OverlayBrokenBackOverGutters</b> (page 340): Similar to OverlayBrokenBackBetweenEdges except that the overlay extends over the gutter to the curb flowline on each side.</p> <p><b>Default Tool Palette:</b> Rehab Subassemblies</p>	Overlay of four-lane road
	<p><b>OverlayCrownBetweenEdges</b> (page 346): Creates a crowned road surface between two existing edges of pavement.</p> <p><b>Default Tool Palette:</b> Rehab Subassemblies</p>	Resurfacing a road with poor crown definition
	<p><b>OverlayMedianAsymmetrical</b> (page 351): Widens a divided highway by extending the travel lanes inward along their existing cross slopes. An asymmetrical barrier is provided that resolves the elevation difference caused by extending the slopes inward.</p> <p><b>Default Tool Palette:</b> Rehab Subassemblies</p>	Widening a divided highway to the inside
	<p><b>OverlayMedianSymmetrical</b> (page 357): Similar to OverlayMedianAsymmetrical except that the cross slopes are adjusted so that the extend lanes meet at the centerline.</p> <p><b>Default Tool Palette:</b> Rehab Subassemblies</p>	Widening a divided highway to the inside
	<p><b>OverlayMillAndLevel1</b> (page 363): Provides milling or leveling as needed, which is then topped with an overlay of user-specified depth. The overlay slope can be set to match existing, set to match superelevation, or entered manually.</p> <p><b>Default Tool Palette:</b> Rehab Subassemblies</p>	Single lane pavement overlay (not crowned)
	<p><b>OverlayMillAndLevel2</b> (page 371): Similar to OverlayMillAndLevel1 except that it is intended for a crowned roadway. Rather than a single overlay slope, two slopes define the crown of the road.</p> <p><b>Default Tool Palette:</b> Rehab Subassemblies</p>	Two-lane pavement overlay (crowned)
	<p><b>OverlayParabolic</b> (page 380): Creates a parabolic overlay between two existing pavement edges.</p> <p><b>Default Tool Palette:</b> Rehab Subassemblies</p>	Overlay of urban road

Image	Subassembly	Common Uses
	<b>OverlayWidenFromCurb</b> (page 385): Similar to OverlayWidenMatchSlope1 except that it extends inward from a curb flange. <b>Default Tool Palette:</b> Rehab Subassemblies	Overlay and widen from curb inward
	<b>OverlayWidenMatchSlope1</b> (page 390): Overlays the existing road, then provides widening at a cross slope that matches the existing road. <b>Default Tool Palette:</b> Rehab Subassemblies	Overlay and widen on one side
	<b>OverlayWidenMatchSlope2</b> (page 395): Similar to OverlayWidenMatchSlope1 except that it widens on two sides. <b>Default Tool Palette:</b> Rehab Subassemblies	Overlay and widen on both sides
	<b>OverlayWidenWithSuper1</b> (page 401): Similar to OverlayWidenMatchSlope1 except that the cross slope is set according to superelevation. <b>Default Tool Palette:</b> Rehab Subassemblies	Overlay and widen with superelevation
	<b>StrippingPavement</b> (page 507): Strips pavement to a given depth starting at the attachment point and working inward to the baseline. <b>Default Tool Palette:</b> Daylight Subassemblies	Pavement removal
	<b>StrippingTopSoil</b> (page 511): Strips topsoil to a given depth from the attachment point to a given stripping width. <b>Default Tool Palette:</b> Daylight Subassemblies	Topsoil removal

## Shoulder Subassemblies

Use these subassemblies to add various types of shoulder shapes to road assemblies.

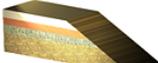
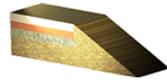
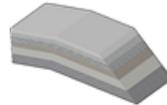
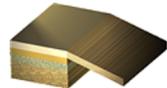
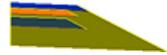
Image	Subassembly	Common Uses
	<b>ShoulderExtendAll</b> (page 439): Shoulder with all courses extended to the daylight slope. <b>Default Tool Palette:</b> Shoulders Subassemblies	Shoulders where all courses extend to the daylight slope

Image	Subassembly	Common Uses
	<p><b>ShoulderExtendSubbase (page 444):</b> Shoulder with subbase extended to the daylight slope. Each course can be assigned an independent extension into the daylight slope as well.</p> <p><b>Default Tool Palette:</b> Shoulders Subassemblies</p>	Shoulders where only the subbase material extends to the daylight slope
	<p><b>ShoulderMultiLayer (page 450):</b> Similar to ShoulderExtendSubbase with additional base and subbase courses. The top two pavement courses have variable extensions into the daylight slope.</p> <p><b>Default Tool Palette:</b> Shoulders Subassemblies</p>	Shoulders requiring more than 4 courses where the base and subbase material extends to the daylight slope
	<p><b>ShoulderMultiSurface (page 461):</b> Similar to ShoulderMultiLayer except that it includes independent paved and earthen shoulder areas. All courses are extended to the daylight slope.</p> <p><b>Default Tool Palette:</b> Shoulders Subassemblies</p>	Shoulders with paved and earthen areas
	<p><b>ShoulderVerticalSubbase (page 467):</b> Shoulder with subbase materials terminating at the edge of the shoulder, with an optional unpaved area outside of the shoulder that can be inserted based on cut/fill and superelevation conditions.</p> <p><b>Default Tool Palette:</b> Shoulders Subassemblies</p>	Shoulders that require an unpaved widening when in cut or on the high side of superelevation
	<p><b>ShoulderWithSubbaseInterlaced (page 476):</b> Shoulder which allows the adjacent lane pavement structure to be extended into the shoulder material and interlaced with the shoulder subbase material.</p> <p><b>Default Tool Palette:</b> Shoulders Subassemblies</p>	Shoulders requiring subbase material to be interlaced with base material
	<p><b>ShoulderWithSubbaseInterlacedAndDitch (page 483):</b> ShoulderWithSubbaseInterlaced plus a parabolic ditch.</p> <p><b>Default Tool Palette:</b> Shoulders Subassemblies</p>	Shoulders with an integrated ditch

## Urban Subassemblies

Use these subassemblies to add curb, gutter, and sidewalk structures to road assemblies that are typically used in urban design applications.

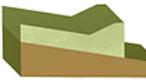
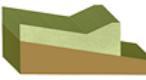
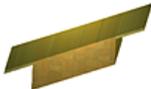
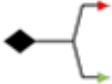
Image	Subassembly	Common Uses
	<b>UrbanCurbGutterGeneral</b> (page 529): Creates a standard curb and gutter shape with input parameters for the dimensions. Also includes a subbase shape with user-defined subbase slope and extension. <b>Default Tool Palette:</b> Curbs Subassemblies	Urban or residential curbs
	<b>UrbanCurbGutterValley1</b> (page 533): Creates a flat-bottomed valley curb and gutter shape with input parameters for the dimensions. Also includes a subbase shape with user-defined subbase slope and extension. <b>Default Tool Palette:</b> Curbs Subassemblies	Urban or residential curbs
	<b>UrbanCurbGutterValley2</b> (page 536): Similar to UrbanCurbAndGutter-Valley1 except that the bottom is sloped. <b>Default Tool Palette:</b> Curbs Subassemblies	Urban or residential curbs
	<b>UrbanCurbGutterValley3</b> (page 540): Similar to UrbanCurbAndGutter-Valley1 except that the bottom is sloped beneath the gutter, then becomes flat beneath the curb. <b>Default Tool Palette:</b> Curbs Subassemblies	Urban or residential curbs
	<b>UrbanReplaceCurbGutter1</b> (page 544): Replaces an existing curb and gutter and can tie the edge of a sod strip to the existing inside edge of a sidewalk. Vertical placement of the curb is controlled by allowable mill and/or overlay and allowable ranges of slopes for the sod strip. <b>Default Tool Palette:</b> Curbs Subassemblies	Curb replacement
	<b>UrbanReplaceCurbGutter2</b> (page 550): Similar to UrbanReplaceCurbGutter1 except that the vertical placement of the curb is controlled by a profile. <b>Default Tool Palette:</b> Curbs Subassemblies	Curb replacement
	<b>UrbanReplaceSidewalk</b> (page 556): Replaces an existing sidewalk by beginning at the outside edge and extending inward at a given width and slope. <b>Default Tool Palette:</b> Curbs Subassemblies	Sidewalk replacement

Image	Subassembly	Common Uses
	<b>UrbanSidewalk</b> (page 560): Creates a concrete sidewalk at a given cross slope with inside and outside grass boulevards. <b>Default Tool Palette:</b> Curbs Subassemblies	Urban or residential sidewalks

## Conditional Subassemblies

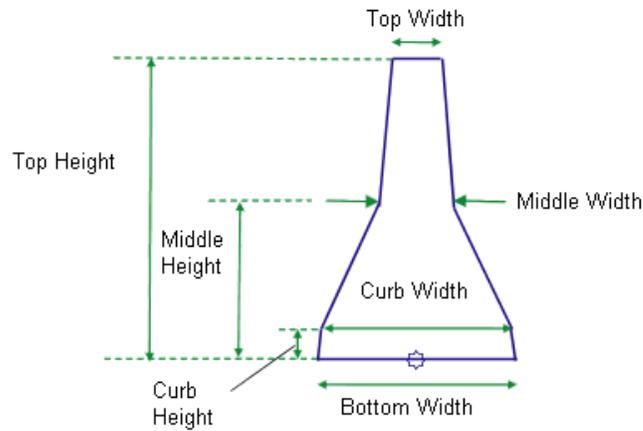
Use these subassemblies to add conditional behavior to road assemblies in cut and fill situations.

Image	Subassembly	Common Uses
	<b>ConditionalCutOrFill</b> (page 64): A special subassembly that applies selected subassemblies based on whether there is a cut or fill condition. It adds no actual geometric data to the assembly. <b>Default Tool Palette:</b> Conditional Subassemblies	General purpose
	<b>ConditionalHorizontalTarget</b> (page 70): - A special subassembly that applies selected subassemblies based on whether an offset target is found at the corridor station. It adds no actual geometric data to the assembly. <b>Default Tool Palette:</b> Conditional Subassemblies	General purpose

## BasicBarrier

This subassembly creates a two-sided New Jersey barrier on a roadway surface.

This subassembly is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.



### Attachment

The attachment point is at the center of the bottom of the barrier.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Top Width	Width of the top of the barrier	Numeric, positive	0.15 m 0.5 ft
Middle Width	Width of the middle of the barrier	Numeric, positive	0.225 m 0.75 ft
Bottom Width	Width of the bottom of the barrier	Numeric, positive	0.6 m 2.0 ft
Top Height	Height to the top of the barrier	Numeric, positive	0.9 m 3.0 ft
Middle Height	Height to the middle of the barrier	Numeric, positive	0.45 m 1.5 ft
Curb Height	Height of the barrier curb	Numeric, positive	0.075 m 0.25 ft

Parameter	Description	Type	Default
Curb Width	Width at the top of the barrier curb	Numeric, positive	0.6 m 1.9 ft

### Output Parameters

None.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Behavior

The subassembly constructs the shape of a two-sided New Jersey barrier, with the base centered about the attachment point.

### Layout Mode Operation

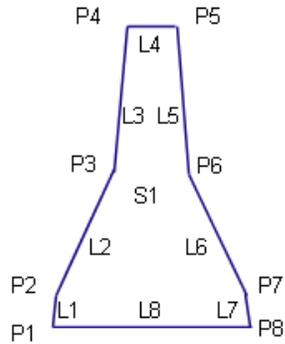
In layout mode, this subassembly draws the barrier shape as specified by the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1 - P8	P1, P2, ... P8	
All links	Barrier	
S1	Barrier	

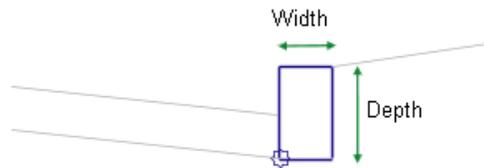
### Coding Diagram



## BasicCurb

This subassembly creates a simple curb at the edge of roadway. It can be attached to either outside edge of pavement or to the edge of a median on the inside.

This subassembly is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.



### Attachment

The attachment point is on the front face of the curb for case 1, and on the back face of the curb for case 2.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left/Right	Right
Width	Width of curb	Numeric, positive	0.225 m 0.75 ft
Depth	Depth of the curb	Numeric, positive	0.45 m 1.5 ft
Attachment Point	Specifies the attachment point of the curb as either Front Face or Back Face	Boolean	Front Face
Depth Below	Depth of the curb below inside attachment point	Numeric, positive	0.3 m 1.0 ft
Back Height	Exposed height of the back face of curb	Numeric, positive	0.0 m 0.0 ft
Curb Face Deflection	Specified deflection of front face of the curb. Specify zero degrees for vertical face.	Angular	0 degrees
Apply Deflection to Curb Top	Sets the top of the curb perpendicular to the front face of the curb.	Boolean: Yes/No	Yes

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The subassembly builds a rectangular shape for a simple curb, with the attachment point at the bottom inside edge of curb.

### Layout Mode Operation

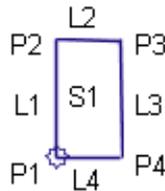
In layout mode, this subassembly draws the curb shape as specified by the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	BottomCurb	Inside bottom of curb
P2	TopCurb	Inside top of curb
P3	BackCurb	Outside top of curb
All links	Curb	
S1	Curb	

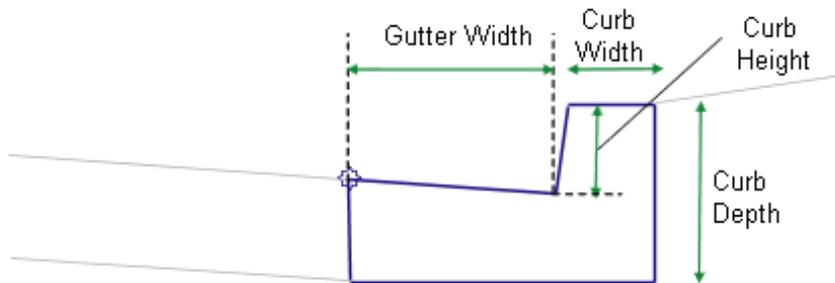
### Coding Diagram



## BasicCurbAndGutter

This subassembly creates a simple curb and gutter structure at the inside or outside edges of roadway.

This subassembly is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.



### Attachment

The attachment point is at the flange point of the gutter or back of the curb.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left / Right	Right
Insertion Point	Specifies insertion point of the curb and gutter as either Gutter Edge or Back of Curb	Boolean	Gutter Edge
Gutter Width	Width from the flange of the gutter to the flowline	Numeric, positive	0.45 m 1.5 ft
Gutter %Slope	% slope of the gutter	Numeric	-6%
Curb Height	Height from the flowline to the top of curb	Numeric, positive	0.225 m 0.75 ft
Curb Width	Width of the top of curb	Numeric, positive	0.15 m 0.5 ft

Parameter	Description	Type	Default
Curb Depth	Depth from the top of curb to the bottom of curb at the back-of-curb point	Numeric, positive	0.45 m 1.5 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The subassembly builds the shape for a simple curb and gutter with the attachment point either at (a) the inside edge of the gutter (or lip), or (b) the back of the curb. The face of the curb is given a small, constant width to make it non-vertical.

### Layout Mode Operation

In layout mode, this subassembly draws the curb and gutter shape as specified by the input parameter values.

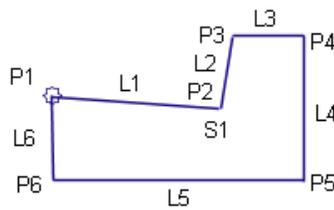
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	Flange	Flange of gutter
P2	Flowline_Gutter	Flowline of the gutter
P3	TopCurb	Top of curb
P4	BackCurb	Back of curb
L1, L2, L3	Top, Curb	Curb links on finish grade

Point, Link, or Shape	Codes	Description
L4	Datum	
S1	Curb	

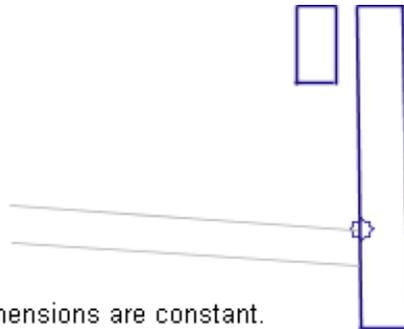
### Coding Diagram



## BasicGuardrail

This subassembly creates a simple guardrail shape on the assembly.

This subassembly is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.



Note: All dimensions are constant.

### Attachment

The attachment point is at the inside edge of the post at finish grade level.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left / Right	Right

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User’s Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The subassembly builds two rectangular shapes for the post and railing. The dimensions are fixed, and cannot be changed by the user. The post extends downward from the attachment point for a fixed distance below finish grade.

### Layout Mode Operation

In layout mode, this subassembly draws the post and rail with the fixed dimensions.

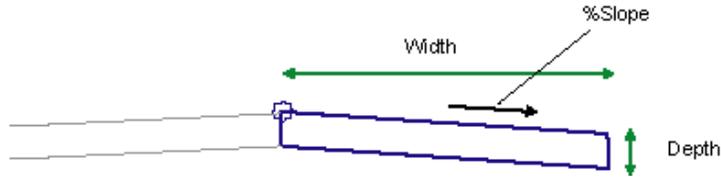
### Point, Link, and Shape Codes

The code “Guardrail” is assigned to all points. No link or shape codes are assigned.

## BasicLane

This subassembly creates a simple lane.

This subassembly is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.



### Attachment

The attachment point is at the inside edge of lane on finish grade.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left / Right	Right
Width	Width of the lane	Numeric, positive	3.6 m 12.0 ft
Depth	Depth from finish grade to subbase	Numeric, positive	0.2 m 0.67 ft
%Slope	% Slope of the lane	Numeric	-2%

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User’s Guide Help.

Target Parameters: None.

### Output Parameters

Parameter	Description	Type
Side	Specifies which side to place the subassembly	Left / Right

Parameter	Description	Type
Width	Width of the lane	Numeric, positive
Depth	Depth from finish grade to subbase	Numeric, positive
%Slope	% Slope of the lane	Numeric

### Behavior

The subassembly builds a finish grade and subbase surface, closed by vertical links at either end. The lane is inserted outward from the attachment point for the given width, depth, and slope.

### Layout Mode Operation

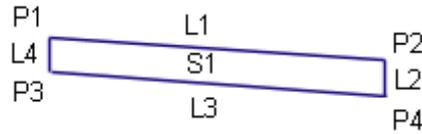
In layout mode, this subassembly draws the lane using the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	Crown	Crown of road on finish grade
P2	ETW	Edge-of-traveled-way on finish grade
P3	Crown_Subbase	Crown of road on subbase
P4	ETW_Subbase	Edge-of-traveled-way on subbase
L1	Top, Pave	Paved finish grade
L3	Datum, Subbase	Subbase
S1	Pave1	

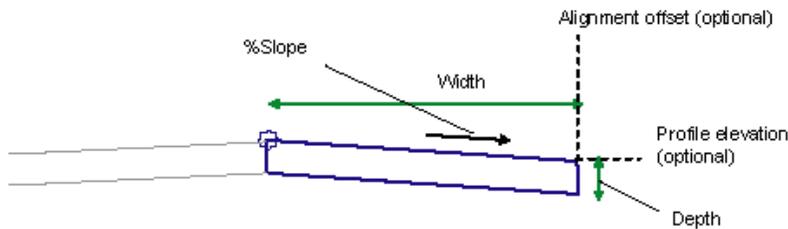
### Coding Diagram



## Basic Lane Transition

This subassembly creates a simple lane with finish grade and subbase, where the edge-of-traveled-way can be tied to an alignment or profile.

This subassembly is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.



### Attachment

The attachment point is either (a) at the inside edge of lane on finished grade, if the insertion point is Crown, or (b) at the outside edge of travel way, if the insertion point is at the edge of travel way.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right

Parameter	Description	Type	Default
Insertion Point	Specifies insertion point of the lane either at the crown, or at the edge of travel way	List of options: Crown, Edge of Travel Way	Crown
Crown Point on Inside	Specifies that the inside edge of travel way be coded as Crown	Yes / No	Yes
Width	Width of lane	Numeric, positive	3.6 m 12.0 ft
Depth	Depth from finish grade to subbase	Numeric, positive	0.2 m 0.67 ft
%Slope	% Slope of the lane	Numeric	-2%
Transition	Describes how the subassembly behaves when an alignment, profile, or both are used as target parameters. Choices are provided in a list including: Hold offset and elevation Hold elevation, change offset Hold grade, change offset Hold offset, change elevation Change offset and elevation	Menu	Hold offset and elevation

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Edge Offset	May be used to override the fixed Width value and tie the edge-of-traveled-way to an offset. The following object types can be used as targets for specifying the offset: alignments, polylines, feature lines, or survey figures.	Optional
Edge Elevation	May be used to override the fixed slope and tie the edge-of-traveled-way to an elevation. The following	Optional

Parameter	Description	Status
	object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	

### Output Parameters

None.

### Behavior

This subassembly provides a simple travel lane that can tie to an alignment for variable width, and a profile for variable slope. The behavior depends on the Transition type selected:

Transition Type	Description
Hold offset and elevation	The width and slope of the lane is held to the Width and % Slope input parameter values.
Hold elevation, change offset	The elevation of the edge-of-traveled-way is calculated from the Width and % slope input parameter values. The width is then tied to the offset alignment.
Hold grade, change offset	The width is adjusted to tie to the offset alignment. The % Slope input value is held for the adjusted width.
Hold offset, change elevation	The width is held to the Width input parameter value. The elevation of the edge-of-traveled-way is tied to the offset profile.
Change offset and elevation	The width is tied to the offset alignment, and the slope is adjusted to tie the elevation of the edge-of-traveled-way to the offset profile.

### Layout Mode Operation

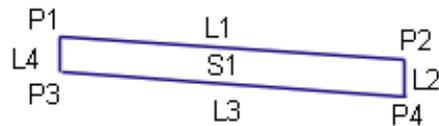
In layout mode, this subassembly draws the lane using the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	Crown	Crown of road on finish grade
P2	ETW	Edge-of-traveled-way on finish grade
P3	Crown_Subbase	Crown of road on subbase
P4	ETW_Subbase	Edge-of-traveled-way on subbase
L1	Top, Pave	Paved finish grade
L3	Datum, Subbase	Subbase
S1	Pave1	

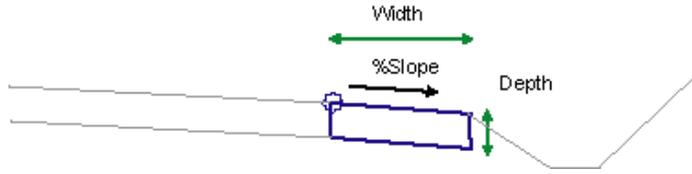
### Coding Diagram



## BasicShoulder

This subassembly creates a simple paved shoulder with finish grade and subbase.

This subassembly is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.



### Attachment

The attachment point is at the inside edge of the shoulder on the finish grade.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left / Right	Right
Width	Width of shoulder	Numeric, positive	0.9 m 3 ft
Depth	Depth from finish grade to subbase	Numeric, positive	0.2 m 0.67 ft
%Slope	% Slope of the shoulder	Numeric	-4%

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User’s Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The shoulder links are inserted outwards from the attachment point at the given width, slope, and depth.

### Layout Mode Operation

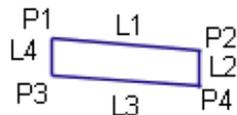
In layout mode, this subassembly draws the lane using the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P2	EPS	Edge of paved shoulder on finish grade
P4	EPS_Sub	Edge of paved shoulder on subbase
L1	Top, Pave	Paved finish grade
L3	Datum, Subbase	Subbase
S1	Pave1	

### Coding Diagram



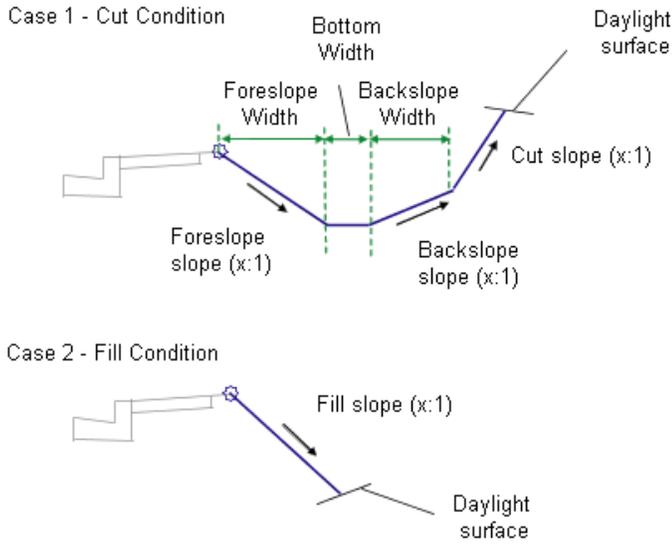
## BasicSideSlopeCutDitch

This subassembly is used to close from the edge of roadway to a daylight point in both cut and fill conditions.

The cut condition includes an optional ditch. The final daylighting link can be omitted for cases where the corridor model needs to be left in an incomplete

state. For example, this might be done so that grading surfaces on adjacent properties can tie to the hinge point on the uncompleted roadway. This subassembly is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.

You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).



### Attachment

The attachment point is at the inside edge of the ditch foreslope for cut, and at the inside edge of the daylight link for fill.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right

Parameter	Description	Type	Default
Daylight Link	Includes or omits the Daylight link.	Include / Omit	Include
Cut Slope	Slope of the daylight link for cut	Numeric, positive	2 : 1
Fill Slope	Slope of the daylight link for fill	Numeric, positive	4 : 1
Foreslope Slope	Slope of the ditch foreslope link (cut only)	Numeric, positive	4 : 1
Foreslope Width	Width of the ditch foreslope link (cut only)	Numeric, positive	1.2 m 4.0 ft
Bottom Width	Width of the bottom of ditch	Numeric, positive	0.6 m 2.0 ft
Backslope Slope	Slope of the ditch backslope link (cut only)	Numeric, positive	4 : 1
Backslope Width	Width of the ditch backslope link (cut only)	Numeric, positive	1.2 m 4.0 ft
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Daylight Surface	Name of the surface for daylighting. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

None.

### Behavior

The attachment point is tested to determine if it is in cut or fill. If it is in fill, the fill daylight link is extended to the Daylight Surface at the given Fill Slope. If in cut, the foreslope, ditch bottom, and backslope are added, and the cut daylight link is extended from the end of the backslope to the Daylight Surface at the given Cut Slope.

This subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

### Layout Mode Operation

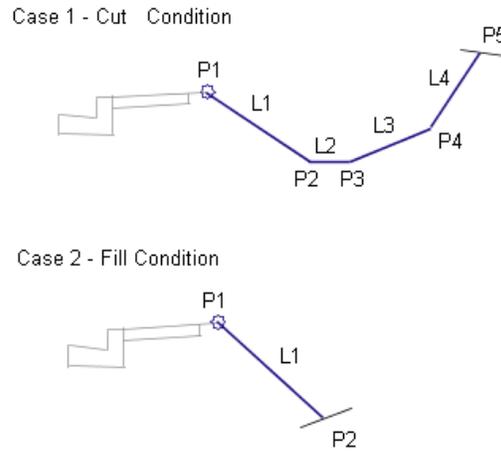
In layout mode, this subassembly draws a generic cut and fill slope with arrows at the ends.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	Hinge Hinge_Fill	Fill condition only - hinge point for fill daylight link
P2	Ditch_In Daylight Daylight_Fill	Cut condition only - inside edge of ditch Fill condition only - daylight point
P3	Ditch_Out	Cut condition only - outside edge of ditch
P4	Hinge_Cut	Cut condition only - hinge point for cut daylight link
P5	Daylight Daylight_Cut	Cut condition only - daylight point
L1 - L4	Top Datum	Unpaved finish grade
L1	Top Datum Daylight Daylight_Fill	Daylight link in fill
L4	Top Datum Daylight Daylight_Cut	Daylight link in cut

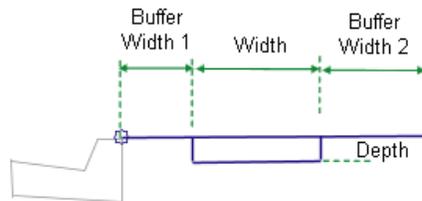
## Coding Diagram



## BasicSideWalk

This subassembly is used to insert links defining a concrete sidewalk with optional boulevards.

This is one of a group of Getting Started subassemblies used for simple roadway modeling, and for tutorial and training purposes.



### Attachment

The attachment point is at the inside edge of the inside buffer.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Indicates which side the subassembly is inserted toward	Left / Right	Right
Width	Width of the concrete sidewalk	Numeric, positive	1.8 m 6.0 ft
Depth	Depth of the concrete sidewalk	Numeric, positive	0.1 m 0.333 ft
Buffer Width 1	Width of the inside buffer zone	Numeric, positive	0 ft, m
Buffer Width 2	Width of the outside buffer zone	Numeric, positive	0 ft, m

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User’s Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The links for the inside buffer zone, sidewalk, and outside buffer zone are inserted outward from the attachment point at a horizontal slope. The buffer zones may be omitted by setting their widths to zero.

### Layout Mode Operation

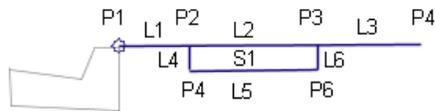
In layout mode, this subassembly draws the buffer zone and sidewalk as specified by the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P2	Sidewalk_In	Inside edge of sidewalk on finish grade
P3	Sidewalk_Out	Outside edge of sidewalk on finish grade
L1	Top Datum	
L2	Top Sidewalk	Sidewalk structure top links
L3	Top Datum	
L4 - L6	Sidewalk Datum	
S1	Sidewalk	Sidewalk concrete area

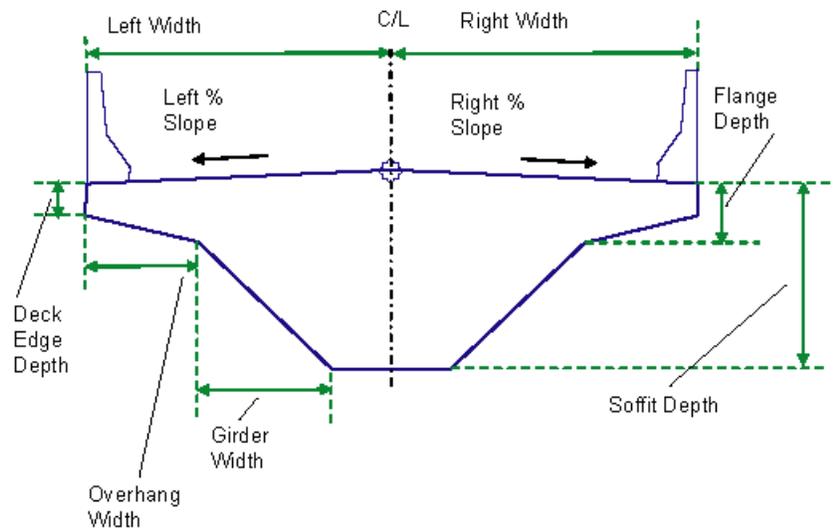
### Coding Diagram



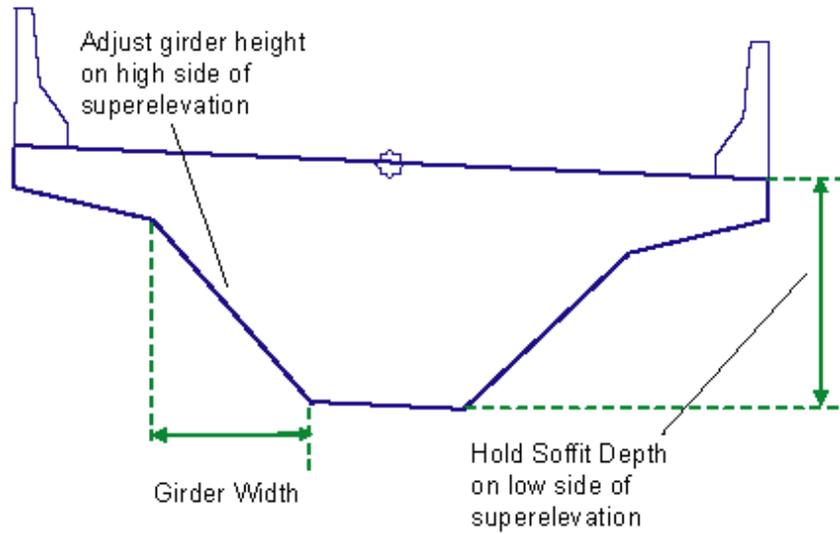
## BridgeBoxGirder1

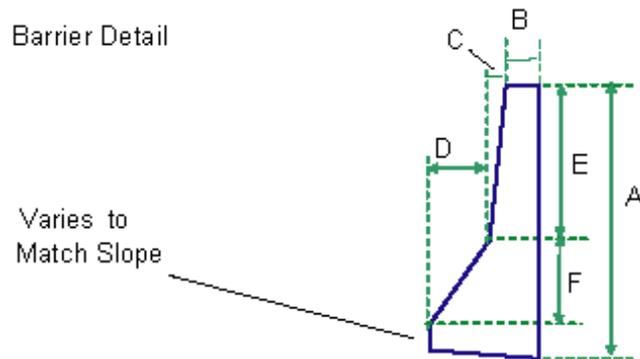
This subassembly creates a simple box girder bridge shape with optional half-barriers.

This subassembly is designed to be used for visualization, not for structural design.



Bridge Section in Normal Crown





### Attachment

The attachment point is at the centerline on the bridge deck finish grade. The bridge section is built to the left and right sides.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Width	Width of the left side of the bridge deck	Numeric, positive	5.34 m 17.8 ft
Right Width	Width of the right side of the bridge deck	Numeric, positive	5.34 m 17.8 ft
Left - Use Superelevation	Specifies to use superelevation slope on the left side of the bridge.	List of options: No, Inside Lane Slope, Outside Lane Slope	Outside Lane Slope
Default Left Slope	Specifies default slope for the left side of the bridge, if superelevation slope is not specified.	Numeric	-2.0%
Right - Use Superelevation	Specifies to use superelevation slope on the right side of the bridge.	List of options: No, Inside Lane Slope, Outside Lane Slope	Outside Lane Slope

Parameter	Description	Type	Default
Default Right Slope	Specifies default slope for the right side of the bridge, if superelevation slope is not specified.	Numeric	-2.0%
Soffit Depth	Vertical distance from the edge of bridge deck to the soffit	Numeric, positive	2.0 m 6.67 ft
Edge Depth	Thickness of the bridge deck at the edge	Numeric, positive	0.150 m 0.5 ft
Flange Depth	Vertical distance from the edge of bridge deck to the root of the flange	Numeric, positive	0.300 m 1.0 ft
Overhang Width	Width of the overhang	Numeric, positive	1.2 m 4.0 ft
Girder Width	Width of the girder	Numeric, positive	2.0 m 6.67 ft
Include Barriers Omit Barriers	Includes or omits barriers to each side of the bridge deck.	Include / Omit	Include
Barrier A (mm or inches)	Height of the barrier at the center of median	Numeric, positive	810 mm 32 in
Barrier B (mm or inches)	As shown in diagram	Numeric, positive	131 mm 4.5 in
Barrier C (mm or inches)	As shown in diagram	Numeric, positive	59 mm 2 in
Barrier D (mm or inches)	As shown in diagram	Numeric, positive	125 mm 5 in
Barrier E (mm or inches)	As shown in diagram	Numeric, positive	557 mm 22 in
Barrier F (mm or inches)	As shown in diagram	Numeric, positive	178 mm 7 in

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Left Width	May be used to override the fixed Left Width value and tie the left edge-of-deck to an offset. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Right Width	May be used to override the fixed Right Width value and tie the right edge-of-deck to an offset. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

None.

### Behavior

The subassembly builds the links for the bridge deck and under-structure based on the input parameter values given. In superelevation, not all of the structure is rotated. The Soffit Depth is held to the given value from the top-edge-of-deck on the low side of the bridge, and the height of the girder is adjusted on the high side to the root of the deck.

If Include Barriers is True, New Jersey barrier sections are added at the left and right edges-of-deck. The slopes of the barrier bottoms adjust to match the deck slopes.

### Layout Mode Operation

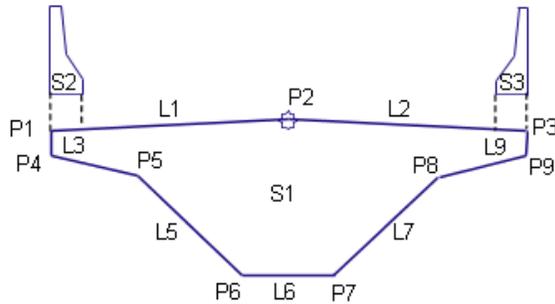
In layout mode, this subassembly draws the bridge structure and barriers as specified by the input parameter values.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1, P3	EBD	Edge of bridge deck
P2	Crown_Deck	Crown point on bridge deck
L1, L2	Deck, Top	
L3 – L9	Bridge	Bridge substructure links
All barrier links	Barrier	
S1	Bridge	
S2, S3	Barrier	

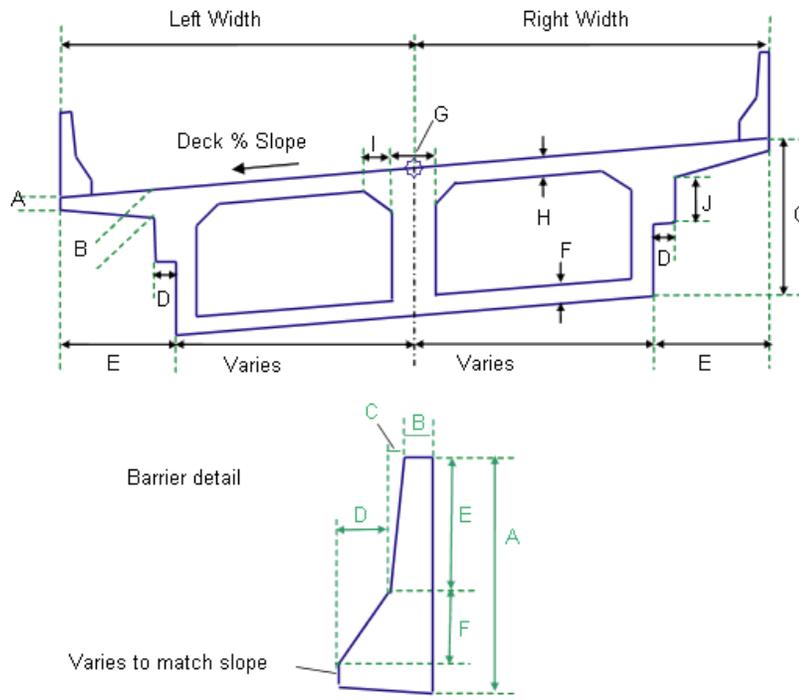
### Coding Diagram



## BridgeBoxGirder2

This subassembly creates a two-chamber box girder bridge shape with optional half-barriers.

This subassembly is designed to be used for visualization, not for structural design.



### Attachment

The attachment point is at the dividing line between the left and right lanes, on the bridge deck finish grade. The bridge section is built to the left and right sides.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a "%" sign.

Parameter	Description	Type	Default
Left Lane Width	Width of the left lanes of the bridge deck	Numeric, positive	5.34 m 17.8 ft
Right Lane Width	Width of the right lanes of the bridge deck	Numeric, positive	5.34 m 17.8 ft

Parameter	Description	Type	Default
Deck Slope - Use Superelevation	Specifies to use the superelevation slope for the bridge deck slope.	List of options: No, Left Outside Lane Slope, Left Inside Lane Slope	Left Outside Lane Slope
Default Deck Slope	Specifies default slope for the bridge deck	Numeric, positive	2.0%
Include Barriers Omit Barriers	Includes or omits barriers to each side of the bridge deck.	Include / Omit	Include
Dimension A	Deck thickness at the edge	Numeric, positive	0.200 m 0.667 ft
Dimension B	Deck thickness at the flange	Numeric, positive	0.300 m 1.0 ft
Dimension C	Total depth from finish grade to bottom of soffit	Numeric, positive	1.8 m 6.0 ft
Dimension D	Step width	Numeric, positive	0.150 m 0.5 ft
Dimension E	Total flange width	Numeric, positive	1.425 m 4.75 ft
Dimension F	Bottom girder thickness	Numeric, positive	0.170 m 0.5625 ft
Dimension G	Center girder thickness	Numeric, positive	0.250 m 0.833 ft
Dimension H	Top girder thickness	Numeric, positive	0.210 m 0.7 ft
Dimension I	Width of the top corner of the inside girder	Numeric, positive	0.300 m 1.0 ft
Dimension J	Step height	Numeric, positive	0.600 m 2.0 ft

Parameter	Description	Type	Default
Barrier A (mm or inches)	Height of the barrier at the center of median	Numeric, positive	810 mm 32 in
Barrier B (mm or inches)	As shown in diagram	Numeric, positive	131 mm 4.5 in
Barrier C (mm or inches)	As shown in diagram	Numeric, positive	59 mm 2 in
Barrier D (mm or inches)	As shown in diagram	Numeric, positive	125 mm 5 in
Barrier E (mm or inches)	As shown in diagram	Numeric, positive	557 mm 22 in
Barrier F (mm or inches)	As shown in diagram	Numeric, positive	178 mm 7 in

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Left Width	May be used to override the fixed Left Width and tie the left edge-of-deck to an offset. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures..	Optional
Right Width	May be used to override the fixed Right Width and tie the right edge-of-deck to an offset alignment at each station along the corridor. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

None.

### Behavior

The subassembly builds the links for the bridge deck and under-structure based on the input parameter values given. If the LI or LO options are used for the bridge deck, the superelevation slope for the left side is held constant across the entire width of the bridge.

If Include Barriers is True, one-sided New Jersey barrier sections are added at the left and right edges-of-deck. The slopes of the barrier bottoms adjust to match the deck slopes.

### Layout Mode Operation

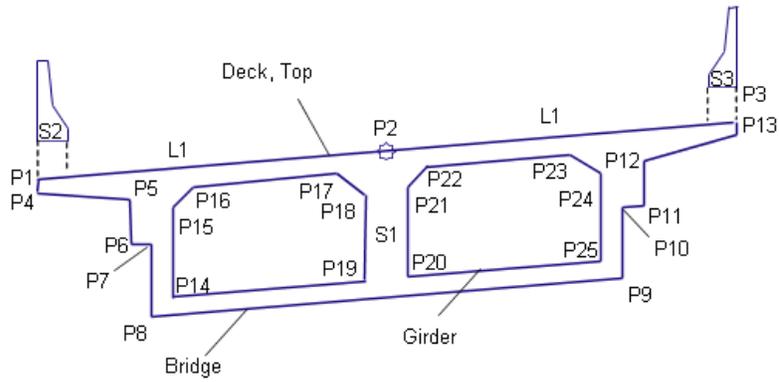
In layout mode, this subassembly draws the bridge structure and barriers as specified by the input parameter values.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

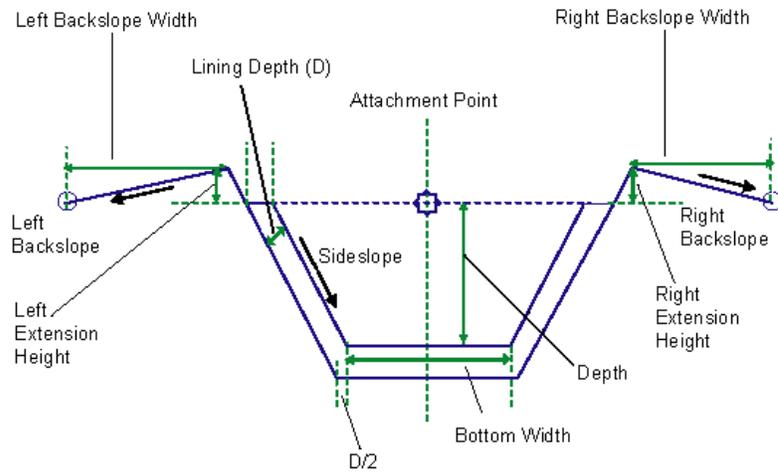
Point, Link, or Shape	Code	Description
P1, P3	EBD	Edge of bridge deck
P2	Crown_Deck	Crown point on bridge deck
L1	Deck, Top	
	Bridge	All exterior bridge substructure links
	Girder	All interior bridge substructure links
All barrier links	Barrier	
S1	Bridge	
S2, S3	Barrier	

## Coding Diagram



## Channel

This subassembly creates an open channel with optional lining and backslope links.



## Attachment

The attachment point is located above the midpoint of the bottom width, at a height equal to the Depth parameter.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Depth	The vertical offset down from the profile grade line elevation to the bottom of the channel.	Numeric, Positive	2.0 m 6.0 ft
Bottom Width	Width of bottom of the channel.	Numeric, Positive	2.0 m 6.0 ft
Sideslope	Channel sideslopes	Numeric	1 (:1)
Lining Depth	Depth of channel lining. The Lining Depth is measured perpendicular to the side of the slope, as shown in the previous diagram.	Numeric, Positive	0.1m 0.33ft
Left Marked Point	Optional marked point on the outermost channel point on the left side; If no code is entered then marked point is not inserted.	String	
Right Marked Point	Optional marked point on the outermost channel point on the right side; If no code is entered then marked point is not inserted.	String	
Left Extension Height	Extension of channel left side over the insertion point	Numeric, Positive	0.5m 1.67ft
Left Backslope Width	Channel backfill width on left side	Numeric, Positive	1.5 m 5.0 ft
Left Backslope	Channel backfill slope on left side	Numeric	4 (:1)

Parameter	Description	Type	Default
Right Extension Height	Extension of channel right side over the insertion point	Numeric, Positive	0.5 m 1.67 ft
Right Backslope Width	Channel backfill width on the right side	Numeric, Positive	1.5 m 5.0 ft
Right Backslope	Channel backfill slope on right side	Numeric	4 (:1)

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Left Extension Height	May be used to override the fixed extension height on left side and tie to a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Left Backslope Width	May be used to override the fixed Left Backslope Width and tie to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Left Backslope Elevation	May be used to override the fixed Left Backslope and tie to a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Right Extension Height	May be used to override the fixed extension height on right side and tie to a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional
Left Backslope Width	May be used to override the fixed Right Backslope Width and tie to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Left Backslope Elevation	May be used to override the fixed Right Backslope and tie to a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

None.

### Behavior

This subassembly builds an open channel shape using the input parameters. The attachment point is typically at the start of the baseline, at associated alignments and profiles. The bottom link of the channel is then drawn using a specified width. Using the sideslope parameter, the channel sides are drawn on either sides.

For the channel lining depth, if a non-zero positive value is specified for the Lining Depth parameter, then a material lining is drawn around the channel. The Lining Depth is measured perpendicular to the side of the slope, as shown in the previous diagram. If a zero value is specified for the Lining Depth, then no links are inserted.

Similarly, if a zero value is specified for left or right extensions and backslope widths, those links are omitted, or are not drawn. Extension height can be controlled with a target parameter profile association. Similarly, the height of the backslope end point can be specified to a profile. To force the outer backslope point to the channel top elevation, associate this point to the channel's finish grade profile, to which this assembly is attached.

If the Backslope Width is omitted, the Right Marked Point is located on the outer point of channel height extension. If the Channel Height Extension link is also omitted, then the marked point is located on the outermost point on the channel top.

---

**NOTE** In Civil 3D 2010 and previous versions, the Lining Depth parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the side slope. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

---

### Layout Mode Operation

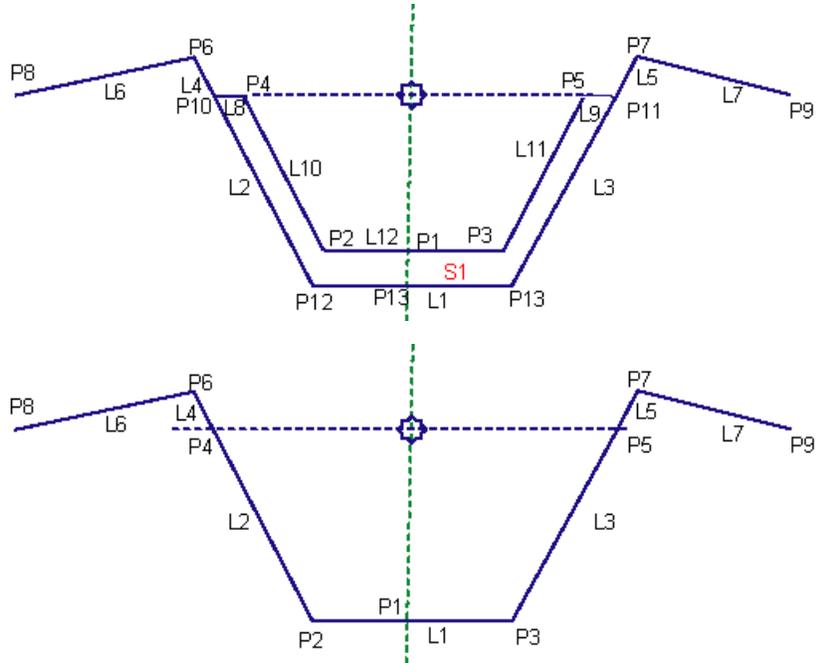
In layout mode, this subassembly draws as it is defined using the input parameters, starting from the attachment point.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

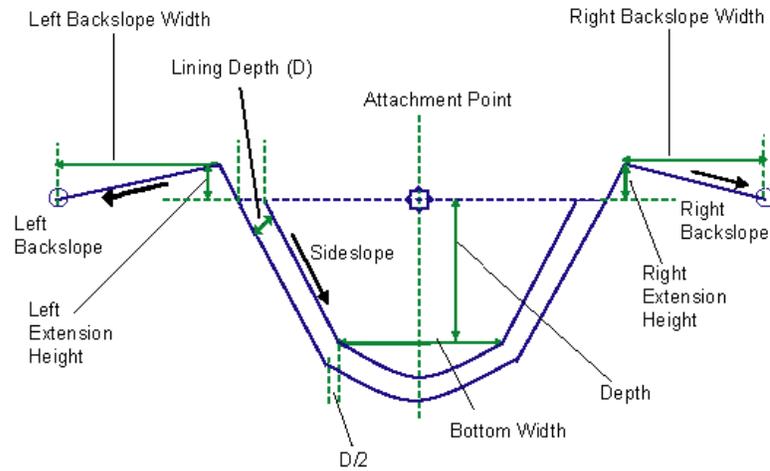
Point/Link	Codes	Description
P1	Channel_Flowline	Middle point of the channel bottom
P2,P3	Channel_Bottom	
P4, P5	Channel_Top	
P6,P7	Channel_Extension	
P8,P9	Channel_Backslope	
P13		
L1, L2, L3	Datum, Channel_Bottom and Top (if lining is NOT used)	
L4 to L7	Datum, Top	
L8 to L12	Channel_Bottom and TOP (if lining IS used)	
S1	Lining_Material	Channel Lining Material

### Coding Diagram



## ChannelParabolicBottom

This subassembly creates an open channel with a parabolic bottom, with optional lining and backslope links.



### Attachment

The attachment point is located above the midpoint of the bottom width, at a height equal to the Depth parameter.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Depth	The vertical offset down from the profile grade line elevation to the bottom of the channel.	Numeric, Positive	2.0 m 6.0 ft
Bottom Width	Width of bottom of the channel.	Numeric, Positive	2.0 m 6.0 ft
Curve Tessellation Points	Number of tessellation points on parabolic curve	Integer, Positive	7
Sideslope	Channel sideslopes	Numeric	1 (:1)
Lining Depth	Depth of channel lining. The Lining Depth is measured perpendicular to	Numeric, Positive	0.1 m 0.33 ft

Parameter	Description	Type	Default
	the side of the slope, as shown in the previous diagram.		
Left Marked Point	Optional marked point on the outermost channel point on the left side; If no code is entered then marked point is not inserted.	String	
Right Marked Point	Optional marked point on the outermost channel point on the right side; If no code is entered then marked point is not inserted.	String	
Left Extension Height	Extension of channel left side over the insertion point	Numeric, Positive	0.5 m 1.67 ft
Left Backslope Width	Channel backfill width on left side	Numeric, Positive	1.5 m 5.0 ft
Left Backslope	Channel backfill slope on left side	Numeric	4 (:1)
Right Extension Height	Extension of channel right side over the insertion point	Numeric, Positive	0.5 m 1.67 ft
Right Backslope Width	Channel backfill width on the right side	Numeric, Positive	1.25 m 5.0 ft
Right Backslope	Channel backfill slope on right side	Numeric	4 (:1)

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Left Extension Height	May be used to override the fixed extension height on left side and tie to a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Left Backslope Width	May be used to override the fixed Left Backslope Width and tie to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Left Backslope Elevation	May be used to override the fixed Left Backslope and tie to a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Right Extension Height	May be used to override the fixed extension height on right side and tie to a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Left Backslope Width	May be used to override the fixed Right Backslope Width and tie to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Left Backslope Elevation	May be used to override the fixed Right Backslope and tie to a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

None.

### Behavior

This subassembly builds an open channel shape using the input parameters. The attachment point is typically at the start of the baseline, at associated alignments and profiles. At the bottom left and right lower sideslope link, points are located using a specified Bottom Width parameter. A parabolic curve is drawn between these two points with grade-in and grade-out equal to the specified sideslope parameter. The length of the parabolic curve is equal

to the Bottom Width value. This parabolic curve is drawn in tessellated links using the Curve Tessellation Points parameter. If the tessellation index is odd, then a point is added directly below the attachment point of the subassembly.

For the channel lining depth, if a non-zero positive value is specified for the Lining Depth parameter, then a material lining is drawn around the channel. The Lining Depth is measured perpendicular to the side of the slope, as shown in the previous diagram. If a zero value is specified for the Lining Depth, then no links are inserted.

Similarly, if a zero value is specified for left or right extensions and backslope widths, those links are omitted or are not drawn. Extension height can be controlled with a profile target parameter association. Similarly, the height of the outermost backslope point can be specified with a profile target parameter. To force the outermost backslope point to the channel top height, associate this to the channel's finish grade profile, to which this assembly is attached.

If the Backslope Width is omitted, then the marked point is located on the outer point of the channel height extension. If the Channel Height Extension link is also omitted, then the marked point is located on the outermost point of the channel top.

---

**NOTE** In Civil 3D 2010 and previous versions, the Lining Depth parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the side slope. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

---

### Layout Mode Operation

In layout mode, this subassembly draws as it is defined using the input parameters, starting from the attachment point.

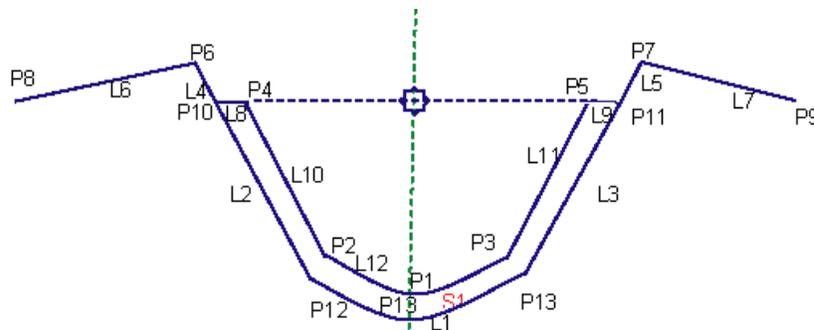
### Point, Link, and Shape Codes

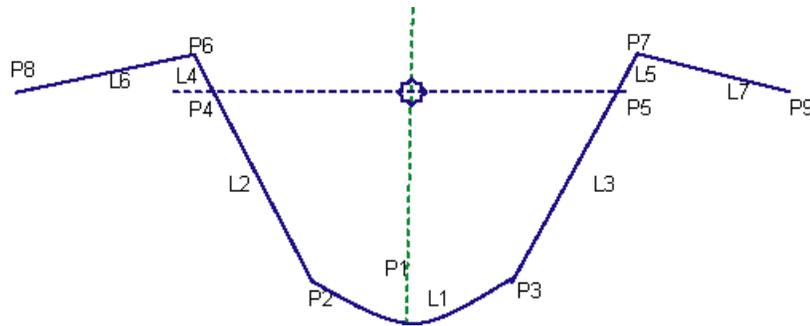
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P1	Channel_Flowline	Middle point of the channel bottom

Point/Link	Codes	Description
P2,P3	Channel_Bottom	
P4, P5	Channel_Top	
P6,P7	Channel_Extension	
P8,P9	Channel_Backslope	
P13		
L1, L2, L3	Datum, Channel_Bottom and Top (if lining is NOT used)	
L4 to L7	Datum, Top	
L8 to L12	Channel_Bottom and TOP (if lining IS used)	
S1	Lining_Material	Channel Lining Material

### Coding Diagram





## ConditionalCutOrFill

This subassembly automatically applies various subassemblies, such as generic links, widening, ditching, or daylighting subassemblies, to an assembly based on whether a cut or fill condition exists.

The ConditionalCutOrFill subassembly is a special type of subassembly that is referred to as a conditional subassembly. Conditional subassemblies automatically add specified subassemblies to an assembly when certain conditions, which you specify, exist.

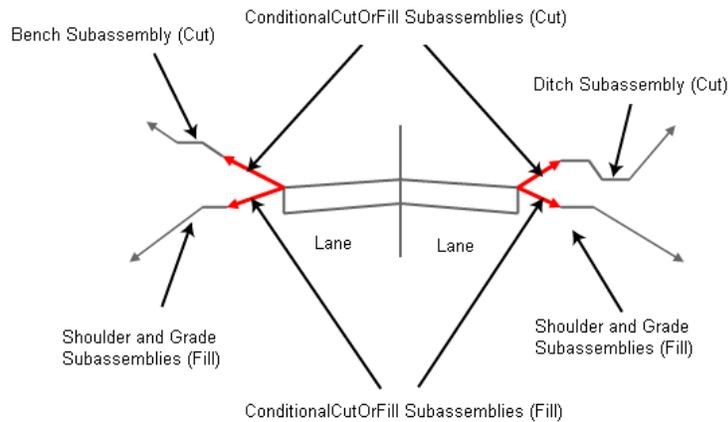
For example, when an assembly contains a ConditionalCutOrFill subassembly, AutoCAD Civil 3D analyzes the station, offset, and elevation position of the subassembly to determine whether it is in cut or fill condition. Depending on how you set the ConditionalCutOrFill subassembly parameters, different types of subsequent subassemblies are automatically applied (added) to the assembly based on whether the subassembly is in cut or fill.

To learn more about how to use the ConditionalCutOrFill subassembly, see the Tutorial: Creating an Assembly with Conditions tutorial.

The following illustration shows a corridor assembly section comprised of:

- a left and a right side lane
- four ConditionalCutOrFill subassemblies (two on the left side and two on the right side)
- The top left side ConditionalCutOrFill subassembly is configured to automatically add a Bench subassembly when AutoCAD Civil 3D detects that the assembly is in a cut condition.

- The bottom left side ConditionalCutOrFill subassembly is configured to automatically add Shoulder and Grade subassemblies on the left side when it detects that the subassembly is in a fill condition.
- Similarly, the top right side ConditionalCutOrFill subassembly is configured to add a Ditch subassembly when it detects a cut condition, while the bottom right side ConditionalCutOrFill subassembly adds Shoulder and Grade subassemblies when it detects a fill condition.



You can add one or multiple ConditionalCutOrFill subassemblies to an assembly, thereby creating simple or complex conditional behaviors in assemblies. For example, in the previous example, you can also add a ConditionalCutOrFill subassembly that automatically daylight at a given slope when it detects that it is in fill condition greater than 3 meters, or some other specified value. Similarly, you can add a ConditionalCutOrFill subassembly that automatically applies widening when it detects a fill condition of greater than a specified value.

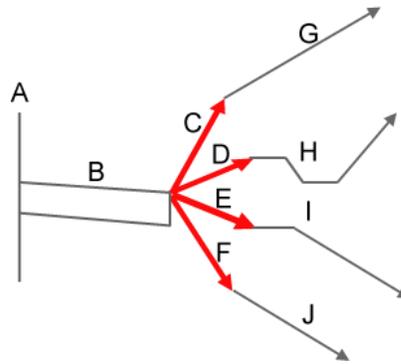
When you create an assembly using ConditionalCutOrFill subassemblies, the assembly construction displayed in the Construction tab of the Assembly Properties dialog box indicates the order in which the subassemblies are processed.

It is important to note the following when using the ConditionalCutOrFill subassembly:

- AutoCAD Civil 3D analyzes the station, offset, and elevation position of the subassembly, relative to the target surface, to determine whether the subassembly is in cut or fill condition.
- When an assembly containing ConditionalCutOrFill subassemblies is applied to a corridor model, only specific portions of the assembly will be applied at any given station.
- Since the ConditionalCutOrFill subassembly uses targets, you must set targets on any ConditionalCutOrFill subassemblies before modeling (generating) the corridor. For more information on setting targets, see Setting Targets in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.
- Unlike most other subassemblies, the ConditionalCutOrFill subassembly does not create any points, links, or shapes in modeling mode.

### Multiple ConditionalCutOrFill Subassemblies

Multiple ConditionalCutOrFill subassemblies may be attached to a common point on an assembly. This includes multiple cut and or multiple fill ConditionalCutOrFill subassemblies, as shown in the following illustration.



This illustration shows only the right side of the assembly. The following table describes the components included on this side of the assembly.

Component	Description
A	Assembly baseline

<b>Component</b>	<b>Description</b>
B	Right side Lane subassembly
C	ConditionalCutOrFill subassembly, with Type parameter set to Cut. If the condition is in cut, and the cut condition is between the minimum/maximum distance values specified for subassembly (C), then a specified type of subassembly (G) is applied.
D	ConditionalCutOrFill subassembly, with Type parameter set to Cut. If the condition is in cut, and the cut condition is between the minimum/maximum distance values specified for subassembly (D), then a Ditch subassembly (H) is applied.
E	ConditionalCutOrFill subassembly, with Type parameter set to Fill. If the condition is in fill, and the fill condition is between the minimum/maximum distance values specified for subassembly (E), then a specified type of subassembly (I) is applied.
F	ConditionalCutOrFill subassembly, with Type parameter set to Fill. If the condition is in fill, and the fill condition is between the minimum/maximum distance values specified for subassembly (F), then a specified type of subassembly (J) is applied.
G	A specified type of subassembly that is applied in cut conditions that are between the minimum/maximum distance values specified for subassembly (C).
H	A specified type of subassembly that is applied in cut conditions that are between the minimum/maximum distance values specified for subassembly (D).
I	A specified type of subassembly that is applied in fill conditions that are between the minimum/maximum distance values specified for subassembly (E).
J	A specified type of subassembly that is applied in fill conditions that are between the minimum/maximum distance values specified for subassembly (E).

You control the cut or fill limit heights using the Minimum Distance and Maximum Distance input parameters. The Layout Width and Layout Grade

input parameters let you control the position of the graphics displayed by this subassembly when it is drawn in layout mode.

---

**NOTE** There is no limit to the number of ConditionalCutOrFill subassemblies that can be added to an assembly.

---

### Attachment

This subassembly can be attached to any subassembly or assembly attachment point. Subsequent subassemblies can be attached to the end point of the ConditionalCutOrFill subassembly.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side of the assembly or corridor the subassembly is inserted towards.	Left/Right	Right
Layout Width	Specifies the length of the line that is drawn to represent this subassembly in layout mode. This parameter, in combination with the Layout Grade parameter, allows you to position the Conditional-CutOrFill subassembly and subassemblies that are attached to it, but does not display or have any effect in the corridor model.	Numeric, positive	3.6 m 12.0 ft
Layout Grade	Specifies the grade of the line that is drawn to represent this subassembly in layout mode. This parameter, in combination with the Layout Width parameter, allows you to position the Conditional-CutOrFill subassembly and subassemblies that are attached to it, but does not display or have any effect in the corridor model.	Numeric, positive or negative	1:1 (cut) -1:1 (fill)

Parameter	Description	Type	Default
Type	Specifies the type of condition this sub-assembly uses to compare itself against the target.	Cut / Fill	Cut
Minimum Distance	Specifies the minimum cut depth or minimum fill height that is required in order to continue processing subassemblies connected to this ConditionalCutOrFill subassembly.	Numeric, positive or negative	0.0 m 0.0 ft
Maximum Distance	Specifies the maximum cut depth or maximum fill height that is required in order to continue processing subassemblies connected to this ConditionalCutOrFill subassembly.	Numeric, positive	9999. ft 9999. m

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Surface	Surface that is used to determine whether the current station, offset, and elevation is in a cut or a fill condition. The station, offset, and elevation that is used is from the ConditionalCutOrFill subassembly attachment point.	Required

### Output Parameters

None.

### Behavior

See description.

### Layout Mode Operation

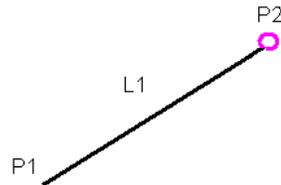
In layout mode, this subassembly draws a line using the Layout Width and Layout Grade input parameter values. This line represents the location in the assembly where the ConditionalCutOrFill subassembly is applied.

### Point, Link, and Shape Codes

Unlike most other subassemblies, the ConditionalCutOrFill subassembly does not create any points, links, or shapes in modeling mode.

### Coding Diagram

The following coding diagram shows the points and links that are created in layout mode. No point, link, or shape codes are created for this subassembly in modeling mode.



## ConditionalHorizontalTarget

This subassembly automatically applies various subassemblies, such as widening, curb and gutter, ditching, or daylighting, to an assembly based on whether an offset target is found at the corridor station.

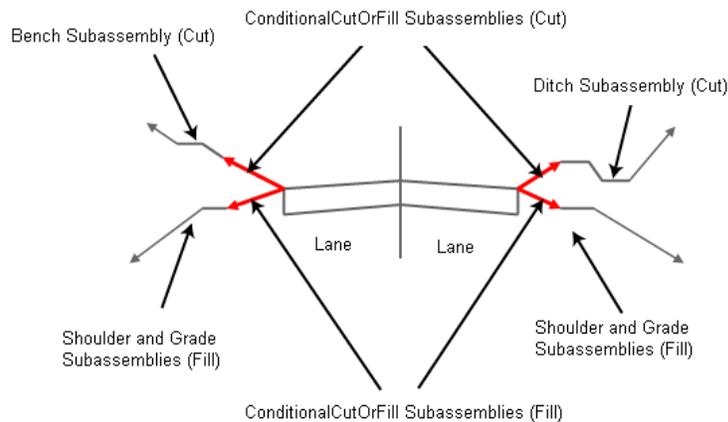
The ConditionalHorizontalTarget subassembly is a conditional subassembly, which is a special type of subassembly. Conditional subassemblies automatically add specified subassemblies to an assembly when certain conditions, which you specify, exist.

For example, when an assembly contains a ConditionalHorizontalTarget subassembly, AutoCAD Civil 3D analyzes the station to determine whether an offset target exists within a specified distance. Depending on the ConditionalHorizontalTarget subassembly parameters, different types of subassemblies are automatically added to the assembly.

To learn more about how to use a conditional subassembly, see the Tutorial: Creating an Assembly with Conditions tutorial.

The following illustration shows a corridor assembly section comprised of:

- a left side lane and a right side lane
- four ConditionalHorizontalTarget subassemblies (two on the left side and two on the right side)
- the top left side ConditionalHorizontalTarget subassembly is configured to automatically add a sidewalk subassembly when an offset target is detected.
- the bottom left side ConditionalHorizontalTarget subassembly is configured to automatically add Shoulder and Gradient subassemblies on the left side, when an offset target is not detected.
- similarly, the top right side ConditionalHorizontalTarget subassembly is configured to add a sidewalk subassembly when an offset target is detected, while the bottom right side ConditionalHorizontalTarget subassembly adds Shoulder and Gradient subassemblies on the right side, when an offset target is not detected.



You can add one or multiple ConditionalHorizontalTarget subassemblies to an assembly to create simple or complex conditional behaviors. For example, in the case of the previous example, you can add a set of polylines to the model that show the location of sidewalks. Because the lines stop where driveways cross the sidewalk, the conditional subassembly adds and removes the sidewalk depending on the presence of the sidewalk line. The conditional subassembly eliminates the need to apply a different assembly to the corridor where a sidewalk is not needed.

When you create an assembly using ConditionalHorizontalTarget subassemblies, the assembly construction displayed in the Construction tab of the Assembly Properties dialog box indicates the order in which the subassemblies are processed.

It is important to note the following when using the ConditionalHorizontalTarget subassembly:

- AutoCAD Civil 3D analyzes the location of the station associated with the subassembly relative to the target offset to determine whether the offset is found.
- When an assembly containing ConditionalHorizontalTarget subassemblies is applied to a corridor model, only specific portions of the assembly are applied to any given assembly construction.
- Since the ConditionalHorizontalTarget subassembly uses targets, you must set targets on any ConditionalHorizontalTarget subassemblies before you generate the corridor. If the targets are not set, the subassembly returns Not Found. For more information on setting targets, see Setting Targets in the AutoCAD Civil 3D User’s Guide Help.
- Unlike most other subassemblies, the ConditionalHorizontalTarget subassembly does not create any points, links, or shapes in modeling mode.

### Attachment

This subassembly can be attached to any subassembly or assembly attachment point. Subsequent subassemblies can be attached to the end point of the ConditionalHorizontalTarget subassembly.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies the side of the assembly or corridor towards which this subassembly is inserted.	Left/Right	Right
Layout Width	Specifies the length of the line that is drawn to represent this subassembly in layout mode. This parameter, in combin-	Numeric, positive	3.6 m 12.0 ft

Parameter	Description	Type	Default
	ation with the Layout Grade parameter, enables you to position the ConditionalHorizontalTarget subassembly and sub-assemblies that are attached to it, but does not display or have any effect in the corridor model.		
Layout Grade	Specifies the grade of the line that is drawn to represent this subassembly in layout mode. This parameter, in combination with the Layout Width parameter, enables you to position the ConditionalHorizontalTarget subassembly and sub-assemblies that are attached to it, but does not display or have any effect in the corridor model.	Numeric, positive, or negative	1:1 (found) -1:1 (not found)
Condition	Specifies the condition available for this subassembly. The Found condition is processed if the offset target is found within the maximum distance. The Not Found condition is processed if the offset target is not set or is not found at the station within the maximum distance.	Found/Not Found	Found
Maximum Distance	Specifies the maximum width within which the subassembly looks for the offset target. If the offset is not found within the specified distance, the Not Found conditional is processed.	Numeric, positive	9999. ft 9999. m

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to offset target objects in a drawing. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Offset	Alignment, feature line, survey figure or polylines. If the specified offset target is found at the station, then the Found condition is processed.	Optional (if not set, the conditional returns Not Found)

### Output Parameters

None.

### Behavior

See description.

### Layout Mode Operation

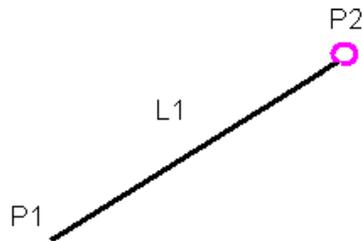
In layout mode, this subassembly draws a line using the Layout Width and Layout Grade input parameter values. This line represents the location in the assembly where the ConditionalHorizontalTarget subassembly is applied.

### Point, Link, and Shape Codes

Unlike most other subassemblies, the ConditionalHorizontalTarget subassembly does not create any points, links, or shapes in modeling mode.

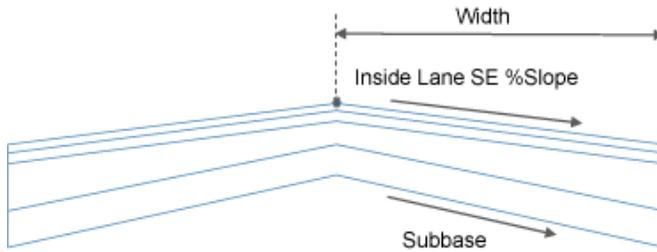
### Coding Diagram

The following coding diagram shows the points and links that are created in layout mode. No point, link, or shape codes are created for this subassembly in modeling mode.



## CrownedLane

This subassembly creates a crowned lane that has separate subbase slope control, as well as the ability to control the subbase crown location by specifying a target alignment.



### Attachment

The attachment point is at the beginning of the first link. The subassembly is sensitive to the direction being inserted. Positive widths increase the offset from the attachment point in the direction inserted.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Lane Width	Width of the left lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Right Lane Width	Width of the right lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Default % Left Slope	Default % Left Slope of the lane to be used when the superelevation slope of the alignment is not defined	Numeric	-2.0
Default % Right Slope	Default % Right Slope of the lane to be used when the superelevation slope of the alignment is not defined	Numeric	-2.0
Base % Slope	Specifies the slope of the base and subbase materials. In superelevation	Numeric	-3.0

Parameter	Description	Type	Default
	will be calculated as the difference between Default slope and base slope, then added to Superelevation value.		
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, positive	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, positive	0.025 m 0.083 ft
Base Depth	Thickness of the Base layer at crown	Numeric, positive	0.100 m 0.333 ft
Subbase Depth	Thickness of the Subbase layer	Numeric, positive	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Left Width	May be used to override the fixed left lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying this width: alignments, polylines, feature lines, or survey figures.	Optional
Left Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the left travel lane to the elevation of a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional
Right Width	May be used to override the fixed right lane Width and tie the edge-of-lane to an offset	Optional

Parameter	Description	Status
	alignment. The following object types can be used as targets for specifying this width: alignments, polylines, features lines, or survey figures.	
Right Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the right travel lane to the elevation of a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional
Base Centerline	May be used to override the crown location of the base and subbase materials. The following object types can be used as targets for specifying this: alignments, polylines, features lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Left Lane %Slope	% slope of the Left Lane	Numeric
Right Lane % Slope	% Slope of Right Lane	Numeric

### Behavior

The Inside Lane superelevation slope is obtained from the superelevation specifications for the baseline alignment. Starting at the attachment point, a finish grade surface and parallel subgrade are inserted using the given width, depth, and the superelevation slope. Vertical links close the shape at either end of the lane.

If an offset horizontal alignment name is assigned to the Left or Right width during corridor modeling, the width of the lane will vary to match the offset of the alignment.

If an alignment is specified for base centerline then the crown point of the base and subbase layers will shift to the location of this alignment.

## Layout Mode Operation

In layout mode, this subassembly displays the links defined by the input parameters.

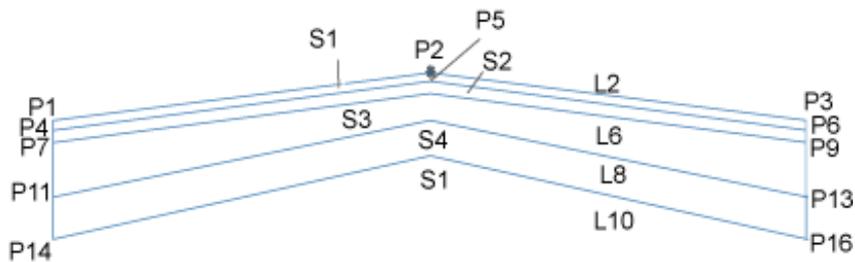
## Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1/P3	ETW	Edge-of-traveled-way on finish grade
P2	Crown	Crown point on finish grade
P1/P3	Lane	Outside edge of lane on finish grade
P4/P6	ETW_Pave1	Edge-of-traveled-way on the Pave1 layer
P5	Crown_Pave1	Crown point on the Pave1 layer
P4/P6	Lane_Pave1	Outside edge of lane on the Pave1 layer
P7/P9	ETW_Pave2	Edge-of-traveled-way on the Pave2 layer
P8	Crown_Pave2	Crown point on the Pave2 layer
P7/P9	Lane_Pave2	Outside edge of lane on the Pave2 layer
P11/P13	ETW_Base	Edge-of-traveled-way edge of lane on the Base layer
P12	Crown_Base	Crown point on base layer (optional)
P11/P13	Lane_Base	Outside edge of lane on the Base layer
P14/P16	ETW_Sub	Edge-of-traveled-way edge of lane on the subbase layer
P15	Crown_Sub	Crown point on subbase layer (optional)
P14/P16	Lane_Sub	Outside edge of lane on the Subbase layer
L1 ,L2	Top, Pave	Finish grade surface

Point, Link, or Shape	Codes	Description
L3,L4	Pave1	
L5,L6	Pave2	
L7,L8	Base	Base surface
L9,L10	SubBase Datum	Subbase surface
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

**Coding Diagram**

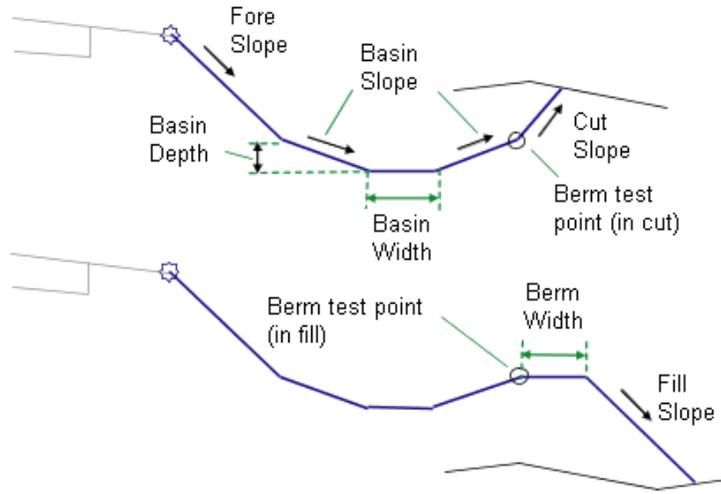


## DaylightBasin

This subassembly inserts links to create a basin and cut daylight slope for a cut condition, or a basin, berm, and fill slope for a fill condition.

The final daylighting link can be omitted in cases where the corridor model needs to be left in an incomplete state. For example, this might be done so that grading surfaces on adjacent properties can tie to the hinge point on the uncompleted roadway.

You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).



### Attachment

The attachment point is at the inside edge of the basin foreslope. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Daylight Link	Includes or omits the Daylight link.	Include / Omit	Include
ForeSlope Slope	The slope for the basin foreslope link	Numeric, positive	3 ( : 1)
ForeSlope Width	The width of the foreslope	Numeric, positive	1.2 m

Parameter	Description	Type	Default
			4.0 ft
Basin Depth	The depth of the bottom of the basin from the bottom of the foreslope link	Numeric, positive	0.0
Basin Slope	The slope of the sides of the basin	Numeric, positive	4 ( : 1)
Basin Width	Width of the basin	Numeric, positive	1.8 m 6.0 ft
Berm Width	Width of the berm used in fill conditions	Numeric, positive	1.8 m 6.0 ft
Cut Slope	The slope of the daylight link in cut conditions	Numeric, positive	3 ( : 1)
Fill Slope	The slope of the daylight link in fill conditions	Numeric, positive	3 ( : 1)
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1

Parameter	Description	Type	Default
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Basin Elevation	May be used to override the fixed Basin Depth and tie the elevation of the basin to a profile (or other object type). The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

None.

### Behavior

The subassembly builds the links for the basin foreslope and basin out to the basin test point. If a profile is given, the width of the foreslope varies to hold to the basin profile, while the basin depth is held constant. If the basin test point is in cut, the daylight intercept is calculated on the target surface at the given Cut Slope. If it is in fill, a top-of-berm link is added, and the daylight intercept is calculated on the target surface at the given Fill Slope. The daylight link is not inserted if Omit Daylight Link is set to True. If the top-of-berm link intersects the target surface, the section is terminated at the intersection.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

---

**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

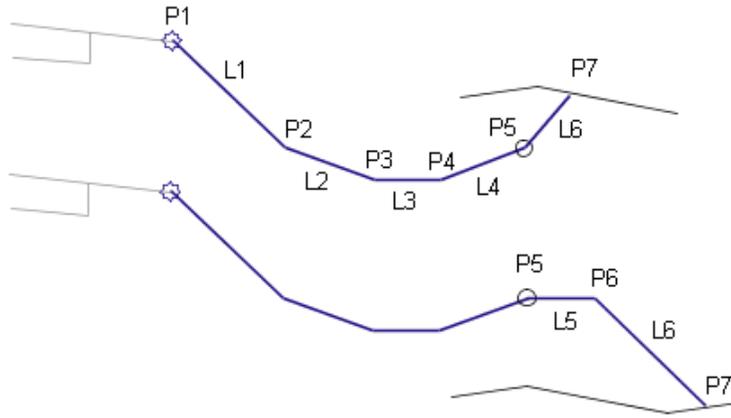
In layout mode, this subassembly draws the foreslope, basin sideslopes, and basin bottom with the given input parameter values. Both the cut and fill condition links are shown in dashed lines, with the daylight links extended outward for a width of 3 meters or 10 feet at the given slopes. The daylight links terminate in arrowheads pointing outwards.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P3	Ditch_In	Inside bottom of basin
P4	Ditch_Out	Outside bottom of basin
P5	Hinge Hinge_Cut	Hinge point for the cut condition
P6	Hinge Hinge_Fill	Hinge point for the fill condition
P7	Daylight Daylight_Cut or Daylight_Fill	Daylight point, and daylight point for either the cut or fill condition
All links	Top Datum	
L6	Top Datum Daylight Daylight_Cut	Daylight link for cut section
L6	Top Datum Daylight Daylight_Fill	Daylight link for fill section

### Coding Diagram

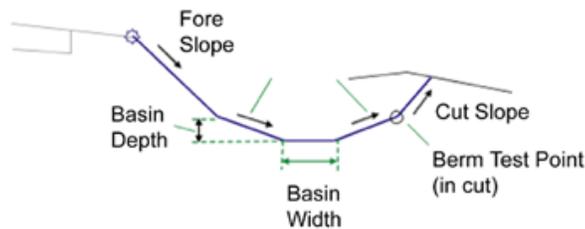


## DaylightBasin2

This subassembly is similar to the DaylightBasin subassembly with the following additional behaviors:

The berm is optional in fill conditions. If no berm is included, a clear zone slope is added, and then a daylight fill slope is added.

The Ditch Width can be controlled by using an optional alignment. Berm Width and Height can be controlled by using an alignment and a profile respectively. In addition, the Place Lined Material needs to include all links of the daylight assemblies from the hinge point out to the daylight to existing ground.



## Attachment

The attachment point is at the inside edge of the basin foreslope. This component can be attached to either the left or right side.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Daylight Link	Includes or omits the Daylight link	Include / Omit	Include
Berm	Includes or Omits Berm in fill	Include / Omit	Omit
Foreslope Slope	The slope for the basin foreslope link	Numeric, positive	3 ( : 1)
Foreslope Width	The width of the foreslope	Numeric, positive	1.2 m 4.0 ft
Basin Depth	The depth of the bottom of the basin from the bottom of the foreslope link	Numeric, positive	0.0
Basin Slope	The slope of the sides of the basin	Numeric, positive	4 (:1)
Basin Width	Width of the basin	Numeric, positive	1.8 m 6.0 ft
Berm Width	Width of the berm used in fill conditions	Numeric, positive	1.8 m 6.0 ft
Cut Slope	The slope of the daylight link in cut conditions	Numeric, positive	3 ( : 1)
Clear Zone Width	Width of the clear zone before Fill link is added	Numeric, positive	6 m 20 ft

Parameter	Description	Type	Default
Clear Zone Slope	Slope for the clear zone	Numeric, positive	6 (:1)
Fill Slope	Slope of the daylight link in fill conditions	Numeric, positive	3 (: 1)
Rounding Option	Specifies whether to round off the daylight link at the catch point	List of options: None, Circular, Parabolic	None
Rounding By	Specifies the parameter that is used for rounding	List of options: Length, Radius	Length
Rounding Parameter	Specifies value for length of radius	Numeric, positive	0.5 m 1.5 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (Max 10 links)	Numeric, positive integer	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1

Parameter	Description	Type	Default
Material 2 Thickness	Specifies the thickness of the lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applied for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of the lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applied for lining along grading links	String	Seeded Grass
Material 4 Thickness	Specifies thickness of the material to be applied in flat slope situations	Numeric, positive	6 inches
Material 4 Name	Specifies the material name to be used in flat slope situations	String	Gravel

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Basin Width Alignment	May be used to override the fixed Basin Width The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Berm Width Alignment	May be used to override the fixed Berm Width. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Basin Elevation	May be used to override the fixed Basin Depth and tie the elevation of the basin to a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Berm Height Profile	Allows the height of the berm to be overridden. The following object types can be used as targets for specifying this height: profiles, 3D polylines, feature lines, or survey figures.	Optional
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying this surface: surfaces.	Required

### Output Parameters

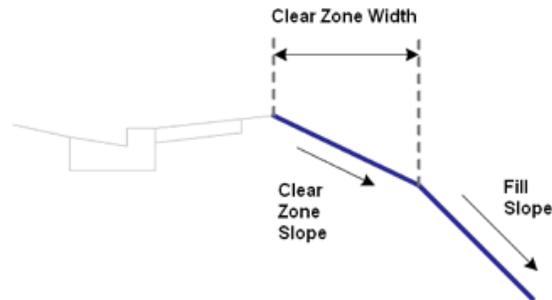
None.

### Behavior

This subassembly builds the links for the basin foreslope and the basin out to the basin test point. If a profile is given, the width of the foreslope varies to hold to the basin profile. If the basin test point is in cut, the daylight intercept is calculated on the target surface at the given cut slope.

If it is in fill, and Berm is set to Include, a top-of-berm link is added, and the daylight intercept is calculated on the target surface at the given Fill Slope. The daylight link is not inserted if Omit Daylight Link is set to True. If the top-of-berm link intersects the target surface, the section is terminated at the intersection.

If it is in fill, and Berm is set to Omit, a link is added from the attachment point at the Clear Zone Slope until the Clear Zone Width is met. Then a daylight link is added to the target surface at the fill slope specified. If the clear zone link intersects existing ground, it will stop at this intersection point.



Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material is applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum, and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name (Material 1 Name, Material 2 Name, or Material 3 Name).

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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

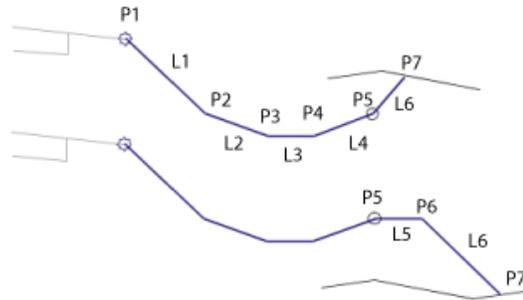
In layout mode, this subassembly draws the foreslope, basin side slopes, and basin bottom with the given input parameter values. Both the cut and fill condition links are shown in dashed lines, with the daylight links extended outward, for a width of 3 meters (or 10 feet) at the given slopes. The daylight links terminate in arrowheads pointing outwards.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P3	Ditch_In	Inside bottom of the basin
P4	Ditch_Out	Outside bottom of the basin
P5	Hinge, Hinge_Cut	Hinge point for the cut condition
P6	Hinge, Hinge_Fill	Hinge point for the fill condition
P7	Daylight, Daylight_Cut or Daylight_Fill	Daylight point, and daylight point for either the cut or fill condition
All links	Top, Datum	
L6	Top, Datum, Daylight, Daylight_Cut	Daylight link for the cut section
L3	Ditch	
L1, L2,L4	Slope_Link	
L5	Bench	
L6	Top, Datum, Daylight, Daylight_Fill	Daylight link for the fill section

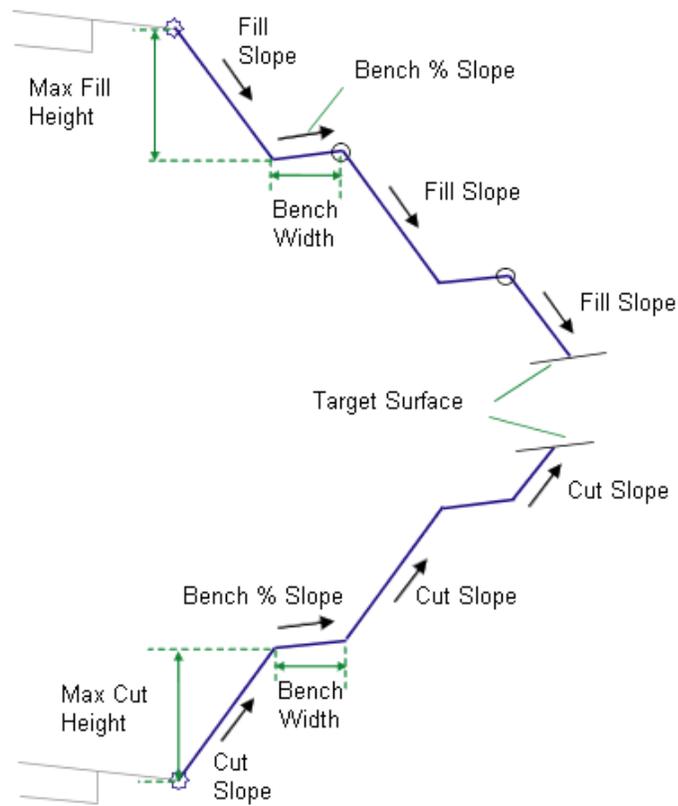
### Coding Diagram



## DaylightBench

This subassembly inserts links to create cut or fill catch slopes with repeating benches as needed.

You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).



**Attachment**

The attachment point is at the inside edge of the initial cut or fill slope. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Cut Slope	The slope for the cut daylight slope	Numeric, positive	2 ( : 1)
Max Cut Height	The maximum allowable height for the cut daylight link without benching	Numeric	3.0 m 10.0 ft
Fill slope	The slope for the fill daylight slope	Numeric, positive	2 ( : 1)
Max Fill Height	The maximum allowable height for the fill daylight link without benching	Numeric, positive	3.0 m 10.0 ft
Bench Width	The width of the bench	Numeric, positive	1.5 m 5.0 ft
Bench % Slope	The +/- % slope of the bench. Positive slopes are upward in the direction of increasing offset	Numeric	2 (%)
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can	String	None

Parameter	Description	Type	Default
	choose All Links, Daylight Links, Fill Links Only, and None.		
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

The initial hinge point is set at the attachment point. The hinge point elevation is checked against the target surface to determine if the section is in the cut or fill condition. An intercept is calculated to the target surface using the given Cut Slope or Fill Slope. If the height to the intercept exceeds the Max Height, the link with the Max Height is inserted, and the bench link is added. The hinge point is reset to the outside edge of the bench and the process is repeated until a daylight link is found that does not exceed the Max Height.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

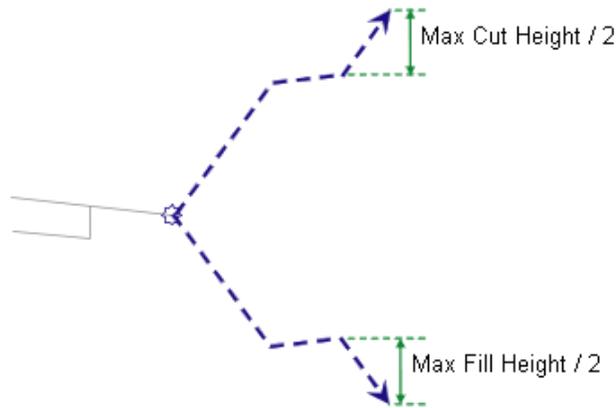
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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode, this subassembly draws the initial cut and fill slopes to their maximum heights, a single bench, followed by cut and fill daylight slopes for half the maximum heights. The daylight links terminate with an arrowhead pointing outwards.



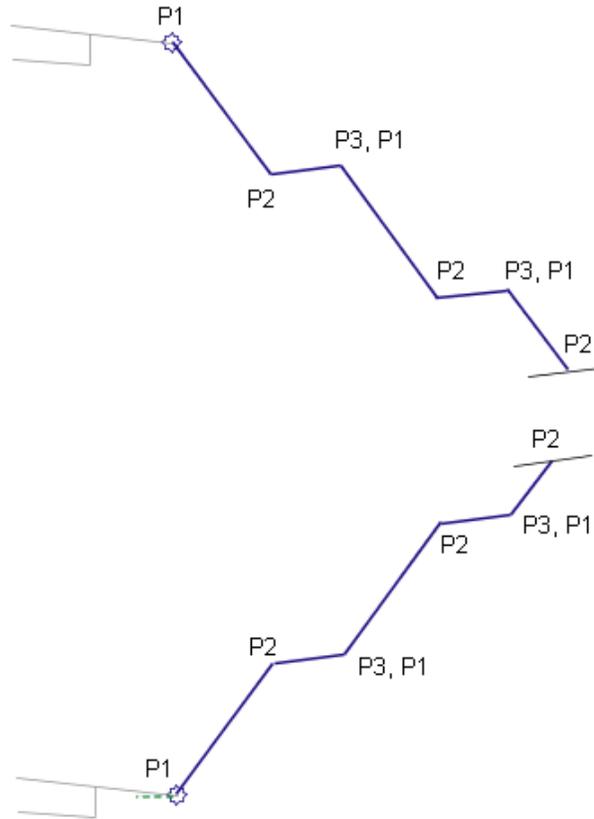
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Cut or Hinge_Fill	Hinge point, either for the cut or fill condition. This only applies to the inside edge of the actual daylighting link.

<b>Point, Link, or Shape</b>	<b>Code</b>	<b>Description</b>
P2	Daylight Daylight_Cut or Daylight_Fill	Daylight point, and daylight point for either the cut or fill condition. This only applies to the actual daylight point.
P2	Bench_In	The inside edge of the bench(es)
P3	Bench_Out	The outside edge of the bench(es)
All links	Top Datum	
Final daylight link	Top Datum Daylight Daylight_Cut	Daylight link for cut section
Final daylight link	Top Datum Daylight Daylight_Fill	Daylight link for fill section

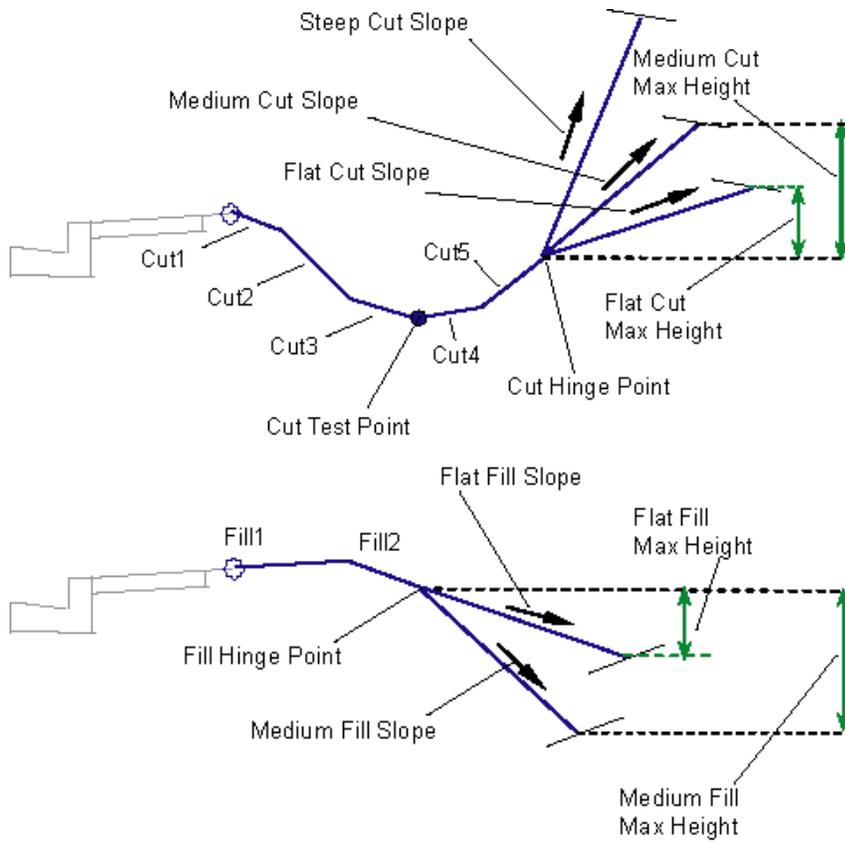
### Coding Diagram

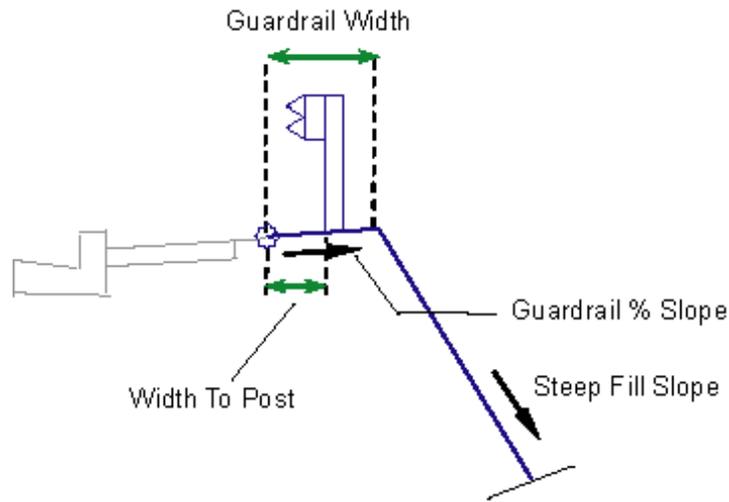


## DaylightGeneral

This subassembly is a generalized solution to closing the sections from the outside edge of roadway to cut or fill intercept point.

It provides a variety of solutions for cut and fill conditions, as described below. Based on the input parameters provided, it first attempts to build a cut section. If unable to do this it builds a fill section instead. The final daylighting link can be omitted for cases where the corridor model needs to be left in an incomplete state. For example, this might be done so that grading surfaces on adjacent properties can tie to the hinge point on the uncompleted roadway.





You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

The DaylightGeneral subassembly is typically attached to the subassembly used at the outside edge of the roadway, such as the edge of shoulder, back of sidewalk, or back of curb. The attachment point is at the inside edge of the first Cut link, first Fill link, or Guardrail widening link.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Include Daylight Link Omit Daylight Link	Include or omit the Daylight link.	Include / Omit	Include
Cut Test Point	Number of the Cut Link whose outside end is the test point	Numeric, positive, integer	3

Parameter	Description	Type	Default
	for determining if the section is in cut or fill		
Cut 1 Width	Width of link Cut 1	Numeric, positive	0.0
Cut 1 Slope	Slope (x : 1) of link Cut 1	Numeric	0.0
Cut 2 Width	Width of link Cut 2	Numeric, positive	0.0
Cut 2 Slope	Slope (x : 1) of link Cut 2	Numeric	0.0
Cut 3 Width	Width of link Cut 3	Numeric, positive	0.0
Cut 3 Slope	Slope (x : 1) of link Cut 3	Numeric	0.0
Cut 4 Width	Width of link Cut 4	Numeric, positive	0.0
Cut 4 Slope	Slope (x : 1) of link Cut 4	Numeric	0.0
Cut 5 Width	Width of link Cut 5	Numeric, positive	0.0
Cut 5 Slope	Slope (x : 1) of link Cut 5	Numeric	0.0
Cut 6 Width	Width of link Cut 6	Numeric, positive	0.0
Cut 6 Slope	Slope (x : 1) of link Cut 6	Numeric	0.0
Cut 7 Width	Width of link Cut 7	Numeric, positive	0.0
Cut 7 Slope	Slope (x : 1) of link Cut 7	Numeric	0.0
Cut 8 Width	Width of link Cut 8	Numeric, positive	0.0
Cut 8 Slope	Slope (x : 1) of link Cut 8	Numeric	0.0
Flat Cut Slope	First, flattest, catch slope to attempt.	Numeric, positive	6 ( : 1)
Flat Cut Max Height	Maximum allowable height of the closing link using the Flat Cut Slope	Numeric, positive	1.5 m 5 ft

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Medium Cut Slope	Cut slope to attempt if the Flat Cut Slope link exceeds the Flat Cut Max Height	Numeric, positive	4 ( : 1)
Medium Cut Max Height	Maximum allowable height of the closing link using the Medium Cut Slope.	Numeric, positive	3 m 10 ft
Steep Cut Slope	Cut slope to use if the Medium Cut Slope link exceeds the Medium Cut Max Height.	Numeric, positive	2 ( : 1)
Fill 1 Width	Width of link Fill 1	Numeric, positive	0.0
Fill 1 Slope	Slope (x : 1) of link Fill 1	Numeric	0.0
Fill 2 Width	Width of link Fill 2	Numeric, positive	0.0
Fill 2 Slope	Slope (x : 1) of link Fill 2	Numeric	0.0
Fill 3 Width	Width of link Fill 3	Numeric, positive	0.0
Fill 3 Slope	Slope (x : 1) of link Fill 3	Numeric	0.0
Flat Fill Slope	First, flattest, catch slope to attempt. (x : 1)	Numeric, positive	6 ( : 1)
Flat Fill Max Height	Maximum allowable height of the closing link using the Flat Fill Slope	Numeric, positive	1.5 m 5 ft
Medium Fill Slope	Fill slope to attempt if the Flat Fill Slope link exceeds the Flat Fill Max Height	Numeric, positive	4 ( : 1)
Medium Fill Max Height	Maximum allowable height of the closing link using the Medium Fill Slope	Numeric, positive	3 m 10 ft

Parameter	Description	Type	Default
Steep Fill Slope	Fill slope to use if the Medium Fill Slope link exceeds the Medium Fill Max Height	Numeric, positive	2 ( : 1)
Guardrail Width	Width of the guardrail widening link for fill slopes using Steep Fill Slope. Use zero for no guardrail widening.	Numeric, positive	0.6 m 2 ft
Guardrail %Slope	% slope of the guardrail widening link	Numeric	-2 (%)
Include Guardrail Omit Guardrail	Include to insert links for the guardrail structure on the guardrail widening segment. Omit does not insert the guardrail structure.	Include / Omit	Omit
Width to Post	When the guardrail is included, the width from the attachment point to the inside edge of the guardrail post.	Numeric	0.3 m 1 ft
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

This subassembly is designed to accommodate a wide variety of clear zone, cut section, and fill section configurations. It allows up to eight links to be used in cut sections from the edge-of-roadway to the cut intercept hinge point, and any one of these links can be used as the cut test point. Up to three fill links can be used out to the fill hinge point, and provides special guardrail shoulder widening for steep fill conditions.

Cut links are denoted as Cut 1, Cut 2, up to Cut 8. The Cut Test Point input value indicates which cut link ends at the cut test point. The logical steps used are as follows:

- 1 The cut surface links are constructed temporarily from Cut 1 to the cut link ending at the test point.
- 2 If the test point, or any portion of the temporary surface, is below the target surface, the section is completed as a cut section. If the entire set of temporary links is above the target surface the section is completed as a fill section.

The cut example in the subassembly diagram show where five Cut links are defined. The cut test point is on the third link. The fill example shows two defined Fill links.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### **Cut Section**

- 1** If the cut test point is above the target surface, the links are traced backwards from the test point until an intersection with the target surface is found. The section is terminated at this point.
- 2** If the test point is below the target surface, the remaining cut links are added one by one. Each one is tested to see if it intersects the daylight surface. If so, the cut section terminates at the intersection point and the appropriate Hinge and Daylight codes are assigned.
- 3** To close to the target surface in cut:
  - If Include Daylight Link is set to False, no cut daylight intercept is calculated.
  - The intercept to the daylight surface is calculated using the Flat Cut Slope value.
  - If the height of the flat cut slope exceeds the Flat Cut Max Height, the intercept to the daylight surface is re-calculated using the Medium Cut Slope value.
  - If the height of the medium cut slope exceeds the Medium Cut Max Height, the intercept to the daylight surface is re-calculated using the Steep Cut Slope value.

### Fill Section

- 1 Fill links are inserted outward from the attachment point to the fill hinge point, which is the outer edge of the last non-zero fill link.
- 2 When a fill link intersects the daylight surface before reaching the hinge point, the section is terminated at the intersection and the appropriate Hinge and Daylight point codes are assigned.
- 3 To close to the target surface in fill:

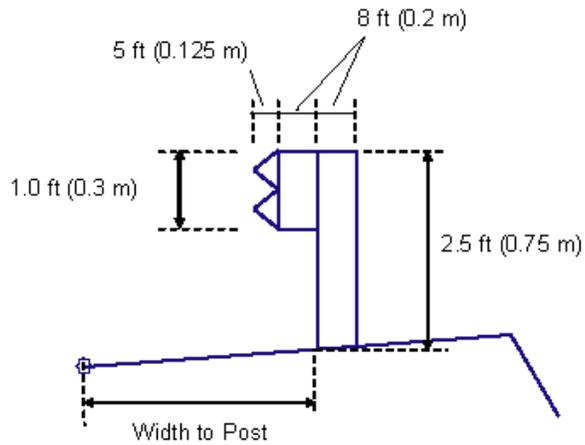
The intercept to the target surface is calculated using the Flat Fill Slope value. If the height of the intercept link does not exceed the Flat Fill Max Height, this slope is used to add the link to the assembly, otherwise:

The intercept to the target surface is re-calculated using the Medium Fill Slope value. If the height of the intercept link does not exceed the Medium Fill Max Height, this slope is used to add the link to the assembly, otherwise:

If a non-zero guardrail width is given, the links (Fill 1, Fill 2 etc.) are removed. The guardrail widening link is added at the attachment point using the Guardrail Width and Guardrail %Slope parameters. The intercept to the target surface is re-calculated from the outside edge of the guardrail widening link using the Steep Fill Slope value, and the link is added to the assembly.

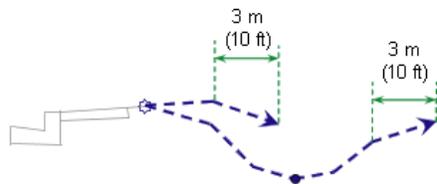
If the guardrail width is zero, the steep fill slope is applied from the fill hinge point.

A guardrail structure may be applied to fill sections that meet the criteria for using the steep fill slope. If this criteria is met, the Guardrail Width is not zero, and Include Guardrail is set to true, then a guardrail structure is drawn at the station. The dimensions of the guardrail structure are fixed as shown in the diagram below.



### Layout Mode Operation

In layout mode, this subassembly shows both the cut and fill condition flat-slope solutions in dashed lines. The daylight link is extended outward for a horizontal distance of 3 meters or 10 feet, and terminates with an arrowhead.



### Point, Link, and Shape Codes

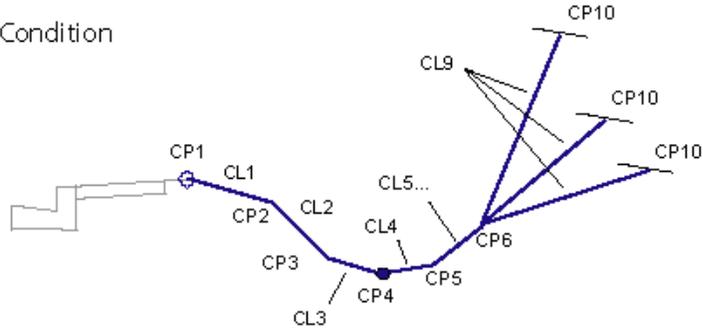
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
CP(n+1)	Ditch_Out	Ditch test point at the end of Cut Link n, where n is the cut test point link number
CP (1 to n)	Hinge Hinge_Cut	Hinge point for the cut intercept slope

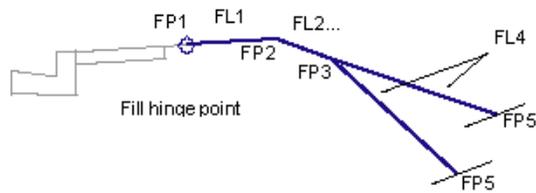
<b>Point, Link, or Shape</b>	<b>Code</b>	<b>Description</b>
CP10	Daylight Daylight_Cut	Cut slope stake point
FP (1 to n)	Hinge Hinge_Fill	Hinge point for the fill intercept slope
FP5	Daylight Daylight_Fill	Fill slope stake point
All links	Top Datum	All cut, fill, and guardrail links
Guardrail points	None	No codes are assigned to the points on the guardrail structure, if included.
Guardrail links	Guardrail	All links comprising the guardrail structure, if included.
Final daylight link	Top Datum Daylight Daylight_Cut	Daylight link for cut section
Final daylight link	Top Datum Daylight Daylight_Fill	Daylight link for fill section

### Coding Diagram

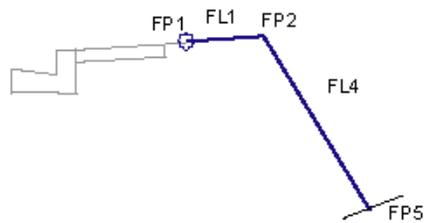
Cut Condition



Medium Fill Slope



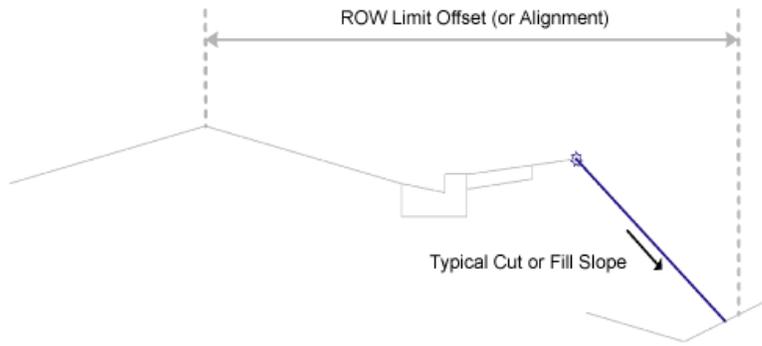
Steep Fill Slope



## DaylightInsideROW

This subassembly inserts a daylight solution that will use a typical slope as long as the daylight is within the ROW limits.

If the typical slope does not fall within the ROW (right-of-way), then a steeper slope is used. If the steeper slope still does not fall within the ROW, the user has options for controlling the behavior.



### Attachment

The attachment point is at the inside edge of the first link. This subassembly typically attaches to the edge of the shoulder.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
ROW Offset from Baseline	+/- offset of the right-of-way limit from the baseline	Numeric	3.0 m 10.0 ft
Typical Fill Slope	Fill Slope to be used normally	Numeric, positive	4 (:1)
Maximum Fill Slope	Fill Slope to be used if the daylight is beyond the right-of-way	Numeric, positive	2 (:1)
Typical Cut Slope	Cut Slope to be used normally	Numeric, positive	4 (:1)
Maximum Cut Slope	Cut Slope to be used if the daylight is beyond the right-of-way	Numeric, positive	2 (:1)

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Hold Slope	Specifies what to do if the slope extends beyond the ROW offset. Choices are a list as follows: Hold Maximum Slope, Override Maximum Slope.	List	Hold Maximum Slope
Rounding Option	Specifies to round off the daylight link at the catch point.	List of options: None, Circular, Parabolic	None
Rounding By	Specifies the parameter that is used for rounding	List of options: Length, Radius	Length
Rounding Parameter	Specifies value for length of radius	Numeric, positive	0.5 m
Rounding Tessellation	Specifies number of intermittent points on rounding links (Max 10 links)	Numeric, positive integer	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links or None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of the lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applied for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1

Parameter	Description	Type	Default
Material 2 Thickness	Specifies the thickness of the lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applied for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of the lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applied for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Type	Status
ROW Offset	May be used to override the fixed ROW Offset and tie the ROW offset to an offset alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying this surface: surfaces.	Required

### Output Parameters

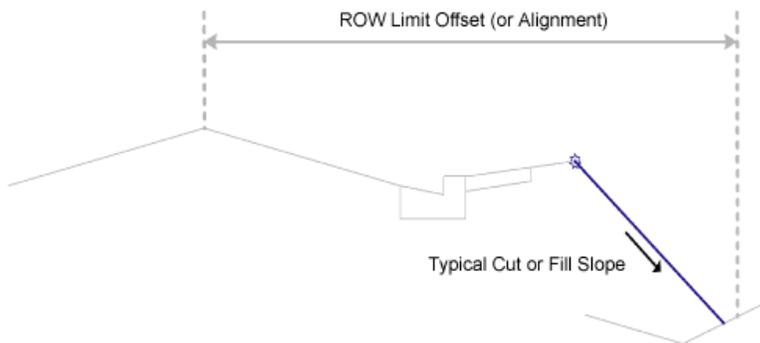
Parameter	Description	Type	Default
Daylight Offset	Offset of the daylight point	Numeric	Daylight Offset
Daylight Elevation	Elevation of the daylight point	Numeric	Daylight Elevation

### Behavior

This subassembly is inserted left of the attachment point if a negative value has been specified for ROW offset, or if a ROW Offset Alignment has been specified that is on the left side of the controlling baseline. A positive value for the ROW Offset parameter results in the daylight being inserted on the right side. A negative value inserts it to the left.

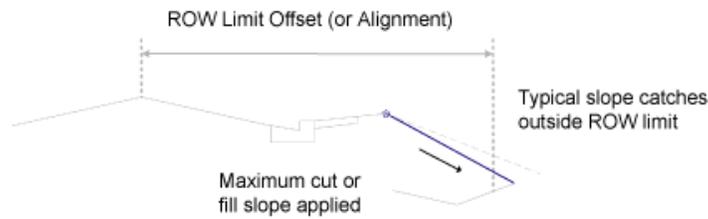
There are 3 logical cases for this subassembly, as shown in the following illustrations.

Case 1 is shown in the following illustration.



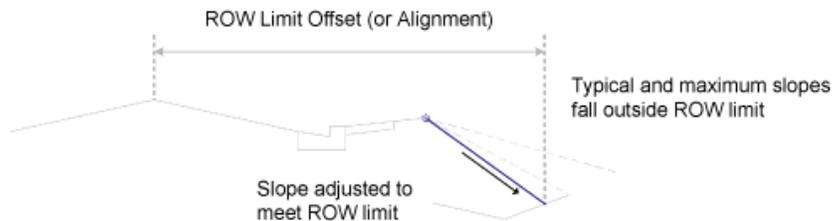
The typical daylight slope allows the catch point to fall within the offset limit specified either by numeric value, or by the alignment location.

Case 2 is shown in the following illustration.



The typical daylight slope forces the catch point to fall outside the offset limit specified either by numeric value or by the alignment location. If the Hold Slope input parameter is set to Hold Maximum Slope, the slope is increased up to the maximum value. At this point the maximum slope is held and the catch point will be beyond the ROW Limit.

Case 3 is shown in the following illustration.



The typical daylight slope forces the catch point to fall outside the offset limit specified either by numeric value or the alignment location. If the Hold Slope input parameter is set to Override Maximum slope, the slope restrictions are ignored, and the catch point is placed at the ROW offset location.

As with all daylight subassemblies, rounding and lined material controls are available with this subassembly.

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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

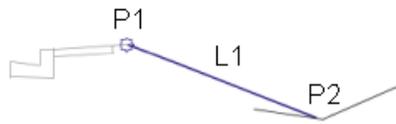
In layout mode, this subassembly will display all links and use the typical slope value specified in the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	Hinge, Hinge_Cut or Hinge_Fill	Hinge point. Hinge_Cut is used if the daylight link has an upward slope; Hinge_Fill is used if the daylight link has a downward slope.
P2	Daylight, Daylight_Cut or Daylight_Fill	Daylight point
L1	Top, Datum, Daylight, Daylight_Cut, Slope_Link	Daylight link for cut section
L1	Top, Datum, Daylight, Daylight_Fill, Slope_Link	Daylight Link for fill section

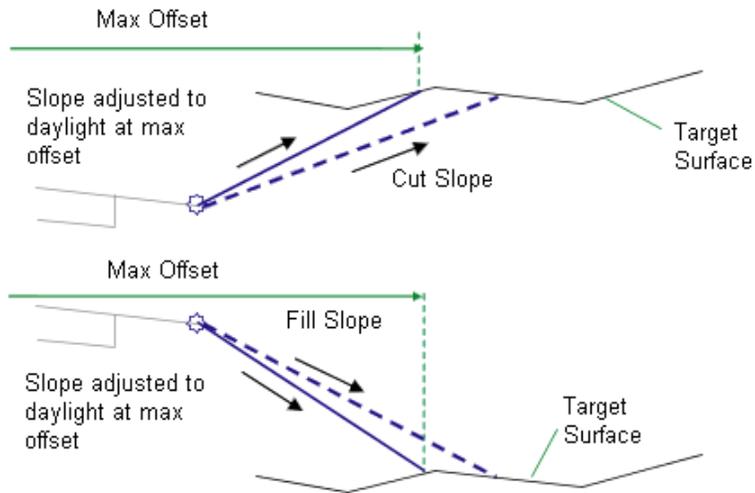
### Coding Diagram



## DaylightMaxOffset

This subassembly inserts a link that extends to a target surface at a user-defined cut or fill slope.

If necessary, the slope is adjusted to keep the daylight point within a maximum +/- offset from the baseline.



You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

The attachment point is at the hinge point of the daylight link. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Cut Slope	The slope for normal daylighting in cut conditions	Numeric, positive	4 (: 1)
Fill Slope	The slope for normal daylighting in fill conditions	Numeric, positive	4 (: 1)

Parameter	Description	Type	Default
Max Offset from Baseline	The maximum allowable offset for the daylight point	Numeric	3.0 m 10.0 ft
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap

Parameter	Description	Type	Default
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Max Offset	May be used to override the fixed Max Offset value and tie the maximum offset to an offset alignment. The following object types can be used as targets for specifying the offset: alignments, polylines, feature lines, or survey figures.	Optional
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point.	Numeric
Daylight Elevation	Elevation of the daylight point.	Numeric

### Behavior

This subassembly attempts to calculate a daylight point for the cut condition. If a daylight point is found, its offset is compared to the Max Offset value. If the Max Offset value is exceeded, the daylight point is moved to the maximum

offset point on the target surface. If no cut daylight point is found, the process is repeated for the fill condition.

If an offset horizontal alignment name is assigned to the Max Offset during corridor modeling, the value of the Max Offset will vary to match the offset of the alignment.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

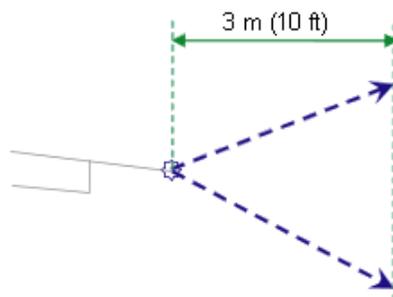
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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode, this subassembly displays both the cut and fill slopes in dashed lines extended outward for a distance of 3 meters or 10 feet. The daylight links are terminated with arrowheads pointing outwards.

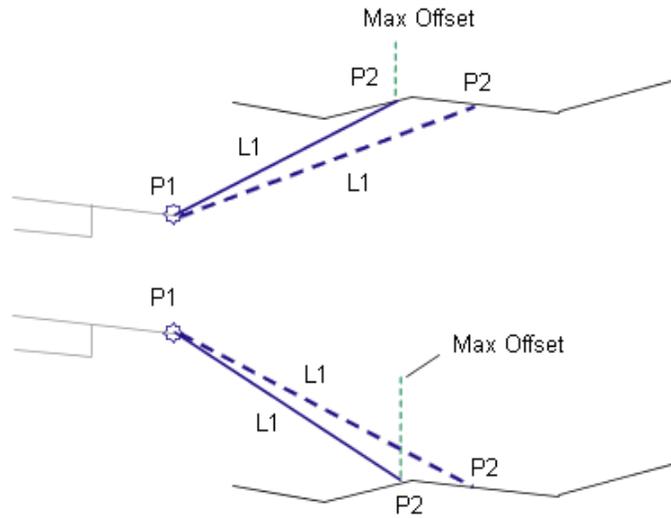


### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Cut or Hinge_Fill	Hinge point, and hinge point for the cut or fill condition
P2	Daylight Daylight_Cut or Daylight_Fill	Daylight point, and daylight point for the cut or fill condition
L1	Top Datum	
L1	Top Datum Daylight Daylight_Cut	Daylight link for cut section
L1	Top Datum Daylight Daylight_Fill	Daylight link for fill section

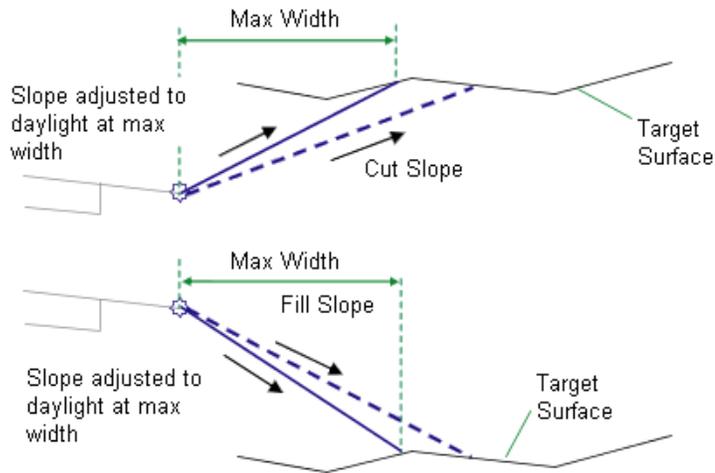
### Coding Diagram



## DaylightMaxWidth

This subassembly inserts a link that daylights to a target surface at a user-defined cut or fill slope.

If necessary, the slope is adjusted to keep the daylight point within a maximum width from the hinge point.



You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

The attachment point is at the hinge point of the daylight link. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left / Right	Right
Cut Slope	The slope for normal daylighting in cut conditions	Numeric, positive	4 ( : 1)
Fill Slope	The slope for normal daylighting in fill conditions	Numeric, positive	4 ( : 1)

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Max Width	The maximum allowable width from the hinge point (attachment point) for the daylight point	Numeric	3.0 m 10.0 ft
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap

Parameter	Description	Type	Default
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Max Width	May be used to override the fixed Max Width value and tie the maximum width to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

This subassembly attempts to calculate a daylight point for the cut condition. If a daylight point is found, the width of the daylight link is compared to the Max Width value. If the Max Width value is exceeded, the daylight point is moved to the maximum width point on the target surface. If no cut daylight point is found, the process is repeated for the fill condition.

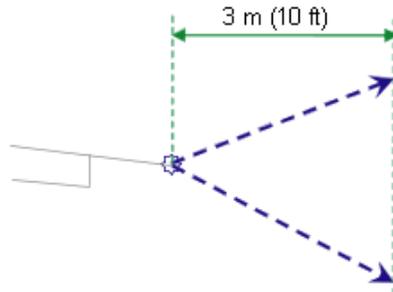
If an offset horizontal alignment name is assigned to the Max Width during corridor modeling, the value of the Max Width will vary to match the offset of the alignment.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

### Layout Mode Operation

In layout mode, this subassembly displays both the cut and fill slopes in dashed lines extended outward for a distance of 3 meters or 10 feet. The daylight links are terminated with arrowheads pointing outwards.



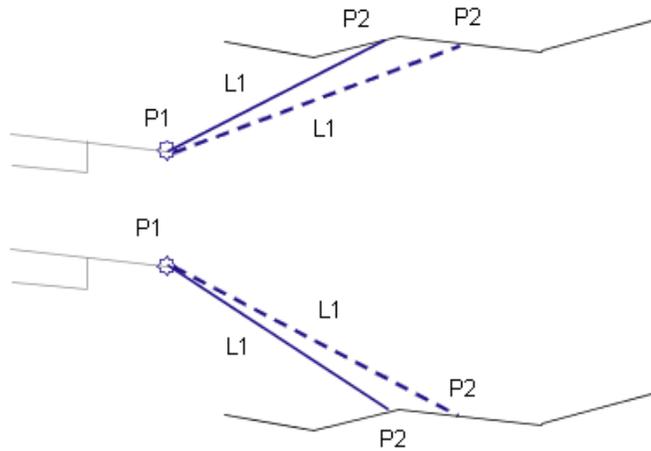
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Cut or Hinge_Fill	Hinge point, and hinge point for the cut or fill condition

Point, Link, or Shape	Code	Description
P2	Daylight Daylight_Cut or Daylight_Fill	Daylight point, and daylight point for the cut or fill condition
L1	Top Datum	
L1	Top Datum Daylight Daylight_Cut	Daylight link for cut section
L1	Top Datum Daylight Daylight_Fill	Daylight link for fill section

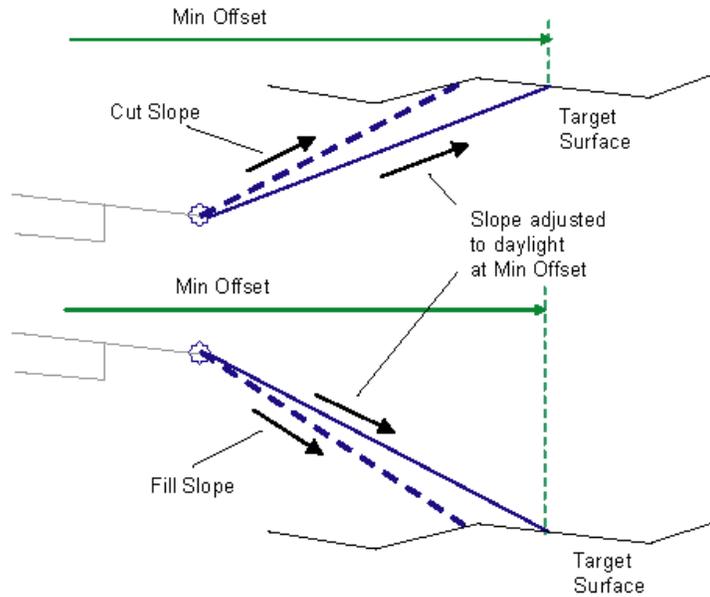
### Coding Diagram



## DaylightMinOffset

This subassembly inserts a link that daylights to a target surface at a user-defined cut or fill slope.

If necessary, the slope is adjusted to keep the daylight point beyond a minimum offset from the baseline.



You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

The attachment point is at the hinge point of the daylight link. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left / Right	Right
Cut Slope	The slope for normal daylighting in cut conditions	Numeric, positive	4 ( : 1)
Fill Slope	The slope for normal daylighting in fill conditions	Numeric, positive	4 ( : 1)
Min Offset from Baseline	The minimum allowable offset for the daylight point	Numeric	3.0 m 10.0 ft
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches

Parameter	Description	Type	Default
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Min Offset	May be used to override the fixed Min Offset and tie the minimum offset to an offset alignment. The following object types can be used as targets for specifying the offset: alignments, polylines, feature lines, or survey figures.	Optional
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

This subassembly attempts to calculate a daylight point for the cut condition. If a daylight point is found, its offset is compared to the Min Offset value. If the daylight point is within the Min Offset, the daylight point is moved to the minimum offset point on the target surface. If no cut daylight point is found, the process is repeated for the fill condition.

If an offset horizontal alignment name is assigned to the Min Offset during corridor modeling, the value of the Min Offset will vary to match the offset of the alignment.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

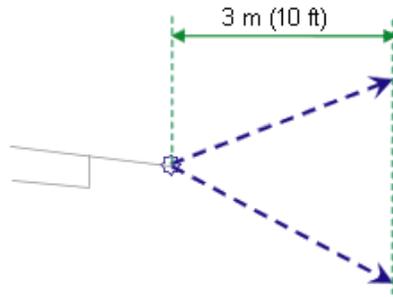
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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode, this subassembly displays both the cut and fill slopes in dashed lines extended outward for the Min Offset distance. The daylight links are terminated with arrowheads pointing outwards.

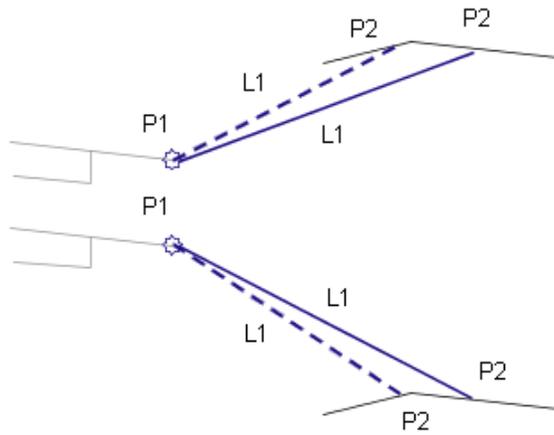


### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Cut or Hinge_Fill	Hinge point, either for the cut or fill condition
P2	Daylight Daylight_Cut or Daylight_Fill	Daylight point, and daylight point for either the cut or fill condition
L1	Top Datum	
L1	Top Datum Daylight Daylight_Cut	Daylight link for cut section
L1	Top Datum Daylight Daylight_Fill	Daylight link for fill section

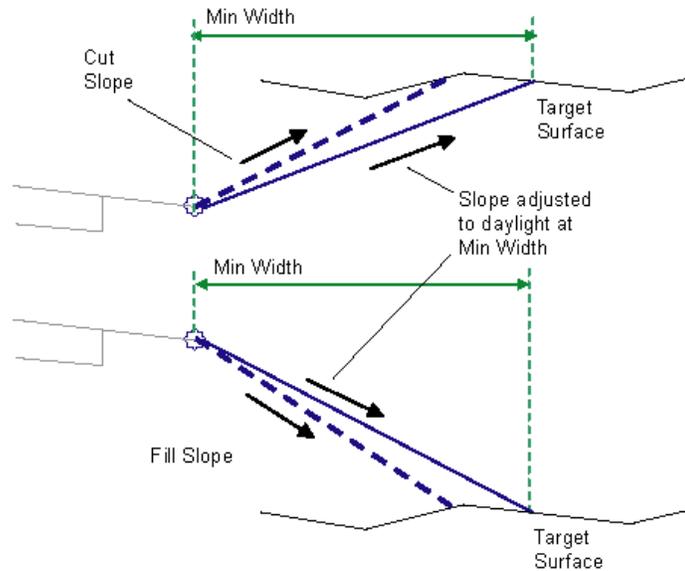
### Coding Diagram



## DaylightMinWidth

This subassembly inserts a link that daylights to a target surface at a user-defined cut or fill slope.

If necessary, the slope is adjusted to keep the daylight point beyond a minimum width from the hinge point.



You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

The attachment point is at the hinge point of the daylight link. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Cut Slope	The slope for normal daylighting in cut conditions	Numeric, positive	4 ( : 1)
Fill Slope	The slope for normal daylighting in fill conditions	Numeric, positive	4 ( : 1)

Parameter	Description	Type	Default
Min Width	The minimum allowable offset for the daylight point	Numeric	3.0 m 10.0 ft
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1

Parameter	Description	Type	Default
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Min Width	May be used to override the fixed Min Width and tie the minimum width to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

This subassembly attempts to calculate a daylight point for the cut condition. If a daylight point is found, the width of the daylight link is compared to the Min Width value. If the daylight point is within the Min Width, the daylight point is moved to the minimum width point on the target surface. If no cut daylight point is found, the process is repeated for the fill condition.

If an offset horizontal alignment name is assigned to the Min Width during corridor modeling, the value of the Min Width will vary to match the offset of the alignment.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

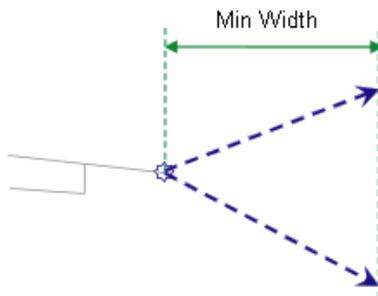
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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode, this subassembly displays both the cut and fill slopes in dashed lines extended outward for the Min Width distance. The daylight links are terminated with arrowheads pointing outwards.

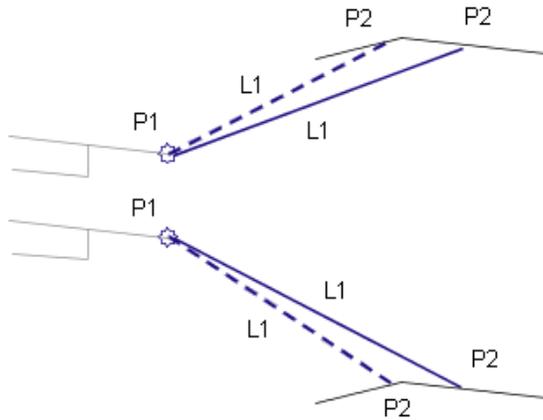


### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Cut or Hinge_Fill	Hinge point, either for the cut or fill condition
P2	Daylight Daylight_Cut or Daylight_Fill	Daylight point, and daylight point for either the cut or fill condition
L1	Top Datum	
L1	Top Datum Daylight Daylight_Cut	Daylight link for cut section
L1	Top Datum Daylight Daylight_Fill	Daylight link for fill section

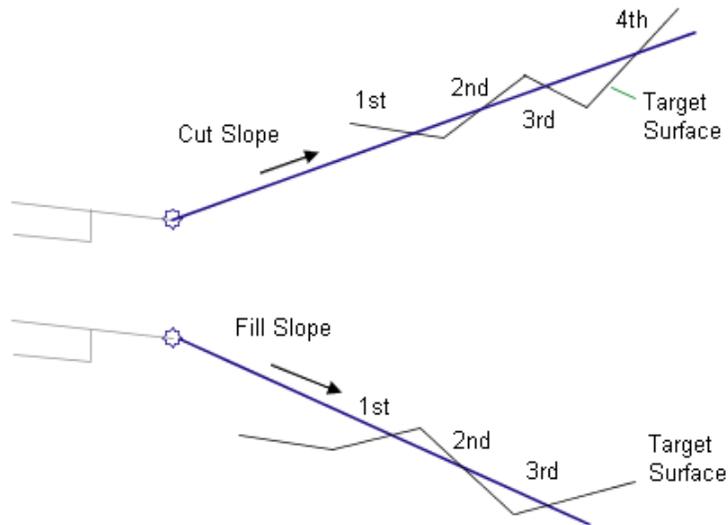
### Coding Diagram



## DaylightMultiIntercept

This subassembly is used when a cut or fill daylight slope may have more than one intersection with the target surface.

An input parameter controls which intercept is used.



You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

The attachment point is at the hinge point of the daylight link. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Cut Slope	The slope for normal daylighting in cut conditions	Numeric, positive	4 ( : 1)
Fill Slope	The slope for normal daylighting in fill conditions	Numeric, positive	4 ( : 1)
Intercept Number	The number of the intercept to save. If the Intercept Number value is greater than the actual number of intercepts, the highest intercept found is used	Numeric, positive, integer	10
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tesselation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None

Parameter	Description	Type	Default
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

This subassembly attempts to find all possible daylight points for the cut slope condition. If one or more daylight points are found, they are ordered and numbered by increasing offset from the hinge point. The daylight link is terminated at the point that matches the Intercept Number value. If the intercept number is higher than the number of intercepts found, the last intercept is used.

If no daylight points are found for the cut condition, the process is repeated for the fill condition.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

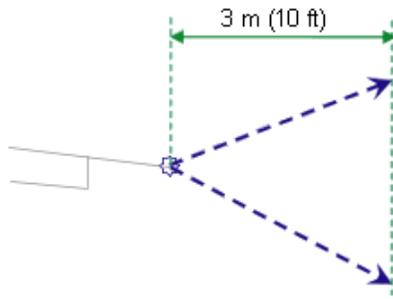
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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode, this subassembly displays both the cut and fill solutions in dashed lines extended outward for a distance of 3 meters or 10 feet. The daylight links terminate in arrowheads pointing outwards.

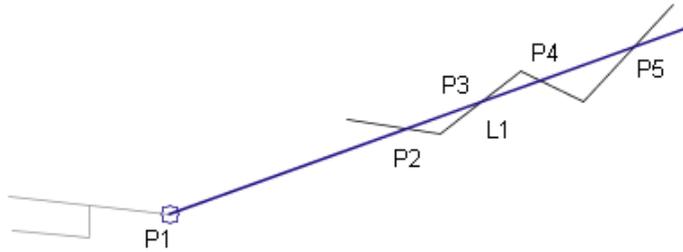


### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Cut or Hinge_Fill	Hinge point, either for the cut or fill condition
P2	Daylight Daylight_Cut or Daylight_Fill	Daylight point, and daylight point for either the cut or fill condition
L1	Top Datum Daylight Daylight_Cut	Daylight link for cut section
L1	Top Datum Daylight Daylight_Fill	Daylight link for fill section

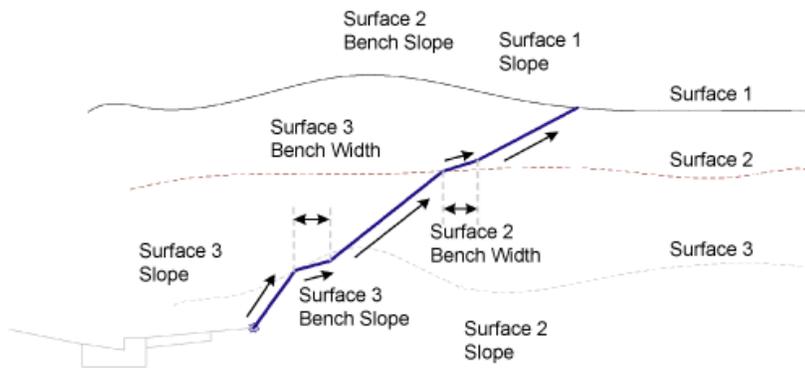
### Coding Diagram



## DaylightMultipleSurface

This subassembly lets you specify three surface layers and cut slopes for each material type.

When transitioning between types, a bench can also be inserted.



### Attachment

The attachment point is at the inside edge of the initial cut or fill slope. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left/Right	Right
Surface 1 Cut Slope	Slope to use for Surface 1 Material	Numeric, positive	4 (:1)
Surface 2 Bench Width	Specifies bench width between surface 1 and 2 (zero to omit)	Numeric, positive	0
Surface 2 Bench Slope	Specifies slope of optional bench	Numeric, positive	4 (:1)
Surface 2 Cut Slope	Slope to use for Surface 2 Material	Numeric, positive	2 (:1)
Surface 3 Bench Width	Specifies bench width between surface 1 and 2 (zero to omit)	Numeric, positive	0
Surface 3 Bench Slope	Specifies slope of optional bench	Numeric, positive	4 (:1)
Surface 3 Cut Slope	Slope to use for Surface 3 Material	Numeric, positive	1 (:1)
Fill Slope	The slope of the daylight link in fill conditions	Numeric, positive	4 (:1)
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap

Parameter	Description	Type	Default
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Surface1	Top Existing Ground Surface. The following object types can be used as targets for specifying this surface: surfaces.	Required
Surface2	First subsurface. The following object types can be used as targets for specifying this surface: surfaces.	Optional
Surface3	Second subsurface. The following object types can be used as targets for specifying this surface: surfaces.	Optional

### Output Parameters

Parameter	Description	Type	Default
Daylight Offset	Offset of the daylight point	Numeric	Daylight Offset
Daylight Elevation	Elevation of the daylight point	Numeric	Daylight Elevation

### Behavior

In a fill situation, a daylight link is inserted with a slope based on the fill slope input parameter to surface 1. In cut, the subassembly first checks to determine if it is below surface 3 by applying the surface 3 slope, and checking for intersection. This process repeats for each additional surface. Optionally, between the surfaces optional transitions can be added at the surface changes. The bench width and slope for the surface that was just intersected will be used.

---

**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

---

### Layout Mode Operation

This subassembly displays in layout mode using the input parameters for Surface 1 Slope and Fill Slope.

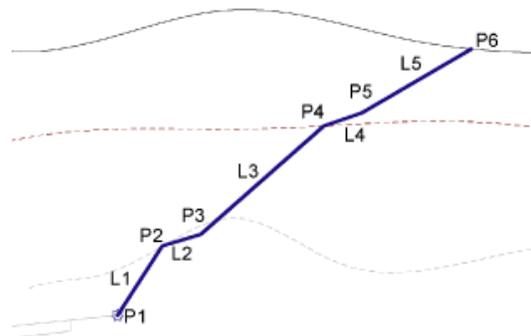
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	Hinge, Hinge_Cut or Hinge_Fill	Hinge point. Hinge_Cut is used if the daylight link has an upward slope; Hinge_Fill is used if the daylight link has a downward slope.

Point, Link, or Shape	Codes	Description
P2	Daylight, Daylight_Cut or Daylight_Fill	Daylight point
P3-P6	Daylight, Daylight_Cut	Daylight point
L1	Top, Datum, Slope_Link	
L1	Daylight, Daylight_Cut	Daylight link for Cut section
L1	Daylight, Daylight_Fill	Daylight link for Fill section
L2-L5	Top, Datum, Slope_Link, Daylight_Cut	Links for slopes through surfaces
L Last	Top, Datum, Daylight, Daylight Cut	Last Link

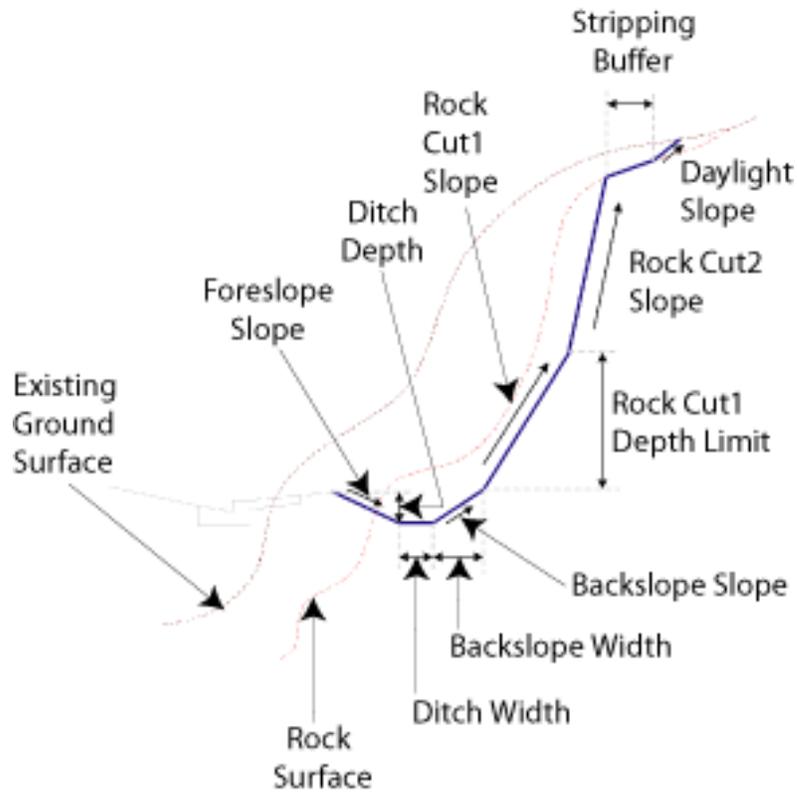
### Coding Diagram



## DaylightRockCut

This subassembly lets you select both an existing ground surface and a rock surface as targets.

Depending on the position (above or below), the daylight will use varied slopes and ditching solutions. In fill and non-rock-cut conditions, this subassembly will behave the same as the BasicSideslopeCutDitch subassembly.



**Attachment**

The attachment point is at the inside edge of the ditch foreslope for cut conditions, and at the inside edge of the daylight link for fill conditions.

**Input Parameters**

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Daylight Link	Includes or omits the Daylight link	Include / Omit	Include
Cut Slope	Slope of the daylight link for cut in Non Rock	Numeric, positive	2 ( : 1)

Parameter	Description	Type	Default
Fill Slope	Slope of the daylight link for fill	Numeric, positive	4 ( : 1)
Foreslope Slope	Slope of the ditch foreslope link (cut only)	Numeric, positive	4 ( : 1)
Ditch Depth	Depth of Ditch	Numeric, positive	1.2 m 4.0 ft
Bottom Width	Width of the bottom of ditch (zero for a V-shaped ditch)	Numeric, positive	0.6 m 2.0 ft
Backslope Slope	Slope of the ditch backslope link (cut only)	Numeric, positive	4 : 1
Backslope Width	Width of the ditch backslope link (cut only)	Numeric, positive	1.2 m 4.0 ft
Rock Cut1 Depth Limit	Height of first rock cut slope	Numeric positive	3.0 m 9.0 ft
Rock Cut1 Slope	Slope of first Rock cut Segment	Numeric, positive	4 (:1)
Rock Cut2 Slope	Slope of second rock cut segment	Numeric, positive	1 (:1)
Existing Ground Strip-ping Width	Width of EG to strip at top of rock	Numeric, positive	1.5 m 5.0 ft
Daylight link slope	Slope of link to EG	Numeric, positive	2 (:1)
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1

Parameter	Description	Type	Default
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

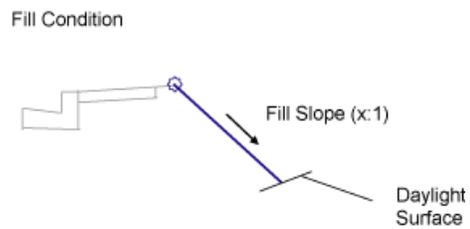
Parameter	Description	Status
Existing Ground Surface	Name of the existing ground surface for daylighting. The following object types can be used as targets for specifying this surface: surfaces.	Required
Rock Surface	Rock surface for rock cut. The following object types can be used as targets for specifying this surface: surfaces.	Optional

## Output Parameters

None.

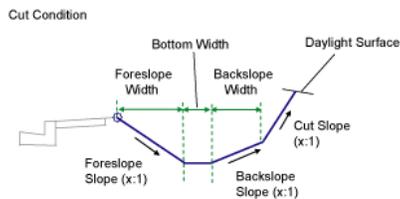
## Behavior

The attachment point is tested to determine if it is in cut or fill. If it is in fill, the fill daylight link is extended to the Existing Surface at the given Fill Slope.



If Point P1 or P2 are below the rock surface then the foreslope, ditch bottom, and backslope are added, the rock cut1 link is added at the height specified by Rock Cut1 Depth Limit. A second rock cut link is added until it reaches the rock surface at the Rock Cut 2 Slope. A stripped area is created as links are created that follow the rock surface for the specified buffer distance. Finally a daylight link to existing ground is inserted using the slope specified by the Daylight link Slope parameter.

If the daylight is not below the rock surface, the foreslope, ditch bottom, and backslope are added, and the cut daylight link is extended from the end of the backslope to the Daylight Surface at the given Cut Slope.



This subassembly optionally lets you add a lined material. The material thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

---

**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode the subassembly will use the same layout behavior as the existing basicsideslopecutditch.

### Point, Link, and Shape Codes

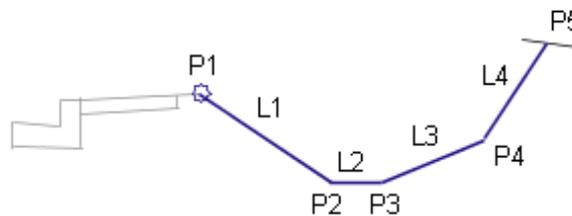
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	Hinge, Hinge_Fill	Fill condition only - hinge point for fill daylight link
P2	Ditch_In, Daylight, Daylight_Fill	Cut condition only - inside edge of ditch Fill condition only - daylight point
P3	Ditch_Out	Cut condition only - outside edge of ditch
P4	Hinge_Cut	Cut condition only - hinge point for cut daylight link

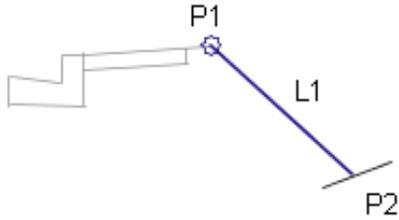
Point, Link, or Shape	Codes	Description
P5-n	Daylight Daylight_Cut	Cut condition only - daylight point
L1 - n	Top, Datum	Unpaved finish grade
L1	Top, Datum, Daylight, Daylight_Fill, Slope_Link (cut only)	Daylight link in fill
L2	Ditch	Ditch Bottom
L3	Slope_Link	Ditch Slope
L4-Ln	Top, Datum, Daylight, Daylight_Cut	Daylight links in cut

### Coding Diagram

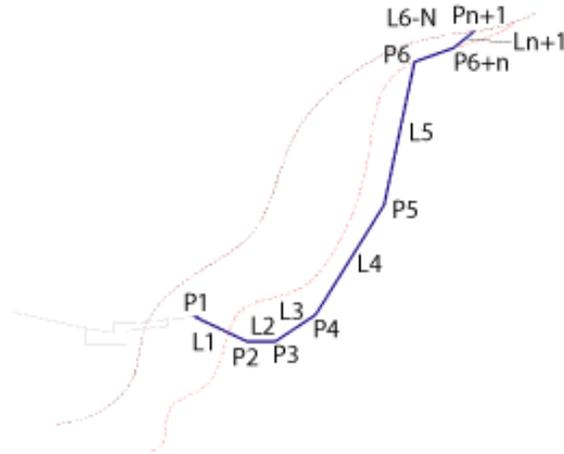
The following coding diagram shows the codes in a cut situation, without a rock surface.



The following coding diagram shows the codes in a fill situation.



The following coding diagram shows the codes in a cut situation, with a rock surface.



## DaylightStandard

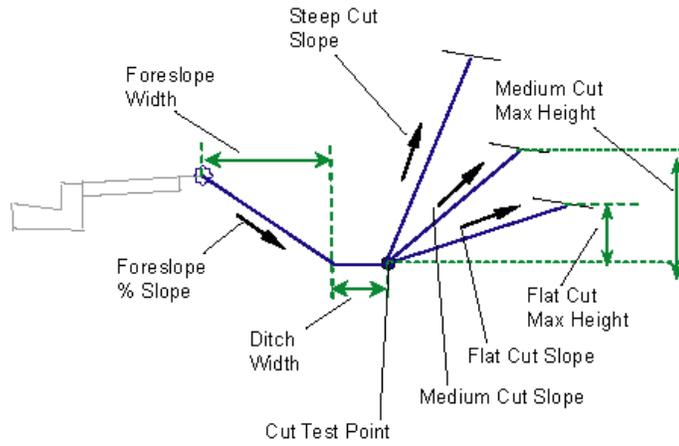
This subassembly creates corridor-side daylighting links with user-defined slope configurations, such as flat, medium, and maximum slopes for cut and fill situations.

This subassembly creates either a v-shaped or flat-bottom ditch in cut situations, and includes an option to include guardrail widening for steep fill conditions.

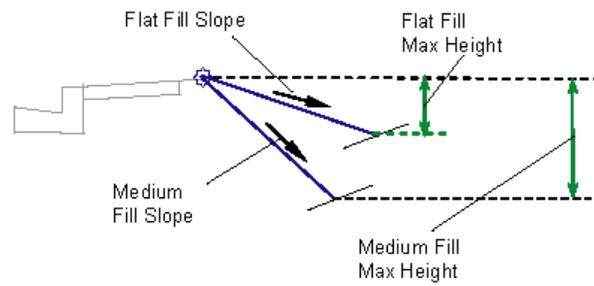
The final daylighting link can be omitted for cases where the corridor model needs to be left in an incomplete state. For example, this might be done so

that grading surfaces on adjacent properties can tie to the hinge point on the uncompleted roadway.

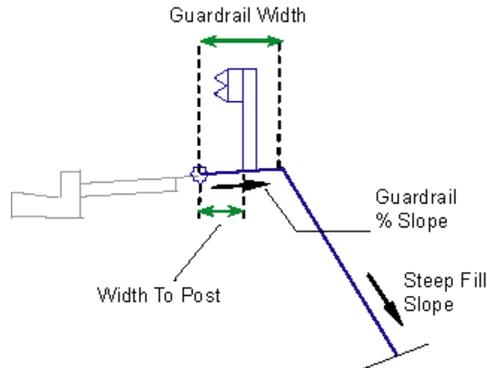
Case 1 - Cut Condition



Case 2 - Cut Condition, Flat or Medium Catch Slope



Case 3 - Steep Fill Condition with Guardrail Widening



You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

This subassembly is typically attached to the subassembly used at the outside edge of the roadway, such as the edge of shoulder, back of sidewalk, or back of curb. The attachment point is at the inside edge of the ditch front link, the top of the flat or medium fill slope, or inside edge of guardrail widening link, depending on conditions.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Include Daylight Link Omit Daylight Link	Include or omit the Daylight link.	Include / Omit	Include
Flat Cut Slope	First, flattest, catch slope to attempt. (x : 1)	Numeric, positive	6 ( : 1)

Parameter	Description	Type	Default
Flat Cut Max Height	Maximum allowable height of the closing link using the Flat Cut Slope	Numeric	1.5 m 5 ft
Medium Cut Slope	Cut slope to attempt if the Flat Cut Slope link exceeds the Flat Cut Max Height	Numeric, positive	4 (: 1)
Medium Cut Max Height	Maximum allowable height of the closing link using the Medium Cut Slope	Numeric	3 m 10 ft
Steep Cut Slope	Cut slope to use if the Medium Cut Slope link exceeds the Medium Cut Max Height	Numeric, positive	2 (: 1)
Foreslope Width	For cut sections, the width of the front-of-ditch link	Numeric	3.6 m 12 ft
Foreslope Slope	Slope of the front-of-ditch link (x : 1). This link is always inserted downwards.	Numeric, positive	4 (: 1)
Ditch Width	Width of the bottom of ditch. Use zero for a V-ditch.	Numeric, positive	1 m 3 ft
Flat Fill Slope	First, flattest, catch slope to attempt. (x : 1)	Numeric, positive	6 (: 1)
Flat Fill Max Height	Maximum allowable height of the closing link using the Flat Fill Slope	Numeric	1.5 m 5 ft
Medium Fill Slope	Fill slope to attempt if the Flat Fill Slope link exceeds the Flat Fill Max Height	Numeric, positive	4 (: 1)
Medium Fill Max Height	Maximum allowable height of the closing link using the Medium Fill Slope	Numeric	3 m 10 ft

Parameter	Description	Type	Default
Steep Fill Slope	Fill slope to use if the Medium Fill Slope link exceeds the Medium Fill Max Height	Numeric, positive	2 ( : 1)
Guardrail Width	Width of the guardrail widening link for fill slopes using Steep Fill Slope. Use zero for no guardrail widening.	Numeric, positive	0.6 m 2 ft
Guardrail %Slope	% slope of the guardrail widening link	Numeric	-2 (%)
Include Guardrail Omit Guardrail	Include to insert the guardrail structure when guardrail widening occurs. Omit does not insert the guardrail structure.	Include / Omit	Omit
Width to Post	When the guardrail is included, the width from the attachment point to the inside edge of the guardrail post.	Numeric	0.3 m 1 ft
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None

Parameter	Description	Type	Default
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

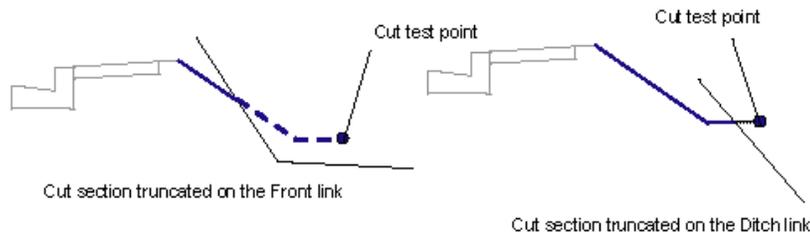
### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

The following steps are used by this subassembly to determine which conditions apply:

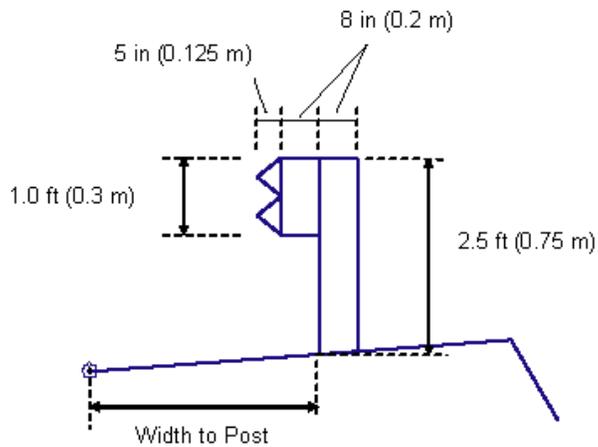
- 1 The location of the Cut Test Point (see diagram) is calculated using the Foreslope Width, Foreslope Slope, and Ditch Width parameters.
- 2 If any portion of the foreslope slope or ditch bottom is in cut, the section is computed as a cut section as follows:
  - If the Cut Test Point is above the target surface, the Foreslope link or ditch bottom is truncated at the point where it intersects the surface going from cut to fill, otherwise:



- If Include Daylight Link is set to omit, no daylight link is calculated.

- The intercept to the target surface is calculated using the Flat Cut Slope value.
  - If the height of the flat cut slope exceeds the Flat Cut Max Height, the intercept to the target surface is re-calculated using the Medium Cut Slope value.
  - If the height of the medium cut slope exceeds the Medium Cut Max Height, the intercept to the target surface is re-calculated using the Steep Cut Slope value.
- 3 If no portion of the foreslope link or ditch bottom is below the target surface, the section is computed as a Fill section as follows:
- The intercept to the target surface is calculated using the Flat Fill Slope value.
  - If the height of the flat fill slope exceeds the Flat Fill Max Height, the intercept to the target surface is re-calculated using the Medium Fill Slope value.
  - If the height of the medium fill slope exceeds the Medium Fill Max Height, the guardrail widening link is added to the assembly using the Guardrail Width and Guardrail %Slope parameters (unless the Guardrail Width is zero). The intercept to the target surface is re-calculated from the outside edge of the guardrail widening link using the Steep Fill Slope value.
  - If Include Daylight Link is True, the flat, medium, or steep fill slope link is added to the assembly.

A guardrail structure may be applied to fill sections that meet the criteria for using the steep fill slope. If this criteria is met, the Guardrail Width is not zero, and Include Guardrail is set to true, then a guardrail structure is drawn at the station. The dimensions of the guardrail structure are fixed as shown in the diagram below.



Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

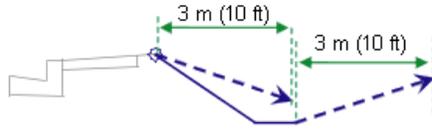
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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode, this subassembly shows both the cut and fill flat-slope conditions. The daylight links are extended outward for a horizontal distance of 3 meters or 10 feet, and are shown in dashed lines terminating in arrowheads pointing outwards.



### Point, Link, and Shape Codes

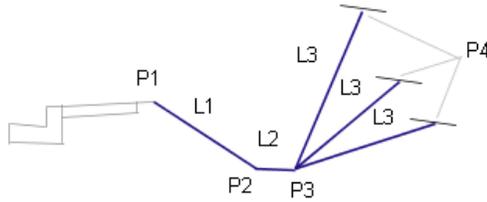
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Fill	Hinge point for the normal fill condition
P2	Hinge Hinge_Fill	Hinge point for the fill condition with guardrail widening
P2	Ditch_In	Inside edge of the bottom of the ditch (cut condition only)
P3	Ditch_Out Hinge Hinge_Cut	Outside edge of the bottom of the ditch (cut condition only)
P3	Daylight Daylight_Fill	Fill slope stake point (fill condition only)
P4	Daylight Daylight_Cut	Cut slope stake point (cut condition only)
All Links	Top Datum	All links added by this subassembly, except for the guardrail structure links.
Guardrail points	None	No codes are assigned to the points on the guardrail structure, if included.
Guardrail links	Guardrail	All links comprising the guardrail structure, if included.
L3	Top	Daylight link for cut section

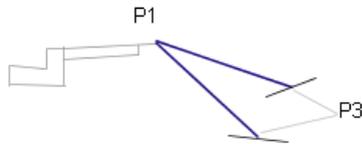
Point, Link, or Shape	Code	Description
	Datum Daylight Daylight_Cut	
Fill Daylight Link	Top Datum Daylight Daylight_Fill	Daylight link for fill section

### Coding Diagram

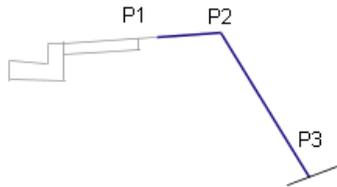
Case 1 -Cut Condition



Case 2 - Fill Condition, Flat or Medium Catch Slope

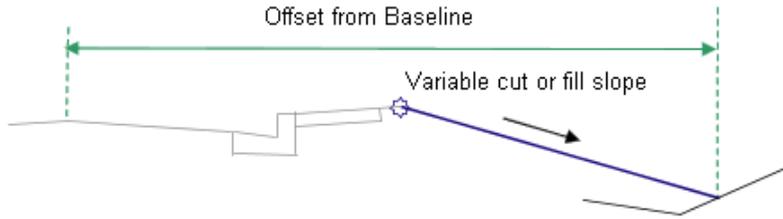


Case 3 - Steep Fill Condition with Guardrail Widening



## DaylightToOffset

This subassembly inserts a daylight link from the attachment point to a given offset from the baseline.



You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

The attachment point is at the inside edge of the daylight link.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted.

Parameter	Description	Type	Default
Daylight Offset from Baseline	+/- offset of the daylight point from the baseline. Specifying a positive value for this parameter inserts this subassembly on the right side of a corridor, or controlling baseline. A negative value inserts it on the left side. For more information, see "Inserting Subassemblies on Right and Left Sides of a Corridor" in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.	Numeric	3.0 m 10.0 ft
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Daylight Offset	May be used to override the fixed Daylight Offset and tie the daylight offset to an offset alignment. The following object types can be used as targets for specifying the offset: alignments, polylines, feature lines, or survey figures.	Optional
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

A daylight ink is inserted from the attachment point to the surface at the given offset.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

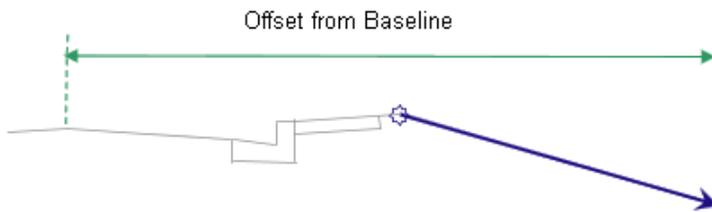
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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode, this subassembly displays a link extending outwards at a -4 : 1 slope to the specified offset. The daylight link terminates with an arrowhead pointing outwards.



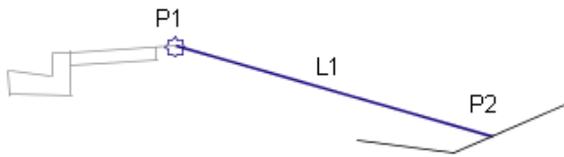
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Cut or Hinge_Fill	Hinge point. Hinge_Cut is used if the daylight link has an upward slope; Hinge_Fill is used if the daylight link has a downward slope.
P2	Daylight Daylight_Cut or Daylight_Fill	Daylight point
L1	Top Datum Daylight Daylight_Cut	Daylight link for cut section

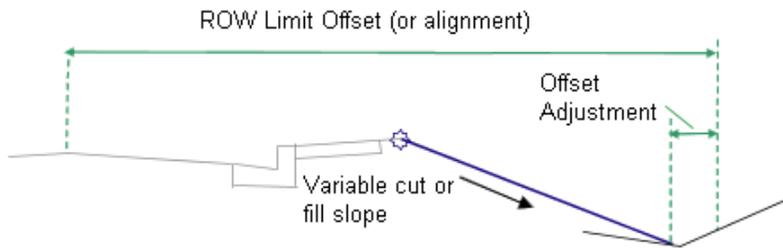
Point, Link, or Shape	Code	Description
L1	Top Datum Daylight Daylight_Fill	Daylight link for fill section

### Coding Diagram



## DaylightToROW

This subassembly inserts a daylight link from the attachment point to a given offset from the right-of-way limit on a target surface.



You can also specify optional lined materials for daylight and other links (All Links, Daylight Links, Fill Links Only, and None).

### Attachment

The attachment point is at the inside edge of the daylight link.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted.

Parameter	Description	Type	Default
ROW Offset from Baseline	+/- offset of the right-of-way limit from the baseline. Specifying a positive value for the this parameter inserts this sub-assembly on the right side of a corridor, or controlling baseline. A negative value inserts it on the left side. For more information, see "Inserting Subassemblies on Right and Left Sides of a Corridor" in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.	Numeric	3.0 m 10.0 ft
Offset Adjustment	+/- value added to the ROW Limit Offset. A negative adjustment value moves the daylight point inside of the ROW limit; a positive value moves it outside the ROW limit.	Numeric	0.0
Rounding Option	Specifies to round off the daylight link at the catch point	String	None
Rounding By	Specifies what parameter is used for rounding	String	Length
Rounding Parameter	Specifies value for length or radius	Numeric, positive	1.500 ft
Rounding Tessellation	Specifies number of intermittent points on rounding links (maximum 10 links)	Numeric, positive	6
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links, Daylight Links, Fill Links Only, and None.	String	None
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1

Parameter	Description	Type	Default
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the link.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
ROW Offset	May be used to override the fixed ROW Offset and tie the ROW offset to an offset alignment. The following object types can be used as targets for specifying the offset: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Daylight Surface	Name of the daylighting surface. The following object types can be used as targets for specifying the surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Daylight Offset	Offset of the daylight point	Numeric
Daylight Elevation	Elevation of the daylight point	Numeric

### Behavior

The daylight offset is calculated as the ROW Limit Offset plus or minus the Offset Adjustment. A daylight link is inserted from the attachment point to the calculated offset on the target surface.

Like other daylight subassemblies, this subassembly optionally lets you add a lined material. You can specify three ranges of slopes. Material type 1 is applied if the slope of the links is up to the specified slope value. From slope 1 to slope 2, the second type of material applied. Similarly, if the slopes of links fall within slope 2 and slope 3 values, then material 3 is applied. If the link slopes are flatter than slope limit 3, then no material is applied.

If a lined material is added to the subassembly, then parallel links are added to the daylight links with specified thickness. This thickness parameter (for example, Material 1 Thickness) is measured perpendicular to the link. Bottom level links are coded with Datum and daylight links are coded with Top. Shapes enclosed by these materials are coded with material name.

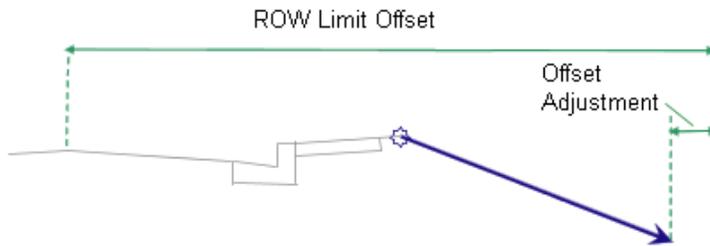
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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

---

### Layout Mode Operation

In layout mode, this subassembly displays a link extending outwards at a -4 : 1 slope to the right-of-way offset, plus or minus the offset adjustment. The daylight link terminates with an arrowhead pointing outwards.

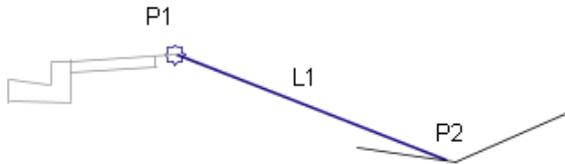


### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Hinge Hinge_Cut or Hinge_Fill	Hinge point. Hinge_Cut is used if the daylight link has an upward slope; Hinge_Fill is used if the daylight link has a downward slope.
P2	Daylight Daylight_Cut or Daylight_Fill	Daylight point
L1	Top Datum Daylight Daylight_Cut	Daylight link for cut section
L1	Top Datum Daylight Daylight_Fill	Daylight link for fill section

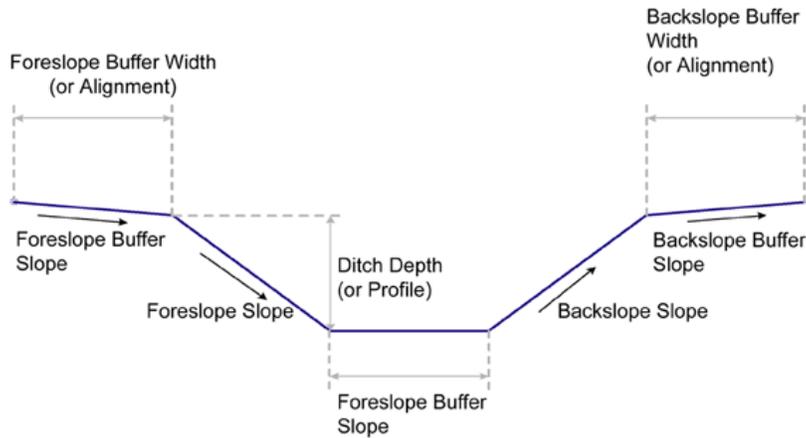
## Coding Diagram



## Ditch

This subassembly inserts a flat or V-shaped ditch with user-defined horizontal and vertical control parameters.

This subassembly can also include an optional lining material.



## Attachment

The attachment point is at the inside edge of the first link. This will be either the inner buffer or the foreslope link of the ditch if the inner buffer width is zero. This is typically connected to the outside edge of a shoulder.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies side to insert subassembly	Left/Right	Right
Include Ditch	Specifies to use the ditch in cut and fill, fill only or cut only	Selection list: a)Cut/Fill, b) Cut, c) Fill	Cut/Fill
Ditch Width	Width of the bottom of ditch. Use zero for a V-shaped ditch.	Numeric, positive	1 m 3 ft
Ditch Depth	Depth of Ditch	Numeric, positive	1 m 3 ft
Foreslope Slope	Slope of the front-of-ditch link (x : 1). This link is always inserted downwards.	Numeric, positive	4 ( : 1)
Foreslope Buffer Width	Allows a Buffer to be placed before the Foreslope (zero to omit)	Numeric, positive	1 m 3 ft
Foreslope Buffer Slope	Slope of the foreslope buffer	Numeric, positive	-6 (:1)
Backslope Slope	Slope of the back-of-ditch link (x : 1). This link is always inserted upwards.	Numeric, positive	4 ( : 1)
Backslope Buffer	Allows a Buffer to be placed back-slope the backslope (zero to omit)	Numeric, positive	1 m 3 ft
Backslope Buffer Slope	Slope of the backslope buffer	Numeric, positive	6 (:1)
Place Lined Material	Specifies to place optional material lining along daylight links. You can choose All Links or None.	String	None

Parameter	Description	Type	Default
Slope Limit 1	Specifies the slope limit until which the associated material lining is placed	Slope	1 : 1
Material 1 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the side of the slope.	Numeric, positive	12 inches
Material 1 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 2	Specifies the slope limit until which the associated material lining is placed	Slope	2 : 1
Material 2 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the side of the slope.	Numeric, positive	6 inches
Material 2 Name	Specifies the name of the material applies for lining along grading links	String	Rip Rap
Slope Limit 3	Specifies the slope limit until which the associated material lining is placed	Slope	4 : 1
Material 3 Thickness	Specifies the thickness of lined material. This thickness is measured perpendicular to the side of the slope.	Numeric, positive	4 inches
Material 3 Name	Specifies the name of the material applies for lining along grading links	String	Seeded Grass

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see [Setting Targets](#) in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Ditch Inner Edge Alignment	May be used to override the fixed width of the foreslope buffer. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Ditch outer edge Alignment	May be used to override the fixed width of the backslope buffer. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Ditch Bottom Profile	May be used to override the fixed foreslope and backslope widths. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Target Surface	Surface used to determine if the ditch is in cut or fill. The following object types can be used as targets for specifying this surface: surfaces.	Optional

### Output Parameters

None.

### Behavior

This subassembly will insert a simple ditch shape (either flat bottom or V-shaped ditch) with optional foreslope and backslope buffers. The location of the inner ditch edge can be specified with a fixed width, or with an optional alignment. The ditch depth can be specified with a fixed height, or a profile can be assigned to control the depth. The Cut/Fill Test point is P3. Depending on the Include Ditch input parameter, the ditch will only be placed in cut, fill, or both cut and fill.

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**NOTE** In Civil 3D 2010 and previous versions, the Material Thickness parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the link. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

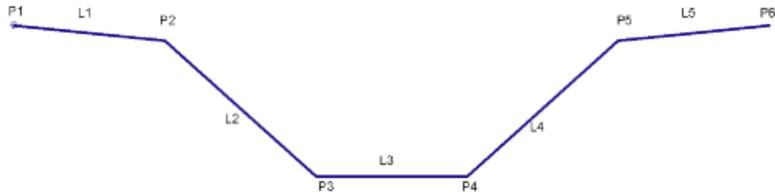
In layout mode, this subassembly displays all of the links comprising the ditch with the parameters set as input by the user.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

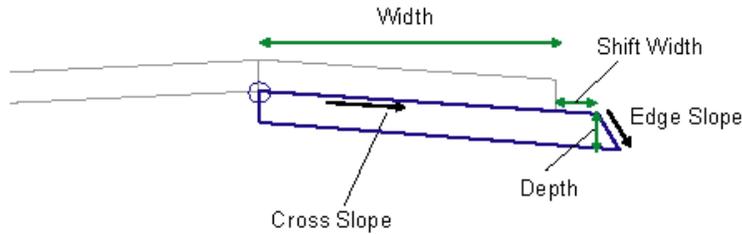
Point, Link, or Shape	Codes	Description
P2	Hinge	
P3	Ditch_In	Inside bottom of ditch
P4	Ditch_Out	Outside bottom of ditch
P5	Hinge	
L1-5	Top Datum	
L2,L4	Slope_Link	
L3	Ditch	Ditch Bottom

### Coding Diagram



## GenericPavementStructure

This subassembly creates a simple pavement structure with user-definable point, link, and shape codes.



This subassembly can be used as a lane or shoulder using superelevation parameters for the slope. The width and outside edge elevation can be calculated based on an optional alignment and profile. This subassembly can be stacked one below another to form multiple layers, or butted side by side to form multiple lanes with or without grade breaks. If multiple GenericPavementStructure subassemblies are stacked, the bottom slope can be used as the top slope of subsequent layers. Optionally, the bottom width of the subsequent subassembly can be assigned as the width of the previous subassembly.

### Attachment

The attachment point is at the upper inside edge of the pavement structure.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Indicates which side the sub-assembly is inserted towards.	Left / Right	Right
Width	Width of the subassembly.	Numeric, positive	3.6 m 12.0 ft
Shift Width	Specifies optional additional width to add.	Numeric, positive	0.2 m 0.67 ft
Default Cross Slope	Default slope of the top link, when superelevation slope for the alignment is not specified.	Numeric	-2%
Use Superelevation Slope	Specifies to use slope from superelevation specification defined on the baseline alignment.	List of options: No, Outside lane slope, Inside lane slope, Outside shoulder slope, Inside shoulder slope	No
Depth	Depth from top link to the bottom link of the subassembly.	Numeric, positive	0.2 m 0.67 ft
Deflect Outer Vertical Face	Indicates to deflect outside vertical face to a specified slope.	Boolean Yes/No	No
Outer Edge Slope	Specifies the slope of the outer edge if choose not to be vertical.	Numeric	1:1
Inside-Top Point Codes	Specifies point codes to the inside point on the top link.	String	
Outside-Top Point Codes	Specifies point codes to the outside point on the top link.	String	
Outside-Bottom Point Codes	Specifies point codes to the outside point on the bottom link.	String	

Parameter	Description	Type	Default
Inside-Bottom Point Codes	Specifies point codes to the inside point on the bottom link.	String	
Top Link Codes	Specifies codes to the top link.	String	
Bottom Link Codes	Specifies codes to the bottom link.	String	
Right Link Codes	Specifies codes to the right link.	String	
Left Link Codes	Specifies codes to the left link.	String	
Shape Codes	Specifies codes for the enclosed shape of the structure.	String	

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Width	May be used to override the fixed width and tie the point on the top link which defines "width" to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Edge Elevation	May be used to override the fixed slope and tie the point on the top link which defines "width" to an offset profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Side	Indicates which side the subassembly is inserted towards.	Left / Right

Parameter	Description	Type
Top Width	Total width of the top link including the effective shift width.	Numeric, positive
Bottom Width	Total bottom width of the pavement structure including the shift width and width due to the deflected outer face.	Numeric, positive
Depth	Depth from top link to the bottom	Numeric, positive
Cross Slope	Cross slope of the structure.	Numeric

### Behavior

This subassembly builds a skeletal subassembly that lets you specify various parameters. All point, link, and shape codes can be user-defined as needed. Additionally, this subassembly can get slopes from a target parameter (profile), or from the superelevation specified on the alignment. It can also assign the width from an offset alignment.

While defining an assembly, you can assign the width of the previous subassembly (the one above), plus a shift width to the subassembly, so that stepped layers are possible.

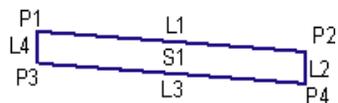
### Layout Mode Operation

In layout mode, the subassembly draws the lane using the input parameter values.

### Point, Link, and Shape Codes

None.

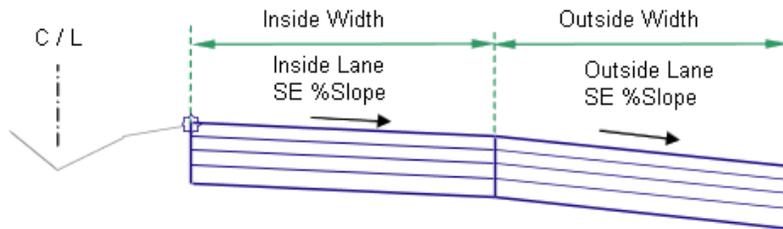
### Coding Diagram



# LaneBrokenBack

This subassembly creates a cross-sectional representation of travel lanes for a broken-back roadway, where the inside and outside lanes have different downward slopes.

This subassembly is used for the inside lanes on divided, broken-back highways. The pavement structure follows the standards described in “Pavement Structure on Paved Sections” in the AutoCAD Civil 3D User’s Guide Help.



### Attachment

The attachment point is at the inside edge of lane on the finish grade surface. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Crown Point on Inside	Specifies that inside edge of travelway to be coded as Crown	Yes / No	No
Inside Width	Width of the inside lanes	Numeric, positive	3.6 m 12.0 ft
Inside Default %Slope	Default % Slope of the inside lanes to be used if the superel-	Numeric	- 2.0 (%)

Parameter	Description	Type	Default
	levation for the alignment is not defined		
Outside Width	Width of the outside lanes	Numeric, positive	3.6 m 12.0 ft
Outside Default %Slope	Default % Slope of the outside lanes to be used if the superelevation for the alignment is not defined	Numeric	- 2.5 (%)
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Thickness of the Base layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Thickness of the Subbase layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Inside Width	May be used to override the fixed Inside Width and tie the edge-of-inside-lane to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Outside Width	May be used to override the fixed Outside Width and tie the edge-of-outside-lane to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Inside Elevation	May be used to override the normal slope and tie the elevation of the edge-of-inside-lane to the elevation of a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal slope and tie the elevation of the edge-of-outside-lane to the elevation of a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Inside Lane Width	Width of the inside lane	Numeric
Inside %Slope	% slope of the inside lane	Numeric
Outside Lane Width	Width of the outside lane	Numeric
Outside %Slope	% slope of the outside lane	Numeric

### Behavior

This subassembly creates a set of inside lanes and outside lanes that may have different slopes. The inside lanes are inserted outwards from the attachment point using the Inside Lane superelevation slope. If the superelevation is not defined at a station, the Inside Default %Slope value is used. The outside lanes are inserted outward from the end of the inside lanes, using the outside lane superelevation slope, or the Outside Default %Slope.

If an offset horizontal alignment name is assigned to the Width during corridor modeling, the width of the lane will vary to match the offset of the alignment.

### Layout Mode Operation

In layout mode, this subassembly displays the finish, base, and subbase links for the given widths and depths at the default % slopes.

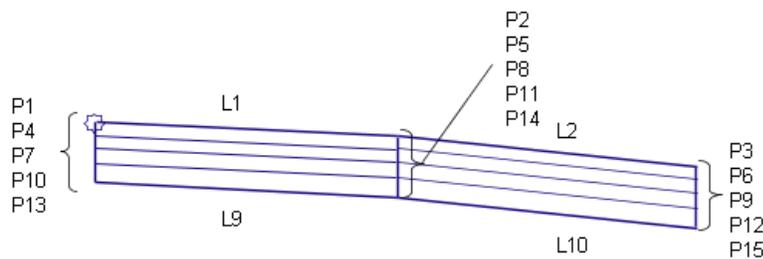
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P3	ETW	Edges of lane on finish grade
P1	Crown	Crown point of the corridor (optional)
P2	Lane	Lane breakpoint on finish grade
P4, P6	ETW_Pave1	Edges of lane on Pave1
P4	Crown_Pave1	Crown point on Pave1 (optional)
P5	Lane_Pave1	Lane break point on Pave1
P7, P9	ETW_Pave2	Edges of lane on Pave2
P7	Crown_Pave2	Crown point on Pave2 (optional)
P8	Lane_Pave2	Lane break point on Pave2
P10, P12	ETW_Base	Edges of lane on the Base layer
P10	Crown_Base	Crown point on base layer (optional)
P11	Lane_Base	Lane break point on the Base layer
P13, P15	ETW_Sub	Edges of lane on the Subbase layer
P13	Crown_Sub	Crown point on subbase layer (optional)
P14	Lane_Sub	Lane break point on the Subbase layer
L1, L2	Top, Pave	Finish grade surface
L3, L4	Pave1	
L5, L6	Pave2	

Point, Link, or Shape	Code	Description
L7, L8	Base	
L9, L10	SubBase Datum	
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

### Coding Diagram

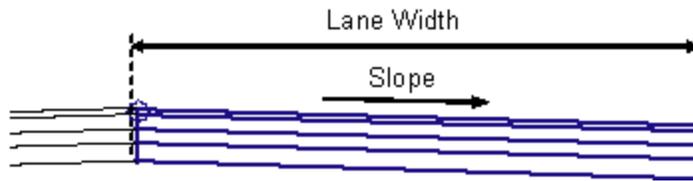


## LaneFromTaperedMedian1

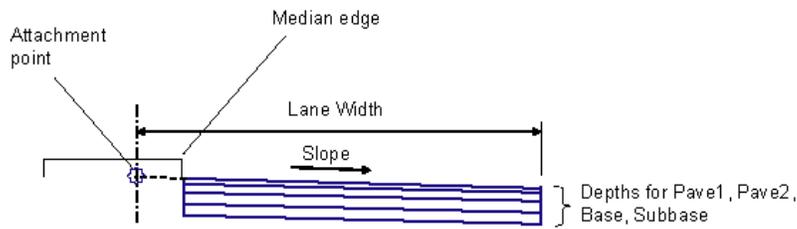
This subassembly inserts one or more travel lanes outward at a constant grade from an alignment that defines the edge of a median that tapers to allow for left-turn lanes.

The alignment defining the edge of the median may at times be either not present (Case 1), outside the roadway centerline (Case 2), or inside of the centerline (Case 3). To use this subassembly you should have separate alignments defining the left and right edges of the median. It may be necessary to define separate corridor model regions for each individual median.

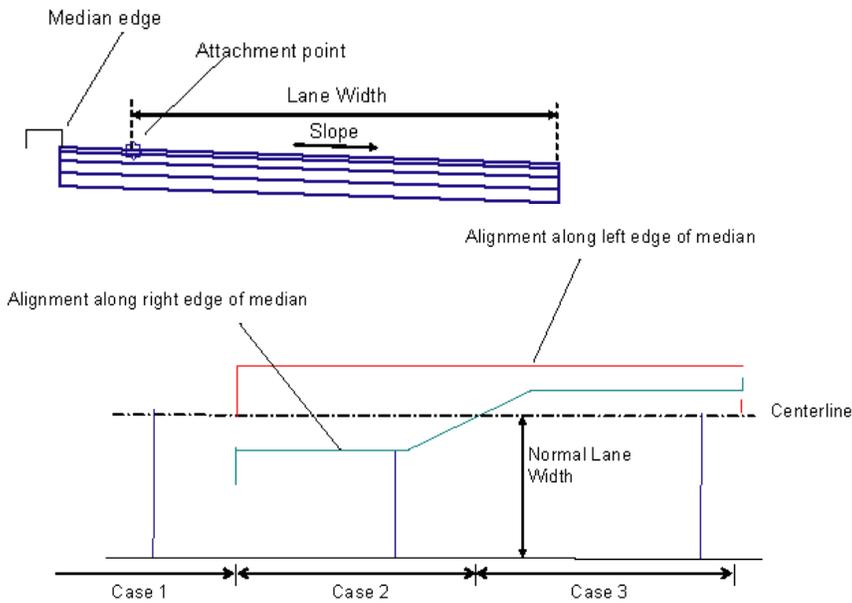
Case 1: No median



Case 2: Median edge outside of attachment point; beginning of lane extended outward



Case 3: Median edge inside of attachment point; beginning of lane extended inward



### Attachment

The attachment point is at the location where the inside edge-of-traveled-way would be if there was no median. This is typically at the assembly baseline, but may be at any marker point on the assembly.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Lane Width	Width of the lane for the condition where there is no median; that is, from the attachment point to the outside edge-of-traveled-way.	Numeric	3.6 m 12.0 ft
Use Superelevation Slope	Specifies to use the superelevation slope for the lane. Choices are No, Outside Lane Slope, and Inside Lane Slope.	String	Outside Lane Slope
Default Slope	Specifies default slope for the lane, if superelevation slope is not specified.	Numeric, positive	- 2.0%
Inside Adjustment	Used if the Median Edge alignment is at a fixed offset from the actual edge-of-traveled-way (for example, at the back of curb). Adjusts the calculated Lane Width to account for the offset (see diagram).	Numeric, positive	0.0

Parameter	Description	Type	Default
Outside Adjustment	Used if the Outside Lane Width alignment is at a fixed offset from the actual edge-of-traveled-way (for example, at the back of curb). Adjusts the calculated Lane Width to account for the offset (see diagram).	Numeric, positive	0.0
Pave1 Depth	Depth between finish grade and Pave1 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Depth between Pave1 and Pave2 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Depth between Pave1 and Base (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Depth of the Subbase layer at the attachment point (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see *Setting Targets* in the *AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Median Edge	May be used to shift the starting offset of the lane to follow an edge-of-median alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Lane Width	May be used to shift the ending offset of the lane to follow an edge-of-lane alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

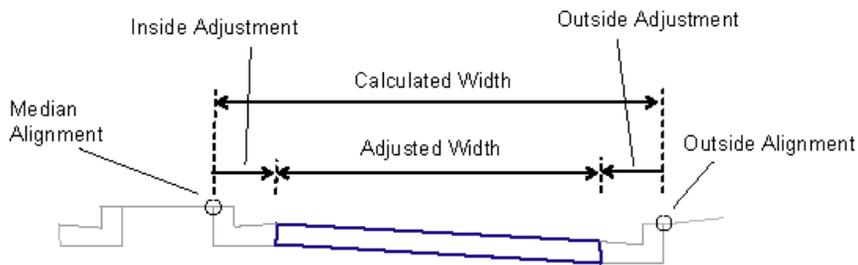
Parameter	Description	Type
Lane Width	Width of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

### Behavior

**Outside Edge-of-Traveled-Way:** The width to the outside edge-of-traveled-way can be defined by a fixed numeric width, or an alignment can be used to override the width. The elevation is determined by applying the specified slope for the width of the lane, unless an Outside Elevation profile is given. In that case, the outside edge elevation is tied to the profile, and the slope is adjusted.

The location of the inside edge-of-traveled-way is calculated based on the three cases shown in the preceding diagram. If no Median Edge alignment is given, or the given one is not found at a station, the inside edge is held at the attachment point (Case 1). If a Median Edge alignment is given, and that alignment is outside the lane's attachment point, the inside edge is shifted outward from the attachment point at lane slope (Case 2). If the Median Edge alignment is inside the lane's attachment point, the inside edge is shifted inward from the attachment point at the lane slope (Case 3).

**Inside and Outside Adjustments:** The Inside Adjustment and Outside Adjustment parameters are provided in case the alignment used for the median edge or lane edge is at a fixed offset from the actual edge-of-traveled-way. For example, the alignment being used for the Median Edge may be at the back-of-curb instead of at the pavement edge. In this case the Inside Adjustment parameter should be set to the width of the curb.



### Layout Mode Operation

In layout mode, this subassembly displays the links comprising the lane for the given width and slope. If a superelevation slope is given (LI or LO), the links are displayed at a slope of -2%.

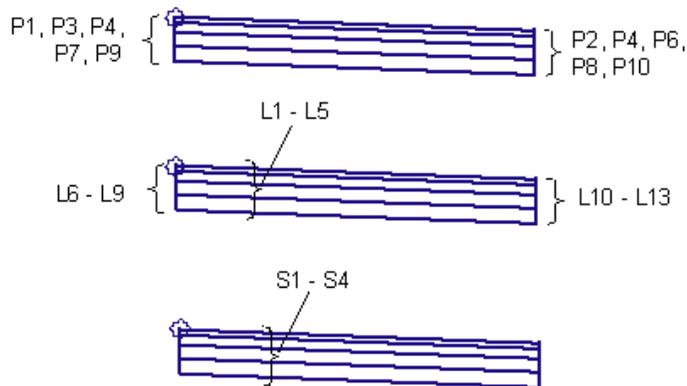
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P2	ETW	Edges of lane on finish grade
P3, P4	ETW_Pave1	Edges of lane on Pave1 layer
P5, P6	ETW_Pave2	Edges of lane on Pave2 layer
P7, P8	ETW_Base	Edges of lane on Base layer
P9, P10	ETW_Sub	Edges of lane on Subbase layer
L1	Top, Pave	Finish grade surface
L2	Pave1	Pave1 surface
L3	Pave2	Pave2 surface
L4	Base	Base surface
L5	SubBase, Datum	Subbase surface
S1	Pave1	Area between finish grade and Pave1

Point, Link, or Shape	Code	Description
S2	Pave2	Area between Pave1 and Pave2
S3	Base	Area between Pave2 and Base
S4	Subbase	Area between Base and Subbase

### Coding Diagram



Points, links, and shapes are numbered from top to bottom.

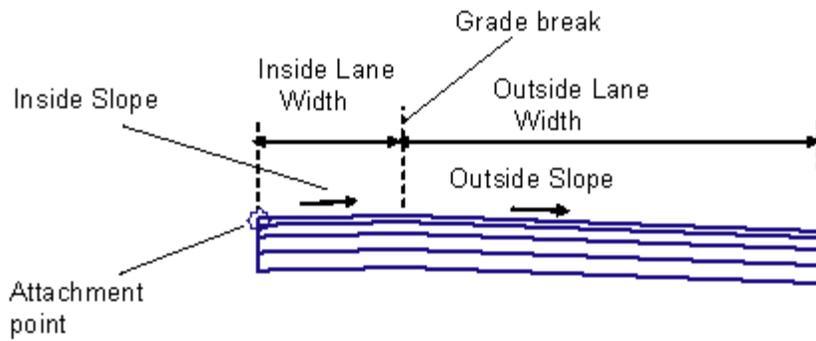
## LaneFromTaperedMedian2

This subassembly inserts one or more travel lanes outward from an alignment that defines the edge of a median.

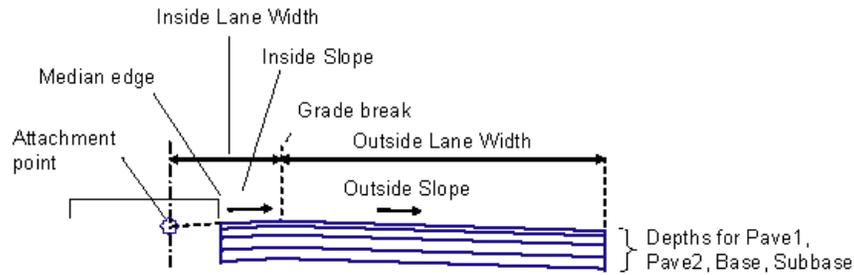
The alignment defining the edge of the median may at times be either not present (Case 1), outside the roadway centerline (Case 2), or inside the centerline (Case 3).

To use this subassembly, you should have separate alignments defining the left and right edges of the median. It may be necessary to define separate corridor model regions for each individual median. This subassembly differs from LaneFromTaperedMedian1 in that it provides for a grade break with different slopes in the travel lanes.

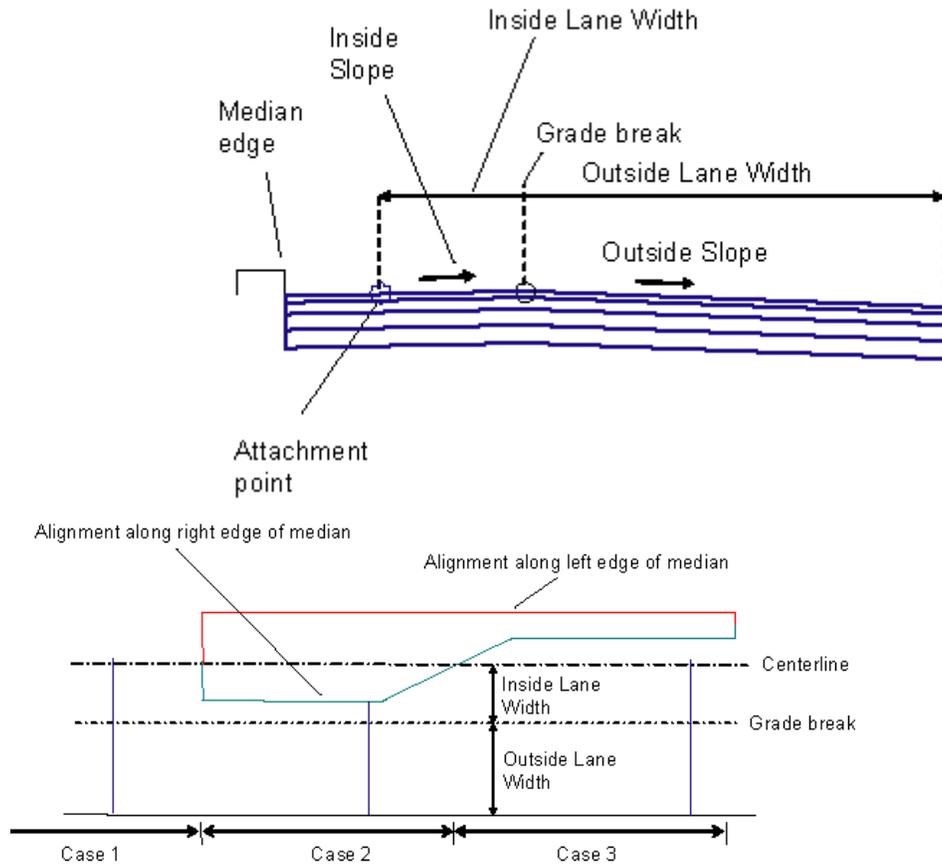
Case 1: No median



Case 2: Median edge outside of attachment point; beginning of lane extended outward.



Case 3: Median edge inside of attachment point; beginning of lane extended inward.



### Attachment

The attachment point is at the location where the inside edge-of-traveled-way would be if there was no median. This is typically at the assembly baseline.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Indicates the outward direction of the lane	Left / Right	Right
Inside Lane Width	Width of the inside lane for the condition where there is no median; that is, from the attachment point to the grade break point.	Numeric	3.6 m 12.0 ft
Inside Lane - Use Superelevation Slope	Specifies to use the superelevation slope for the inside lane. Choices are No, Outside Lane Slope, and Inside Lane Slope.	String	Inside Lane Slope
Default Inside Slope	Specifies default slope for the inside lane. This value is used if superelevation slope is not used, or is not specified for the baseline alignment.	Numeric, positive	2.0%
Outside Lane - Use Superelevation Slope	Specifies to use the superelevation slope for the outside lane. Choices are No, Outside Lane Slope, and Inside Lane Slope.	String	Outside Lane Slope
Default Outside Slope	Specifies default slope for the outside lane, if superelevation slope is not specified.	Numeric, positive	- 2.0%

Parameter	Description	Type	Default
Outside Lane Width	Width from the grade break point to the outside edge-of-traveled-way.	Numeric	3.6 m 12.0 ft
Inside Adjustment	Used if the Median Edge alignment is at a fixed offset from the actual edge-of-traveled-way (for example, at the back of curb). Adjusts the calculated Inside Lane Width to account for the offset (see diagram).	Numeric, positive	0.0
Outside Adjustment	Used if the Outside Lane Width alignment is at a fixed offset from the actual edge-of-traveled-way (for example, at the back of curb). Adjusts the calculated Outside Lane Width to account for the offset (see diagram).	Numeric, positive	0.0
Pave1 Depth	Depth between finish grade and Pave1 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Depth between Pave1 and Pave2 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Depth between Pave1 and Base (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Depth of the Subbase layer at the attachment point (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

Note that if the Inside %Slope value is always the same as Outside %Slope, or if Inside Lane Width is zero, then the simpler LaneFromTaperedMedian1 subassembly can be used instead.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Median Edge	May be used to shift the starting offset of the lane to follow an edge-of-median alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Inside Lane Width	May be used to override the fixed Inside Lane Width and tie the grade break to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Outside Lane Width	May be used to override the fixed Outside Lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Inside Lane Width	Width of the inside lane	Numeric
Inside Lane %Slope	% slope of the inside lane	Numeric
Outside Lane Width	Width of the outside lane	Numeric
Outside Lane %Slope	% slope of the outside lane	Numeric

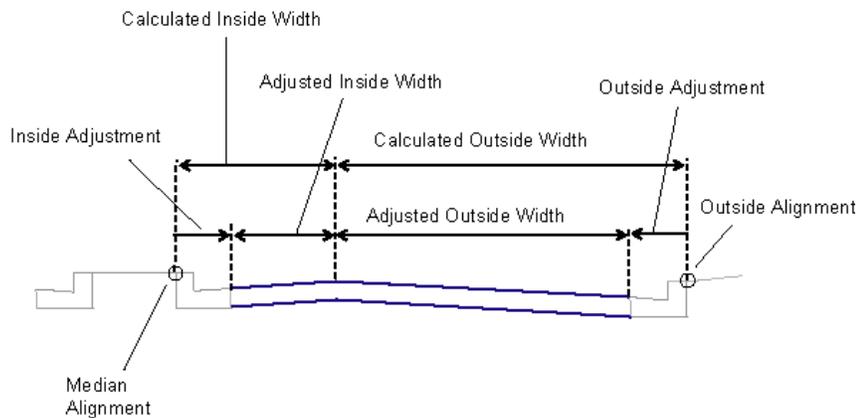
## Behavior

**Grade Break:** The width from the attachment point outwards to the grade break between the inside and outside lanes can be defined by a fixed numeric width, or an alignment can be used to override the width. The elevation at the grade break is determined by applying the specified slope for the inside lane across the width of the lane.

**Outside Edge-of-Traveled-Way:** The width to the outside edge-of-traveled-way can be defined by a fixed numeric width, or an alignment can be used to override the width. The elevation is determined by applying the specified slope for the width of the lane, unless an Outside Elevation profile is given. In that case, the outside edge elevation is tied to the profile, and the slope is adjusted.

**Inside Edge-of-Traveled-Way:** The location of the inside edge-of-traveled-way is calculated based on the three cases shown in the previous diagram. If a Median Edge alignment is given, and that alignment is outside of the lane's attachment point, the inside edge is shifted outward from the attachment point at the lane slope (Case 2). If the Median Edge alignment is inside of the lane's attachment point, the inside edge is shifted inward from the attachment point at the inside lane slope (Case 3). If no Median Edge alignment is given, or the given one is not found at a station, the inside edge is held at the attachment point (Case 1).

**Inside and Outside Adjustments:** The Inside Adjustment and Outside Adjustment parameters are provided in case the alignments used for the inside or outside edges are at a fixed offset from the actual edge-of-traveled-way. For example, the alignment being used for the Median Edge may be at the back-of-curb instead of at the pavement edge. In this case, the Inside Adjustment parameter should be set to the width of the curb.



### Layout Mode Operation

In layout mode, this subassembly displays the links comprising the lanes for the given widths and slopes. If a superelevation slope is given (LI or LO), the links are displayed at a slope of -2%.

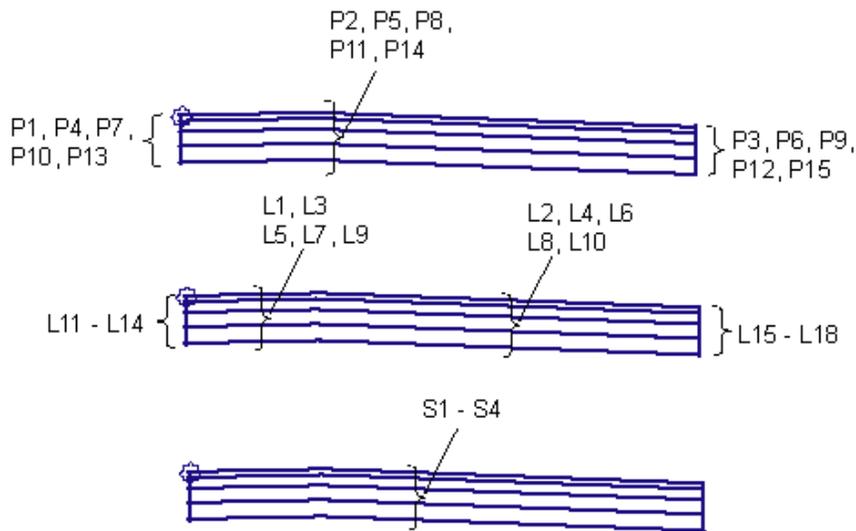
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P3	ETW	Edges of lane on finish grade
P4, P6	ETW_Pave1	Edges of lane on Pave1 layer
P7, P9	ETW_Pave2	Edges of lane on Pave2 layer
P10, P12	ETW_Base	Edges of lane on Base layer
P13, P15	ETW_Sub	Edges of lane on Subbase layer
P2	Crown	Crown (grade break) on finish grade
P5	Crown_Pave1	Crown (grade break) on Pave1
P8	Crown_Pave2	Crown (grade break) on Pave2
P11	Crown_Base	Crown (grade break) on Base
P14	Crown_Subbase	Crown (grade break) on Subbase
L1, L2	Top, Pave	Finish grade surface
L3, L4	Pave1	Pave1 surface
L5, L6	Pave2	Pave2 surface
L7, L8	Base	Base surface
L9, L10	SubBase, Datum	Subbase surface
S1	Pave1	Area between finish grade and Pave1

Point, Link, or Shape	Code	Description
S2	Pave2	Area between Pave1 and Pave2
S3	Base	Area between Pave2 and Base
S4	Subbase	Area between Base and Subbase

### Coding Diagram

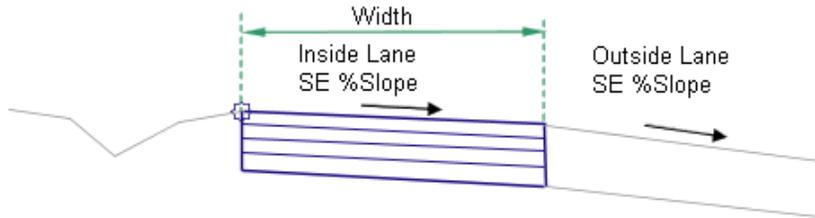


Points, links, and shapes are numbered from top to bottom.

## LaneInsideSuper

This subassembly creates a cross-sectional representation of finish grade, base layer, and subbase layer for a travel lane, applying the Inside Lane superelevation slope value for the corridor model's baseline alignment.

It is used for the inside lanes on divided, broken-back highways. The pavement structure follows the standards described in "Pavement Structure on Paved Sections" in the AutoCAD Civil 3D Help.



### Attachment

The attachment point is at the inside edge of lane on the finish grade surface. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Crown Point on Inside	Specifies that inside edge of travelway to be coded as Crown	Yes / No	No
Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Default %Slope	Default % Slope of the lane to be used when the superelevation slope of the alignment is not defined	Numeric	-2.0
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft

Parameter	Description	Type	Default
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Thickness of the Base layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Thickness of the Subbase layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see *Setting Targets* in the *AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Width	May be used to override the fixed lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Lane Width	Width of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

### Behavior

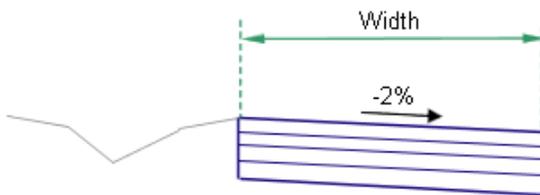
The Inside Lane superelevation slope is obtained from the superelevation specifications for the baseline alignment. Starting at the attachment point, a finish grade surface and parallel subgrade are inserted using the given width,

depth, and the superelevation slope. Vertical links close the shape at either end of the lane.

If an offset horizontal alignment name is assigned to the Width during corridor modeling, the width of the lane will vary to match the offset of the alignment.

### Layout Mode Operation

In layout mode, this subassembly displays the lane links using the given width and depths at a slope of -2%.



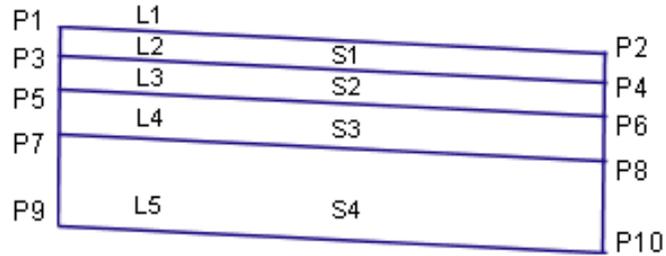
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	ETW	Edge-of-traveled-way on finish grade
P1	Crown	Crown point on finish grade (optional)
P2	Lane	Outside edge of lane on finish grade
P3	ETW_Pave1	Edge-of-traveled-way on the Pave1 layer
P3	Crown_Pave1	Crown point on the Pave1 layer (optional)
P4	Lane_Pave1	Outside edge of lane on the Pave1 layer
P5	ETW_Pave2	Edge-of-traveled-way on the Pave2 layer
P5	Crown_Pave2	Crown point on the Pave2 layer (optional)
P6	Lane_Pave2	Outside edge of lane on the Pave2 layer

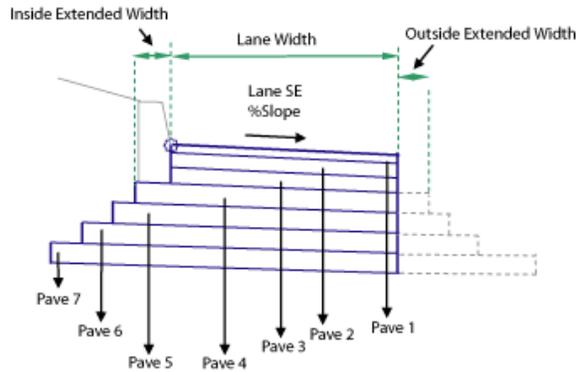
<b>Point, Link, or Shape</b>	<b>Code</b>	<b>Description</b>
P7	ETW_Base	Edge-of-traveled-way edge of lane on the Base layer
P7	Crown_Base	Crown point on base layer (optional)
P8	Lane_Base	Outside edge of lane on the Base layer
P9	ETW_Sub	Edge-of-traveled-way edge of lane on the subbase layer
P9	Crown_Sub	Crown point on subbase layer (optional)
P10	Lane_Sub	Outside edge of lane on the Subbase layer
L1	Top, Pave	Finish grade surface
L2	Pave1	
L3	Pave2	
L4	Base	Base surface
L5	SubBase Datum	Subbase surface
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

### Coding Diagram



## LaneInsideSuperLayerVaryingWidth

This subassembly creates a cross-sectional representation of a lane comprised of multiple layers. The layers can be of varying widths. It also applies the Inside Lane superelevation slope value for the corridor model's baseline alignment.



### Attachment

The attachment point is at the inside edge of lane on the finish grade surface. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Indicates which side the sub-assembly is inserted towards	Left/Right	Right
Crown Point on Inside	Specifies that inside edge of travelway to be coded as Crown	Yes/No	No
Lane Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Default %Slope	Default % Slope of the lane, to be used when the super-elevation slope of the alignment is not defined	Numeric	-2.0
Pave1 Name	Name of the Pave1 layer	String	BC
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Name	Name of the Pave2 layer	String	WMM
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Width Specification	Specifies how the width of Pave2 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave2 Inside Extended Width	Specifies the Pave2 layer inside extension width	Numeric, positive	0

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Pave2 Outside Extended Width	Specifies the Pave2 layer outside extension width	Numeric, positive	0
Pave3 Name	Name of the Pave3 layer	String	WMM
Pave3 Depth	Thickness of the Pave3 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave3 Width Specification	Specifies how the width of Pave3 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave3 Inside Extended Width	Specifies the Pave3 layer inside extension width	Numeric, positive	0
Pave3 Outside Extended Width	Specifies the Pave3 layer outside extension width	Numeric, positive	0
Pave4 Name	Name of the Pave4 layer	String	WMM
Pave4 Depth	Thickness of the Pave4 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave4 Width Specification	Specifies how the width of Pave4 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave4 Inside Extended Width	Specifies the Pave4 layer inside extension width	Numeric, positive	0
Pave4 Outside Extended Width	Specifies the Pave4 layer outside extension width	Numeric, positive	0
Pave5 Name	Name of the Pave5 layer	String	WMM
Pave5 Depth	Thickness of the Pave5 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft

Parameter	Description	Type	Default
Pave5 Width Specification	Specifies how the width of Pave5 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave5 Inside Extended Width	Specifies the Pave5 layer inside extension width	Numeric, positive	0
Pave5 Outside Extended Width	Specifies the Pave5 layer outside extension width	Numeric, positive	0
Pave6 Name	Name of the Pave6 layer	String	SUBBASE
Pave6 Depth	Thickness of the Pave6 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave6 Width Specification	Specifies how the width of Pave6 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave6 Inside Extended Width	Specifies the Pave6 layer inside extension width	Numeric, positive	0
Pave6 Outside Extended Width	Specifies the Pave6 layer outside extension width	Numeric, positive	0
Pave7 Name	Name of the Pave7 layer	String	SUBBASE
Pave7 Depth	Thickness of the Pave7 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave7 Width Specification	Specifies how the width of Pave7 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Pave7 Inside Extended Width	Specifies the Pave7 layer inside extension width	Numeric, positive	0
Pave7 Outside Extended Width	Specifies the Pave7 layer outside extension width	Numeric, positive	0
Pave8 Name	Name of the Pave8 layer	String	
Pave8 Depth	Thickness of the Pave8 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave8 Width Specification	Specifies how the width of Pave8 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave8 Inside Extended Width	Specifies the Pave8 layer inside extension width	Numeric, positive	0
Pave8 Outside Extended Width	Specifies the Pave8 layer outside extension width	Numeric, positive	0
Pave9 Name	Name of the Pave9 layer	String	
Pave9 Depth	Thickness of the Pave9 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave9 Width Specification	Specifies how the width of Pave9 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave9 Inside Extended Width	Specifies the Pave9 layer inside extension width	Numeric, positive	0
Pave9 Outside Extended Width	Specifies the Pave9 layer outside extension width	Numeric, positive	0
Pave10 Name	Name of the Pave10 layer	String	

Parameter	Description	Type	Default
Pave10 Depth	Thickness of the Pave10 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave10 Width Specification	Specifies how the width of Pave10 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave10 Inside Extended Width	Specifies the Pave10 layer inside extension width	Numeric, positive	0
Pave10 Outside Extended Width	Specifies the Pave10 layer outside extension width	Numeric, positive	0

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Lane Width	May be used to override the fixed lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

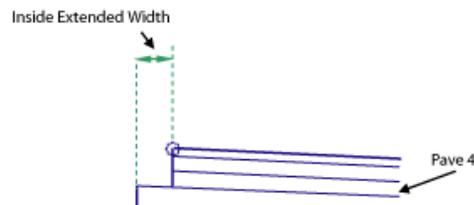
Parameter	Description	Type
Lane Width	Width of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

## Behavior

Each layer has its own separate extension options both on the inside and outside. The inside and outside extensions specify the additional width on the inside or outside relative to the pavement layer immediately above.

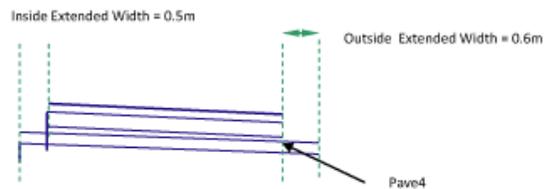
Example 1:

In the following example, the Pave4 Inside Extended Width is 0.5 meters. The Pave4 Outside Extended Width is zero. If this subassembly is inserted on the right side, it is drawn as shown in the following illustration.



Example 2:

In the following example, the Pave4 Inside Extended Width is 0.5 meters. The Pave4 Outside Extended Width is 0.6 meters. If this subassembly is inserted on the right side, it is drawn as shown in the following illustration.



The extension widths will always be specified as positive widths.

The pavements layer widths may be specified using the following methods:

- by specifying that the pavement width be the same as the pavement immediately above
- by specifying a pavement width
- by specifying an inside and outside pavement layer extended width so that pavement layer width will be the distance between the inside and outside offsets

- by specifying an inside pavement layer extended width and pavement width so that the outside pavement layer is automatically calculated

Breakover removal is required if there is a change in slope of pavement while applying superelevation.

### Layout Mode Operation

In layout mode, this subassembly displays the links defined by the input parameters.

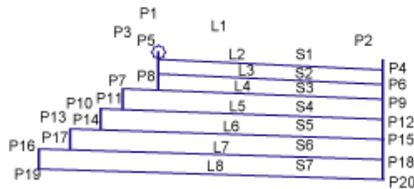
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P1	ETW	Edge-of-traveled-way on finish grade
P1	Crown	Crown point on finish grade (optional)
P2	Lane	Outside edge of lane on finish grade
P3	ETW_Pave1	Edge-of-traveled-way on the Pave1 layer
P3	Crown_Pave1	Crown point on the Pave1 layer (optional)
P4	Lane_Pave1	Outside edge of lane on the Pave1 layer
P5	ETW_Pave2	Edge-of-traveled-way on the Pave2 layer
P5	Crown_Pave2	Crown point on Pave2 layer (optional)
P6	Lane_Pave2	Outside edge of lane on the Pave2 layer
P7	ETW_Pave3	Edge-of-traveled-way on the Pave3 layer
P7	Crown_Base	Crown point on Pave3 layer (optional)
P8	Lane_Base	Outside edge of lane on the Base layer
P9	ETW_Sub	Edge-of-traveled-way edge of lane on the Subbase layer

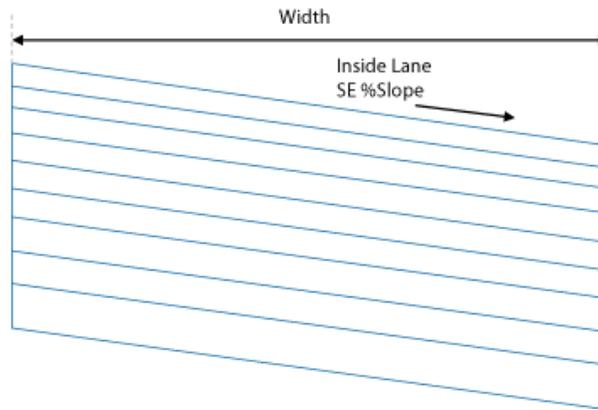
Point/Link	Codes	Description
P9	Crown_Sub	Crown point on subbase layer (optional)
P10	Lane_Sub	Outside edge of lane on the Subbase layer
L1	Top, Pave	Finish grade surface
L2	Pave1	
L3	Pave2	
L4	Base	Base surface
L5	SubBase	Subbase surface
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

### Coding Diagram



## LaneInsideSuperMultiLayer

This subassembly is similar to the LaneInsideSuper subassembly. However, there are additional layers within this subassembly, and the bottom layer does not follow the same slope as the finished grade. Instead it is controlled by an inside height and outside height.



### Attachment

The attachment point is at the inside edge of lane on the finish grade surface. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Crown Point on Inside	Specifies that inside edge of travelway to be coded as Crown	Yes / No	No
Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Default %Slope	Default % Slope of the lane to be used when the superelevation slope of the alignment is not defined	Numeric	-2.0
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft

Parameter	Description	Type	Default
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave 3 Depth	Thickness of the Pave3 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base1 Depth	Thickness of the Base1 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base2 Depth	Thickness of the Base2 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base3 Depth	Thickness of the Base3 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase1 Depth	Thickness of the Subbase1 layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase2 Depth	Thickness of the Subbase2 layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase3 Inner Depth	Thickness of the Subbase3 layer at the attachment point (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase3 Outer Depth	Thickness of the Subbase3 layer at the edge of travelway (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Type	Status
Width	May be used to override the fixed lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for spe-	Optional

Parameter	Type	Status
	cifying this: alignments, polylines, feature lines, or survey figures.	
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Lane Width	Width of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

### Behavior

This subassembly is inserted on the side of the attachment point specified. All links follow the slope specified for the top link L1, with the exception of L10. Link L10 is determined by the Subbase3 Inner Depth and Subbase3 Outer Depth. The Pave1 and Pave2 layers in this subassembly support optional extension of the layer widths. All other behavior of this subassembly is the same as that of the existing LaneInsideSuper subassembly.

### Layout Mode Operation

In layout mode, this subassembly displays the links defined by the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

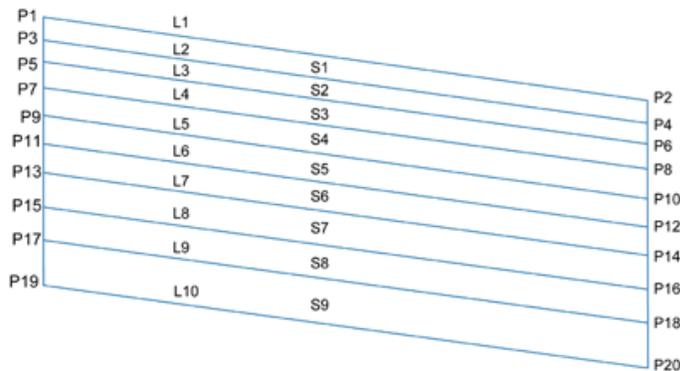
Point, Link, or Shape	Codes	Description
P1	ETW	Edge-of-traveled-way on finish grade
P1	Crown	Crown point on finish grade (optional)

<b>Point, Link, or Shape</b>	<b>Codes</b>	<b>Description</b>
P2	Lane	Outside edge of lane on finish grade
P3	ETW_Pave1	Edge-of-traveled-way on the Pave1 layer
P3	Crown_Pave1	Crown point on the Pave1 layer (optional)
P4	Lane_Pave1	Outside edge of lane on the Pave1 layer
P5	ETW_Pave2	Edge-of-traveled-way on the Pave2 layer
P5	Crown_Pave2	Crown point on the Pave2 layer (optional)
P6	Lane_Pave2	Outside edge of lane on the Pave2 layer
P7	Crown_Pave3	Crown point on the Pave3 layer (optional)
P8	Lane_Pave3	Outside edge of lane on the Pave3 layer
P9	ETW_Base1	Edge-of-traveled-way edge of lane on the Base1 layer
P9	Crown_Base1	Crown point on base1 layer (optional)
P10	Lane_Base1	Outside edge of lane on the Base1 layer
P11	ETW_Base2	Edge-of-traveled-way edge of lane on the Base2 layer
P11	Crown_Base2	Crown point on base2 layer (optional)
P12	Lane_Base2	Outside edge of lane on the Base2 layer
P13	ETW_Base3	Edge-of-traveled-way edge of lane on the Base3 layer
P13	Crown_Base3	Crown point on base3 layer (optional)
P14	Lane_Base3	Outside edge of lane on the Base3 layer
P15	ETW_Sub1	Edge-of-traveled-way edge of lane on the subbase1 layer
P15	Crown_Sub1	Crown point on subbase1 layer (optional)

<b>Point, Link, or Shape</b>	<b>Codes</b>	<b>Description</b>
P16	Lane_Sub1	Outside edge of lane on the Subbase1 layer
P17	ETW_Sub2	Edge-of-traveled-way edge of lane on the subbase2 layer
P17	Crown_Sub2	Crown point on subbase2 layer (optional)
P18	Lane_Sub2	Outside edge of lane on the Subbase2 layer
P19	ETW_Sub3	Edge-of-traveled-way edge of lane on the subbase3 layer
P19	Crown_Sub3	Crown point on subbase3 layer (optional)
P20	Lane_Sub3	Outside edge of lane on the Subbase3 layer
L1	Top, Pave	Finish grade surface
L2	Pave1	
L3	Pave2	
L4	Pave3	
L5	Base1	
L6	Base2	
L7	Base3	
L8	Subbase1	
L9	Subbase2	
L10	SubBase3 Datum	Subbase surface
S1	Pave1	
S2	Pave2	
S3	Pave3	

Point, Link, or Shape	Codes	Description
S4	Base1	
S5	Base2	
S6	Base3	
S7	Subbase1	
S8	Subbase2	
S9	Subbase3	

**Coding Diagram**

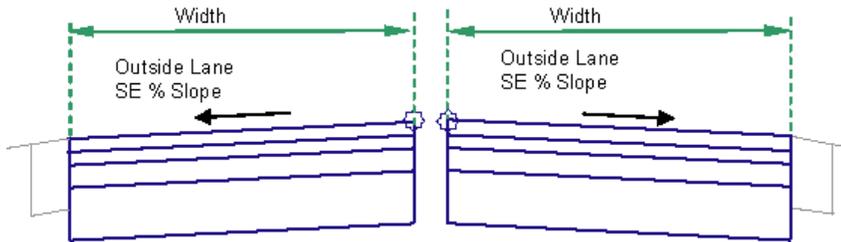


## LaneOutsideSuper

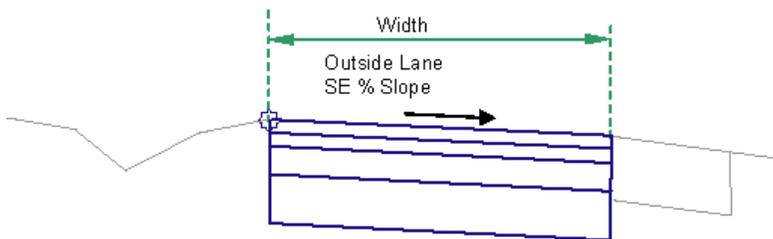
This subassembly creates a cross-sectional representation of a travel lane, applying the Outside Lane superelevation slope value for the corridor model's baseline alignment.

It is used for most undivided roads, or divided roads with no lane slope break on either side. It may also be used for the outside lanes of divided crowned or broken-back highways. The pavement structure follows the standards described in "Pavement Structure on Paved Sections" in the AutoCAD Civil 3D Help.

Crowned, undivided road (left and right insertions shown)



Uncrowned, divided road (only right insertion shown)



### Attachment

The attachment point is either (a) at the inside edge of lane on finished grade, if the insertion point is Crown, or (b) at the outside edge of travel way, if the insertion point is at the edge of travel way. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Insertion Point	Specifies insertion point of the lane either at the crown, or at the edge of travel way	List of options: Crown, Edge of Travel Way	Crown

Parameter	Description	Type	Default
Crown Point on Inside	Specifies that inside edge of travelway be coded as Crown	Yes / No	No
Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Base Depth	Thickness of the base layer (zero to omit)	Numeric, positive	0.100 m 0.333 ft
Default Slope	Default slope of the lane to be used when the superelevation slope for the alignment is not defined	Numeric	-2.0
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer (zero to omit).	Numeric, non-negative	0.025 m 0.083 ft
Subbase Depth	Thickness of the subbase layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Width	May be used to override the fixed lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Lane Width	Width of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

### Behavior

The Outside Lane superelevation slope is obtained from the superelevation specifications for the baseline alignment. Starting at the attachment point, a finish grade surface and parallel subgrade are inserted using the given width, depth, and the superelevation slope. Vertical links close the shape at either end of the lane.

If an offset horizontal alignment name is assigned to the Width during corridor modeling, the width of the lane will vary to match the offset of the alignment.

### Layout Mode Operation

In layout mode, this subassembly displays all lane links using the width and depth input parameters at a -2% slope.

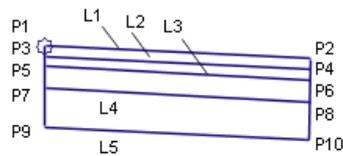
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Crown	Crown point on finish grade (optional)
P2	ETW	Inside edge of lane on finish grade
P3	Crown_Pave1	Crown point on the Pave1 layer (optional)
P4	ETW_Pave1	Inside edge of lane on Pave.
P5	Crown_Pave2	Crown point on the Pave2 layer (optional)
P6	ETW_Pave2	Inside edge of lane on Pave2
P7	Crown_Base	Crown point on base grade (optional)

Point, Link, or Shape	Code	Description
P8	ETW_Base	Inside edge of lane on Base
P9	Crown_Sub	Crown point on subbase grade (optional)
P10	ETW_Sub	Inside edge of lane on Subbase
L1	Top, Pave	Finish grade surface
L2	Pave1	Pave1 surface
L3	Pave2	Pave2 surface
L4	Base	Base surface
L5	Subbase Datum	Subbase surface
S1	Pave1	Area between finish grade and Pave1
S2	Pave2	Area between Pave1 and Pave2
S3	Base	Area between Pave2 and Base
S4	Subbase	Area between Base and Subbase

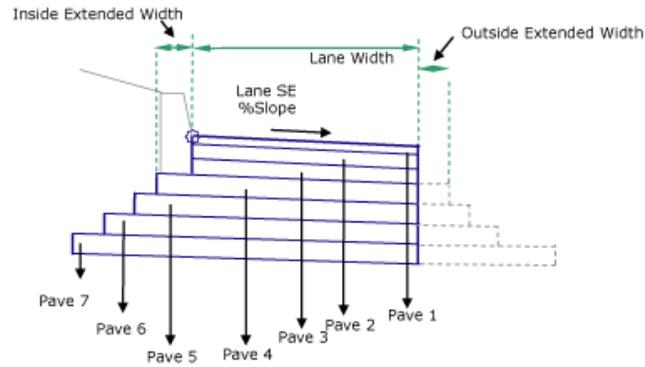
### Coding Diagram



## LaneOutsideSuperLayerVaryingWidth

This subassembly creates a cross-sectional representation of a lane comprised of multiple layers. The layers can be of varying widths. It also applies the

Inside Lane superelevation slope value for the corridor model's baseline alignment.



### Attachment

The attachment point is at the inside edge of lane on the finish grade surface. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Indicates which side the subassembly is inserted towards	Left/Right	Right
Crown Point on Inside	Specifies that inside edge of travelway to be coded as Crown	Yes/No	No
Lane Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Default %Slope	Default % Slope of the lane, to be used when the	Numeric	-2.0

Parameter	Description	Type	Default
	superelevation slope of the alignment is not defined		
Pave1 Name	Name of the Pave1 layer	String	BC
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Name	Name of the Pave2 layer	String	WMM
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Width Specification	Specifies how the width of Pave2 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave2 Inside Extended Width	Specifies the Pave2 layer inside extension width	Numeric, positive	0
Pave2 Outside Extended Width	Specifies the Pave2 layer outside extension width	Numeric, positive	0
Pave3 Name	Name of the Pave3 layer	String	WMM
Pave3 Depth	Thickness of the Pave3 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave3 Width Specification	Specifies how the width of Pave3 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave3 Inside Extended Width	Specifies the Pave3 layer inside extension width	Numeric, positive	0

Parameter	Description	Type	Default
Pave3 Outside Extended Width	Specifies the Pave3 layer outside extension width	Numeric, positive	0
Pave4 Name	Name of the Pave4 layer	String	WMM
Pave4 Depth	Thickness of the Pave4 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave4 Width Specification	Specifies how the width of Pave4 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave4 Inside Extended Width	Specifies the Pave4 layer inside extension width	Numeric, positive	0
Pave4 Outside Extended Width	Specifies the Pave4 layer outside extension width	Numeric, positive	0
Pave5 Name	Name of the Pave5 layer	String	WMM
Pave5 Depth	Thickness of the Pave5 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave5 Width Specification	Specifies how the width of Pave5 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave5 Inside Extended Width	Specifies the Pave5 layer inside extension width	Numeric, positive	0
Pave5 Outside Extended Width	Specifies the Pave5 layer outside extension width	Numeric, positive	0

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Pave6 Name	Name of the Pave6 layer	String	SUBBASE
Pave6 Depth	Thickness of the Pave6 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave6 Width Specification	Specifies how the width of Pave6 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave6 Inside Extended Width	Specifies the Pave6 layer inside extension width	Numeric, positive	0
Pave6 Outside Extended Width	Specifies the Pave6 layer outside extension width	Numeric, positive	0
Pave7 Name	Name of the Pave7 layer	String	Subbase
Pave7 Depth	Thickness of the Pave7 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave7 Width Specification	Specifies how the width of Pave7 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave7 Inside Extended Width	Specifies the Pave7 layer inside extension width	Numeric, positive	0
Pave7 Outside Extended Width	Specifies the Pave7 layer outside extension width	Numeric, positive	0
Pave8 Name	Name of the Pave8 layer	String	

Parameter	Description	Type	Default
Pave8 Depth	Thickness of the Pave8 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave8 Width Specification	Specifies how the width of Pave8 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave8 Inside Extended Width	Specifies the Pave8 layer inside extension width	Numeric, positive	0
Pave8 Outside Extended Width	Specifies the Pave8 layer outside extension width	Numeric, positive	0
Pave9 Name	Name of the Pave9 layer	String	
Pave9 Depth	Thickness of the Pave9 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave9 Width Specification	Specifies how the width of Pave9 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave9 Inside Extended Width	Specifies the Pave9 layer inside extension width	Numeric, positive	0
Pave9 Outside Extended Width	Specifies the Pave9 layer outside extension width	Numeric, positive	0
Pave10 Name	Name of the Pave10 layer	String	
Pave10 Depth	Thickness of the Pave10 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft

Parameter	Description	Type	Default
Pave10 Width Specification	Specifies how the width of Pave10 layer will be specified	String, combo list of options: Match Higher Pavement Layer, Width, Inside Offset-Outside Offset, Inside Offset-Width	Match Higher Pavement Layer
Pave10 Inside Extended Width	Specifies the Pave10 layer inside extension width	Numeric, positive	0
Pave10 Outside Extended Width	Specifies the Pave10 layer outside extension width	Numeric, positive	0

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see [Setting Targets](#) in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Lane Width	May be used to override the fixed lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Lane Width	Width of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

## Behavior

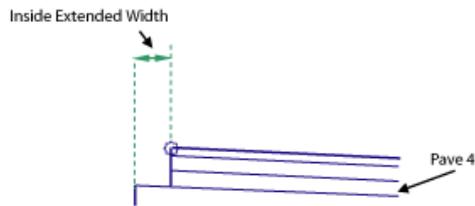
Each layer has its own separate extension options both on the inside and outside. The inside and outside extensions specify the additional width on the inside or outside relative to the pavement layer immediately above.

Example 1:

Pave4 Inside Extended Width = 0.5m

Pave4 Outside Extended Width = 0m

If inserted on the right side,

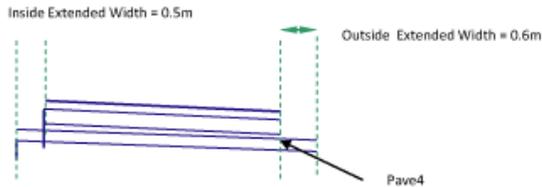


Example 2:

Pave4 Inside Extended Width = 0.5m

Pave4 Outside Extended Width = 0.6m

If inserted on the right side,



The extension widths will always be specified as positive widths.

The pavements layer widths may be specified using the following methods:

- By specifying that the pavement width will be the same as the pavement immediately above.
- By specifying a pavement width.

By specifying an inside and outside pavement layer extended width so that pavement layer width will be the distance between the inside and outside offsets.

By specifying an inside pavement layer extended width and pavement width so that the outside pavement layer is automatically calculated.

Breakover removal is required if there is a change in slope of pavement while applying superelevation.

### Layout Mode Operation

In layout mode, this subassembly displays the links defined by the input parameters.

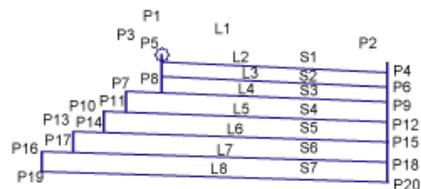
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P1	ETW	Edge-of-traveled-way on finish grade
P1	Crown	Crown point on finish grade (optional)
P2	Lane	Outside edge of lane on finish grade
P3	ETW_Pave1	Edge-of-traveled-way on the Pave1 layer
P3	Crown_Pave1	Crown point on the Pave1 layer (optional)
P4	Lane_Pave1	Outside edge of lane on the Pave1 layer
P5	ETW_Pave2	Edge-of-traveled-way on the Pave2 layer
P5	Crown_Pave2	Crown point on Pave2 layer (optional)
P6	Lane_Pave2	Outside edge of lane on the Pave2 layer
P7	ETW_Pave3	Edge-of-traveled-way on the Pave3 layer
P7	Crown_Base	Crown point on Pave3 layer (optional)
P8	Lane_Base	Outside edge of lane on the Base layer

Point/Link	Codes	Description
P9	ETW_Sub	Edge-of-traveled-way edge of lane on the Subbase layer
P9	Crown_Sub	Crown point on subbase layer (optional)
P10	Lane_Sub	Outside edge of lane on the Subbase layer
L1	Top, Pave	Finish grade surface
L2	Pave1	
L3	Pave2	
L4	Base	Base surface
L5	SubBase	Subbase surface
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

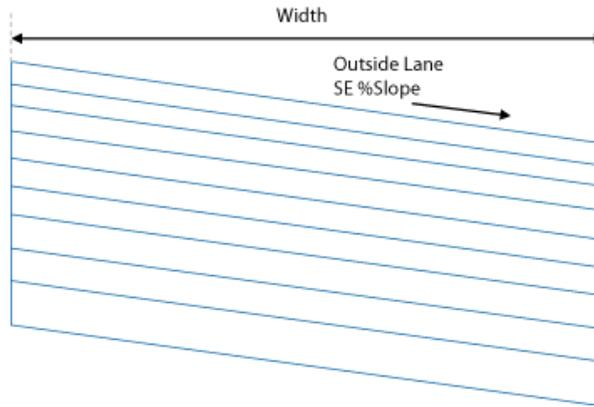
### Coding Diagram



## LaneOutsideSuperMultiLayer

This subassembly is similar to the LaneOutsideSuper subassembly. However, there are additional layers within this subassembly, and the bottom layer does

not follow the same slope as the finished grade. Instead it is controlled by an inside height and outside height.



### Attachment

The attachment point is either (a) at the inside edge of lane on finished grade, if the insertion point is Crown, or (b) at the outside edge of travel way, if the insertion point is at the edge of travel way. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a "%" sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Insertion Point	Specifies insertion point of the lane either at the crown, or at the edge of travel way	List of options: Crown, Edge of Travel Way	Crown
Crown Point on Inside	Specifies that inside edge of travelway be coded as Crown	Yes / No	No
Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft

Parameter	Description	Type	Default
Default %Slope	Default % Slope of the lane to be used when the superelevation slope of the alignment is not defined	Numeric	-2.0
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave 3 Depth	Thickness of the Pave3 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base1 Depth	Thickness of the Base1 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base2 Depth	Thickness of the Base2 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base3 Depth	Thickness of the Base3 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase1 Depth	Thickness of the Subbase1 layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase2 Depth	Thickness of the Subbase2 layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase3 Inner Depth	Thickness of the Subbase3 layer at the attachment point (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase3 Outer Depth	Thickness of the Subbase3 layer at the edge of travelway (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Type	Status
Width	May be used to override the fixed lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

#### Output Parameters

Parameter	Description	Type
Lane Width	Width of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

#### Behavior

This subassembly is inserted on the side of the attachment point specified. All links follow the slope specified for the top link L1, with the exception of L10. Link L10 is determined by the Subbase3 Inner Depth and Subbase3 Outer Depth. The Pave1 and Pave2 layers in this subassembly support optional extension of the layer widths. All other behavior of this subassembly is the same as that of the existing LaneOutsideSuper subassembly.

#### Layout Mode Operation

In layout mode, this subassembly will display all links using the input parameters for display.

### Point, Link, and Shape Codes

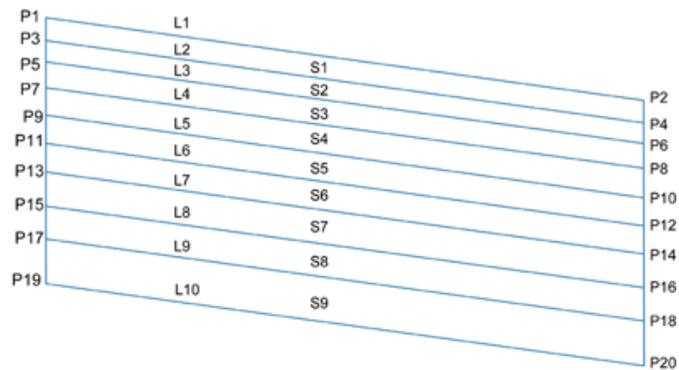
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	ETW	Edge-of-traveled-way on finish grade
P1	Crown	Crown point on finish grade (optional)
P2	Lane	Outside edge of lane on finish grade
P3	ETW_Pave1	Edge-of-traveled-way on the Pave1 layer
P3	Crown_Pave1	Crown point on the Pave1 layer (optional)
P4	Lane_Pave1	Outside edge of lane on the Pave1 layer
P5	ETW_Pave2	Edge-of-traveled-way on the Pave2 layer
P5	Crown_Pave2	Crown point on the Pave2 layer (optional)
P6	Lane_Pave2	Outside edge of lane on the Pave2 layer
P7	Crown_Pave3	Crown point on the Pave3 layer (optional)
P8	Lane_Pave3	Outside edge of lane on the Pave3 layer
P9	ETW_Base1	Edge-of-traveled-way edge of lane on the Base1 layer
P9	Crown_Base1	Crown point on base1 layer (optional)
P10	Lane_Base1	Outside edge of lane on the Base1 layer
P11	ETW_Base2	Edge-of-traveled-way edge of lane on the Base2 layer
P11	Crown_Base2	Crown point on base2 layer (optional)
P12	Lane_Base2	Outside edge of lane on the Base2 layer
P13	ETW_Base3	Edge-of-traveled-way edge of lane on the Base3 layer

<b>Point, Link, or Shape</b>	<b>Codes</b>	<b>Description</b>
P13	Crown_Base3	Crown point on base3 layer (optional)
P14	Lane_Base3	Outside edge of lane on the Base3 layer
P15	ETW_Sub1	Edge-of-traveled-way edge of lane on the subbase1 layer
P15	Crown_Sub1	Crown point on subbase1 layer (optional)
P16	Lane_Sub1	Outside edge of lane on the Subbase1 layer
P17	ETW_Sub2	Edge-of-traveled-way edge of lane on the subbase2 layer
P17	Crown_Sub2	Crown point on subbase2 layer (optional)
P18	Lane_Sub2	Outside edge of lane on the Subbase2 layer
P19	ETW_Sub3	Edge-of-traveled-way edge of lane on the subbase3 layer
P19	Crown_Sub3	Crown point on subbase3 layer (optional)
P20	Lane_Sub3	Outside edge of lane on the Subbase3 layer
L1	Top, Pave	Finish grade surface
L2	Pave1	
L3	Pave2	
L4	Pave3	
L5	Base1	
L6	Base2	
L7	Base3	
L8	Subbase1	
L9	Subbase2	

Point, Link, or Shape	Codes	Description
L10	SubBase3 Datum	Subbase surface
S1	Pave1	
S2	Pave2	
S3	Pave3	
S4	Base1	
S5	Base2	
S6	Base3	
S7	Subbase1	
S8	Subbase2	
S9	Subbase3	

### Coding Diagram

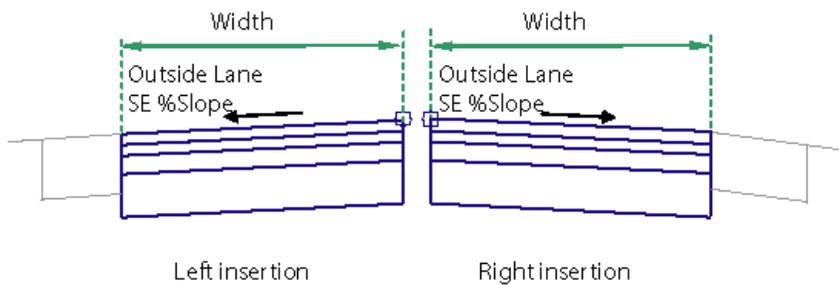


## LaneOutsideSuperWithWidening

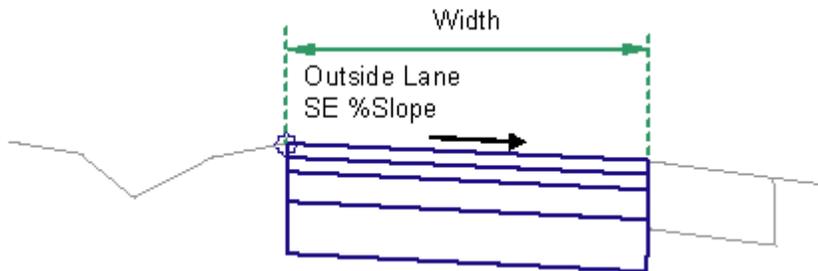
This subassembly inserts a travel lane, applying the Outside Lane superelevation slope value, and widens the pavement at superelevated regions.

It can be used for most undivided roads, or divided roads with no lane slope break on either side. It may also be used for the outside lanes of divided crowned or broken-back highways. The pavement structure follows the standards described in "Pavement Structure on Paved Sections" in the AutoCAD Civil 3D Help. The only difference between this subassembly and the LaneOutsideSuper subassembly is that this subassembly also widens the pavement width in superelevated regions of the corridor.

Crowned, undivided road (Left and Right insertions shown)



Uncrowned, divided road (only right side insertion shown)



### Attachment

The attachment point is (a) at the inside edge of lane on finished grade, if the insertion point is Crown, or (b) at the outside edge of travel way, if the insertion point is at the edge of travel way. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
Insertion Point	Specifies insertion point of the lane either at the crown, or at the edge of travel way	List of options: (a) Crown, (b) Edge of Travel Way	Crown
Crown Point on Inside	Specifies that the inside edge of travelway be coded as Crown	Yes / No	No
Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Default %Slope	Default % slope of the lane to be used when the superelevation slope for the alignment is not defined	Numeric	-2.0
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Thickness of the base layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Thickness of the subbase layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Wheelbase Length	Length of the vehicle wheelbase, including front overhang	Numeric, positive	10 m 33 ft
Number of Travel Lanes	Number of planned travel lanes in this subassembly	Integer, positive	1

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide.

Parameter	Description	Status
Width	May be used to override the fixed lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Lane Width	Width of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

### Behavior

The Outside Lane superelevation slope is obtained from the superelevation specifications for the baseline alignment. Starting at the attachment point, a finish grade surface and parallel subgrade are inserted using the given width, depth, and the superelevation slope. Vertical links close the shape at either end of the lane.

#### Lane Widening

If the current station is within a superelevated region, then the lane width value is calculated as follows:

Width = Default Width + Pavement Widening

where Pavement Widening =

$$n \left( R - \sqrt{R^2 - L^2} \right)$$

n = Number of lanes

R = Radius of the alignment at full superelevation

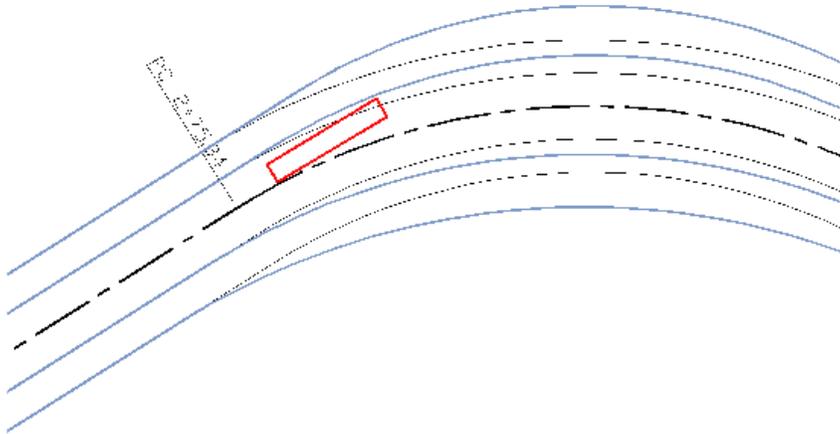
L = Length of wheelbase including the front overhang

The lane should be widened starting from the "End Normal Crown" and by the time "full super" station lane should be "default width + pavement widening". If spirals are used, typically this widening transition length is equal to the length of the spiral.

The key steps in completing this conditional subassembly are:

- 1 Set pavement widening to zero.
- 2 Get the default width from parameters.
- 3 Verify whether a station is in Superelevation zone or not.
- 4 If Yes, then find the radius of curvature at full super station (not current station).
- 5 Compute the pavement widening value from the equation mentioned in the spec (ExtraW).
- 6 Find out the station value of "End Normal Crown" in this region; and similarly find station value of "Full Super"; find the difference as length along alignment to distribute (L).
- 7 Divide ExtraW by L and get that factor RateW.
- 8 For the current station, find the difference between "end normal crown" station and current station (DeltaL).
- 9 Multiply RateW by DeltaL to get DeltaW for the current station.
- 10 Add the DeltaW to the default Width provided in the subassembly properties.
- 11 Hence, the new width at the current station is = Width+DeltaW.

The DeltaW is the only parameter (note that it is not an input parameter) that is shown in the following diagram.



The preceding diagram is not accurate, but indicative. The black line represents centerline and the blue lines on left and right denotes edges of different lanes on right and left sides (after design). The light (gray) colored lines in the diagram indicate original right and left edges. The deviation of the designed edges is due to the provision of extra widening.

If an offset horizontal alignment name is assigned to the Width during corridor modeling, the width of the lane will vary to match the offset of the alignment.

### Layout Mode Operation

In layout mode, this subassembly displays all lane links using the width and depth input parameters at a -2% slope.

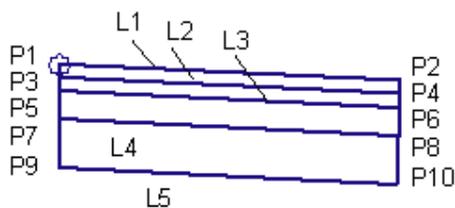
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P2	ETW	Inside edge of lane on finish grade
P4	ETW_Pave1	Inside edge of lane on Pave1.
P6	ETW_Pave2	Inside edge of lane on Pave2
P8	ETW_Base	Inside edge of lane on Base

Point, Link, or Shape	Code	Description
P10	ETW_Sub	Inside edge of lane on Subbase
L1	Top, Pave	Finish grade surface
L2	Pave1	Pave1 surface
L3	Pave2	Pave2 surface
L4	Base	Base surface
L5	Subbase	Subbase surface
S1	Pave1	Area between finish grade and Pave1
S2	Pave2	Area between Pave1 and Pave2
S3	Base	Area between Pave2 and Base
S4	Subbase	Area between Base and Subbase

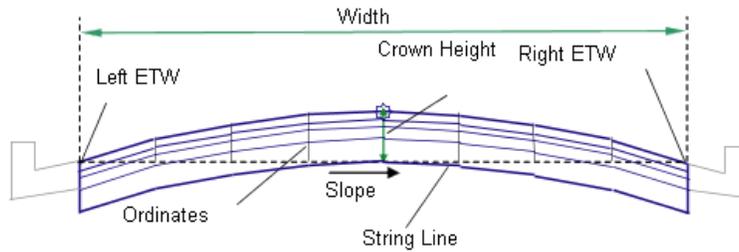
### Coding Diagram



## LaneParabolic

This subassembly creates a cross-sectional representation of finish grade, pavement, and subbase for urban, parabolic lanes between the left and right edges of traveled way.

The parabolic shape is simulated by a series of short, straight-line links. No superelevation is applied to the travel lanes. The pavement structure follows the standards described in "Pavement Structure on Paved Sections" in the AutoCAD Civil 3D Help.



### Attachment

The attachment point is at the crown of road on the finish grade surface. This component is symmetrical about the attachment point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Crown Height	Height from the center point of the string line to the crown of road	Numeric, positive	0.10 m 0.3333 ft.
Width	Width of the roadway from the left edge-of-traveled-way to the right edge-of-traveled-way	Numeric, positive	7.2 m 24.0 ft
Pave1 Depth	Depth between the finish grade and the Pave1 surface (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Depth between the Pave1 and Pave2 surfaces (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Depth between the Pave2 and Base surfaces (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Depth between the Base and Subbase surfaces (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

Parameter	Description	Type	Default
%Slope	% slope of the string line from the left ETW to the right ETW	Numeric	0 (%)
No. Increments	Number of straight line increments simulating the parabolic shape	Numeric, positive, even	8

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The center of the string line is calculated by subtracting the Crown Height from the attachment point, and the left and right edges-of-traveled-way are calculated by applying the Width and Slope symmetrically about the attachment point. The ordinates of the parabolic curve are calculated at even intervals along the string line, and straight line links are added to connect the ordinate points. Parallel surfaces are inserted for the Pave1, Pave2, Base, and Subbase surfaces from the given depths.

### Layout Mode Operation

In layout mode, this subassembly displays the lane links calculated from the given input parameters.

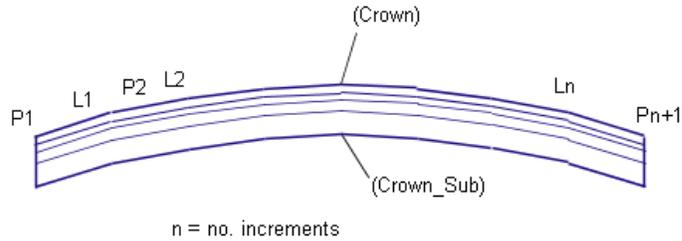
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
	ETW	Outside edges of lane on finish grade

<b>Point, Link, or Shape</b>	<b>Code</b>	<b>Description</b>
	ETW_Pave1	Outside edges of lane on the Base surface
	ETW_Pave2	Outside edges of lane on subbase
	Crown	Crown point on finish grade
	Crown_Pave1	Crown point on Pave1
	Crown_Pave2	Crown point on Pave2
	Crown_Base	Crown point on Base
	Crown_Sub	Crown point on subbase
	Top Pave	Finish grade
	Pave1	Pave1 surface
	Pave2	Pave2 surface
	Base	Base surface
	SubBase Datum	Subbase surface
S1	Pave1	Area between finish grade and Pave1
S2	Pave2	Area between Pave1 and Pave2
S3	Base	Area between Pave2 and Base
S4	Subbase	Area between Base and Subbase

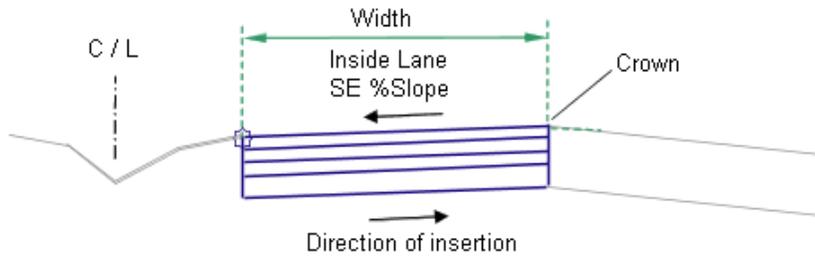
### Coding Diagram



## LaneTowardCrown

This subassembly creates a cross-sectional representation of a travel lane that is being inserted from the inside edge of pavement towards the crown point.

It uses the Outside Lane superelevation slope value for the corridor model's baseline alignment. The pavement structure follows the standards described in "Pavement Structure on Paved Sections" in the AutoCAD Civil 3D Help.



### Attachment

The attachment point is at the inside edge of lane on the finish grade surface. This component can be attached to either the left or right side.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left / Right	Right
Crown Point on In-side	Specifies that the inside edge of travelway be coded as Crown	Yes / No	Yes
Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.6 m 12.0 ft
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Thickness of the Base layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Thickness of the Subbase layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Width	May be used to override the fixed lane Width value and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying the width: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Crown Elevation	May be used to override the normal lane slope and tie the outer edge of the travel lane to the elevation of a profile. The following object types can be used as targets for specifying the elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Lane Width	Width slope of the lane	Numeric
Lane %Slope	% slope of the lane	Numeric

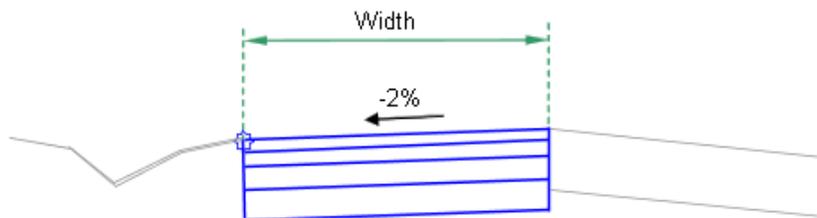
### Behavior

The Inside Lane superelevation slope is obtained from the superelevation specifications for the baseline alignment, and the algebraic sign of this value is reversed. If inserting to the left, the Right Outside Lane Slope is obtained and reversed; if inserting to the right, the Left Outside Lane Slope is obtained and reversed. Starting at the attachment point, a finish grade surface and parallel subgrade are inserted using the given width, depth, and the reverse superelevation slope. Vertical links close the shape at either end of the lane.

If an offset horizontal alignment name is assigned to the Width during corridor modeling, the width of the lane will vary to match the offset of the alignment.

### Layout Mode Operation

In layout mode, this subassembly displays the finish, base, and subbase links for the given width and depths at a -2% slope.



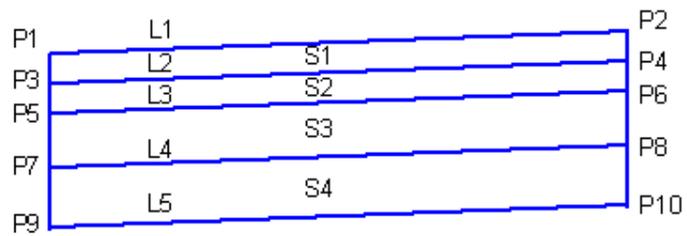
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	ETW	Inside edge of lane on finish grade
P2	Crown	Outside edge of lane (at the crown point) on finish grade
P3	ETW_Pave1	Inside edge of lane on Pave1
P4	Crown_Pave1	Outside edge of lane on Pave1
P5	ETW_Pave2	Inside edge of lane on Pave2
P6	Crown_Pave2	Outside edge of lane on Pave2
P7	ETW_Base	Inside edge of lane on the base layer
P8	Crown_Base	Outside edge of lane on the base layer
P9	ETW_Sub	Inside edge of lane on the subbase layer
P10	Crown_Sub	Outside edge of lane on the subbase layer
L1	Top, Pave	Finish grade surface
L2	Pave1	
L3	Pave2	
L4	Base	
L5	Subbase Datum	
S1	Pave1	
S2	Pave2	

Point, Link, or Shape	Code	Description
S3	Base	
S4	Subbase	

### Coding Diagram





# Subassembly Reference (continued)

# 2

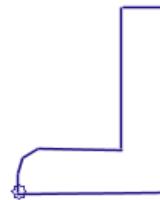
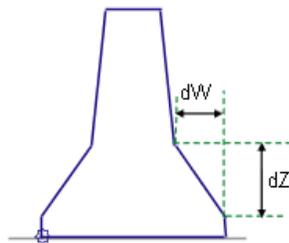
The subassemblies in this subassembly reference are organized alphabetically into the following sections:

- [Subassembly Reference - Introduction through LaneTowardCrown](#) (page 1)
- Subassembly Reference (continued)- LinkMulti through OverlayWidenWithSuper1 (this section)
- [Subassembly Reference \(continued\) - RailSingle through UrbanSidewalk](#) (page 407)

## LinkMulti

This subassembly is a general purpose subassembly to add a series of connected links.

This is typically used to add structural shapes that are not pre-defined as subassemblies. Up to 12 links may be specified. If a shape requires more than 12 links, the LinkMulti subassembly can be used multiple times.



## Attachment

The attachment point is at the beginning of the first link. The subassembly is sensitive to the direction being inserted. Positive widths increase the offset from the attachment point in the direction inserted.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left / Right	Right
No. of Links	The number of links used to draw the shape	Numeric, positive integer	0
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Point Codes	A list of point codes to be assigned for each vertex in this subassembly	Comma-separated string	MultiLink_Point
Shape Codes	A list of point codes to be assigned for the shapes formed, if any, by this subassembly	Comma-separated string	MultiLink
dW1	+/- width of the first link. Positive widths are in the direction of insertion.	Numeric	0
dZ1	+/- vertical deflection of the first link	Numeric	0
dW2	+/- width of the 2nd link	Numeric	0
dZ2	+/- vertical deflection of the 2nd link	Numeric	0
... (links 3 – 11)	...	Numeric	0

Parameter	Description	Type	Default
dW12	+/- width of the 12th link	Numeric	0
dZ12	+/- vertical deflection of the 12th link	Numeric	0

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Target Parameters: None.

### Output Parameters

None.

### Behavior

Up to 12 links are inserted in sequence at the given widths and vertical deflections. Shapes are not automatically closed; a closing link must be included.

### Layout Mode Operation

In layout mode, this subassembly displays the links defined by the input parameters.

### Point, Link, and Shape Codes

Point and link codes are as specified in the Input Parameters list.

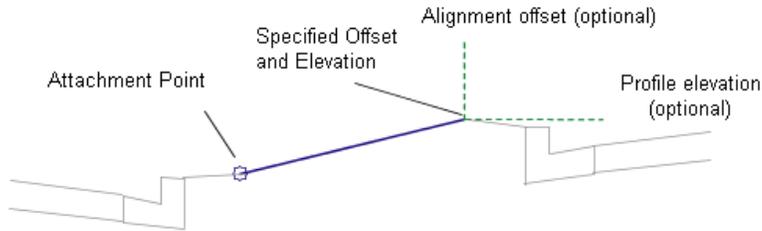
### Coding Diagram

Points are numbered sequentially from the beginning of the first link from 1 up to 13. Links are numbered sequentially from 1 up to 12.

## LinkOffsetAndElevation

This subassembly is a general purpose utility to connect a link from the attachment point to a specified offset and elevation.

An alignment can be substituted for the offset, and a profile for the elevation.



### Attachment

The attachment point is at the beginning of the link. The direction of the link is determined by the location of the given offset and elevation relative to the attachment point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Offsetfrom Baseline	+/- offset of the end of the link. Specifying a positive value for the this parameter inserts this subassembly on the right side of a corridor, or controlling baseline. A negative value inserts it on the left side. For more information, see "Inserting Subassemblies on Right and Left Sides of a Corridor" in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.	Numeric	3.0 m 10.0 ft
Elevation	Elevation at the end of the link	Numeric	0.0
Point Codes	A list of surface codes to be assigned to the outside edge of the link	Comma-separated string	P2
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link	Yes\No	No

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Offset	May be used to override the fixed Offset and tie the end-of-link to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Elevation	May be used to override the fixed Elevation and tie the end-of-link to a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

### Behavior

A link is added from the attachment point to the given offset and elevation.

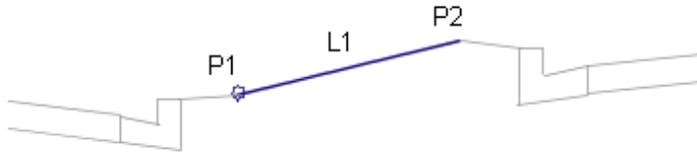
### Layout Mode Operation

In layout mode, this subassembly displays a horizontal link using the given Offset input parameters as the width.

### Point, Link, and Shape Codes

None.

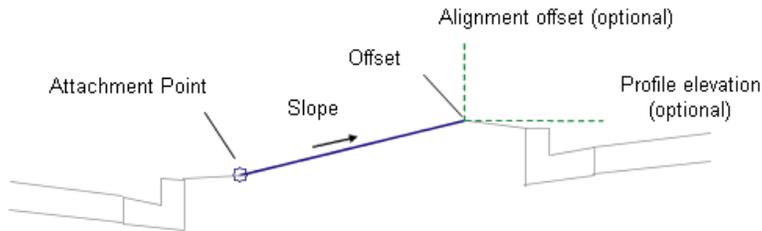
### Coding Diagram



## LinkOffsetAndSlope

This subassembly is a general purpose utility to connect a link from the attachment point to a specified offset at a given slope.

An alignment can be substituted for the offset, and a profile for the slope.



### Attachment

The attachment point is at the beginning of the link. The direction of the link is determined by the location of the given offset and slope.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Offset from Baseline	+/- offset of the end of the link. Specifying a positive value for the this parameter inserts this subassembly on the right side of a corridor, or controlling baseline. A negative value inserts it on the left side. For more information, see	Numeric	10.0 m 33.0 ft

Parameter	Description	Type	Default
	"Inserting Subassemblies on Right and Left Sides of a Corridor" in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.		
Slope	% slope of the link. Negative slopes go downward in the direction inserted.	Numeric, Grade\Slope	2 (%), (or 2:1)
Point Codes	A list of surface codes to be assigned to the outside edge of the link	Comma-separated string	P2
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link.	Yes\No	No
Use Superelevation	Specifies to use superelevation slope for the shoulder	Selection List: a) Outside Shoulder Slope, b) Inside Shoulder Slope, c)Outside Lane, d)Inside Lane, e) None	None

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Offset	May be used to override the fixed Offset and tie the end-of-link to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Slope	May be used to override the fixed Slope and tie the end-of-link to a profile. The following object types can	Optional

Parameter	Description	Status
	be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	

### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

### Behavior

A link is added from the attachment point to the given offset at the given slope.

This subassembly includes an optional input parameter named Use Superelevation Slope that lets you specify to use the superelevation slope for the shoulder. This parameter can be set to a) Outside shoulder slope, b) Inside shoulder slope, c) Outside Lane, d) Inside Lane, or e) None. None is the default setting.

If the input offset value is a negative number and superelevation slope is specified (Use Superelevation Slope parameter not set to None), the values from the left side lane or shoulder will be used. If a positive offset is specified, the values from the right side superelevation will be used.

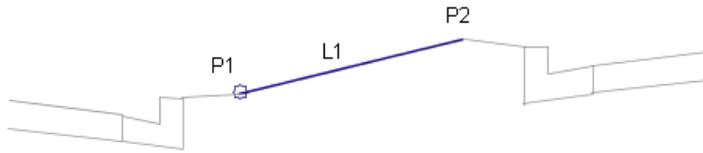
### Layout Mode Operation

In layout mode, this subassembly displays the link calculated from the given offset and slope parameters.

### Point, Link, and Shape Codes

None.

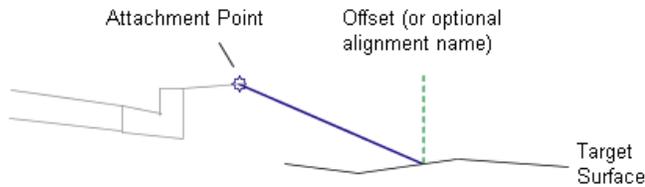
### Coding Diagram



## LinkOffsetOnSurface

This subassembly is a general purpose utility to extend a link from the attachment point to a given offset on a target surface.

An alignment can be used when building a corridor model to calculate the offset.



### Attachment

The attachment point is at the beginning of the link.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Offset from Baseline	+/- offset to tie the link into the target surface. Specifying a positive value for this parameter inserts this subassembly on the right side of a corridor, or controlling baseline. A negative value inserts it on the left side. For more information, see "Inserting Subassemblies"	Numeric	0.0

Parameter	Description	Type	Default
	on Right and Left Sides of a Corridor" in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.		
Point Codes	A list of surface codes to be assigned to the outside edge of the link	Comma-separated string	P2
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link.	Yes\No	No

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Offset	May be used to override the fixed Offset and tie the end-of-link to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Target Surface	Name of the surface the link is tying to. The following object types can be used as targets for specifying this surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric

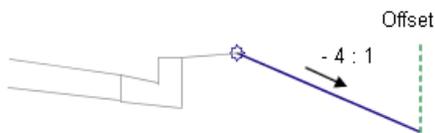
Parameter	Description	Type
End Elevation	Elevation of the end of the link	Numeric

### Behavior

A link is extended to the point on the target surface at the given offset.

### Layout Mode Operation

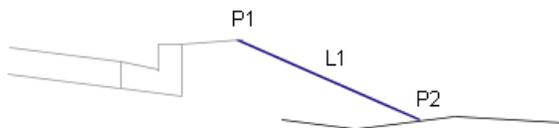
In layout mode, this subassembly displays the link drawn to the given offset at a -4 : 1 slope. The link terminates with an arrowhead pointing outwards.



### Point, Link, and Shape Codes

None.

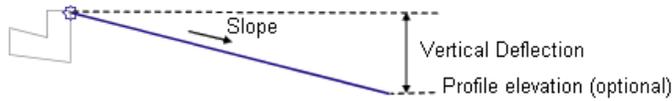
### Coding Diagram



## LinkSlopeAndVerticalDeflection

This subassembly is a general purpose utility to extend a link at a slope for a vertical deflection distance.

A profile can be given for the vertical deflection when building a corridor model.



### Attachment

The attachment point is at the inside edge of the link. This subassembly can be inserted in the left or right direction from the attachment point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left/Right	Right
Slope	% or ratio slope of the link.	Numeric, positive, nonzero	2 (%), (or 2:1)
Vertical Deflection	+/- Vertical deflection between the beginning and end of the link	Numeric, non-zero	3.0 m 10.0 ft
Point Codes	A list of surface codes to be assigned to the outside edge of the link	Comma-separated string	P2
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link.	Yes\No	No
Use Superelevation	Specifies to use superelevation slope for the shoulder	Selection List: a) Outside Shoulder Slope, b) Inside Shoulder Slope, c) Outside Lane, d) Inside Lane, e) None	None

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	
Vertical Deflection	May be used to override the fixed Vertical Deflection and tie the end-of-link to a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

### Behavior

A link is added from the attachment point in the direction of insertion for the given slope until it reaches the given elevation. If a profile name is specified at runtime, the vertical deflection is adjusted to match the profile elevation.

This subassembly includes an optional input parameter named Use Superelevation Slope that lets you specify to use the superelevation slope for the shoulder. This parameter can be set to a) Outside shoulder slope, b) Inside shoulder slope, c) Outside Lane, d) Inside Lane, or e) None. None is the default setting.

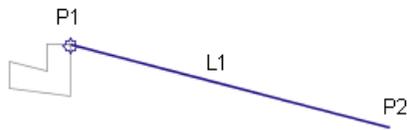
### Layout Mode Operation

In layout mode, this subassembly displays the link at the given slope and vertical deflection.

### Point, Link, and Shape Codes

None.

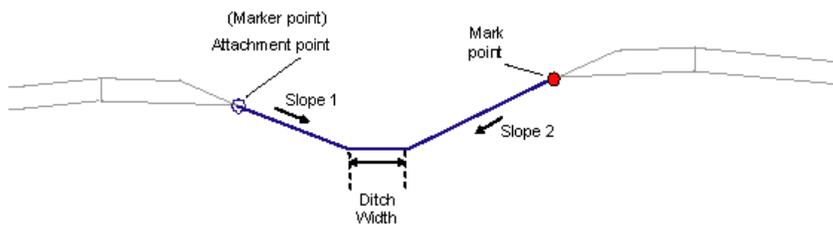
### Coding Diagram



## LinkSlopesBetweenPoints

This subassembly is used to insert intersecting links between two points.

It is typically used to place intersecting slopes to a V-ditch between the edges of two adjacent or merging roadways. A flat-bottomed ditch can also be specified.



### Attachment

The attachment point is at the outside edge of either the left or right intersecting slope, and the previously defined marked point must be on the opposite outside edge. It does not matter which point is left or right of the other. When prompted for marker point, choose attachment point. Be sure to name the marked point and set the marked point name in this subassembly.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Marked Point Name	Name of the previously defined marked point	String	None

Parameter	Description	Type	Default
Slope 1	Slope (x : 1) of the link extending inward from the attachment point. Negative slope values are downward.	Numeric	-4 ( : 1)
Slope 2	Slope (x : 1) of the link extending inward from the marked point	Numeric	-4 ( : 1)
Ditch Width	Width of the bottom of the median ditch (zero for a V-ditch)	Numeric, positive	0.6 m 2 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The locations of the attachment point and marked point are determined. The marked point may be either to the right or left of the attachment point. Links are extended inward at Slope 1 from the attachment point, and Slope 2 from the marked point, until they intersect. If a non-zero ditch width is given, a horizontal bottom-of-ditch link is fit into the intersecting side slopes.

### Layout Mode Operation

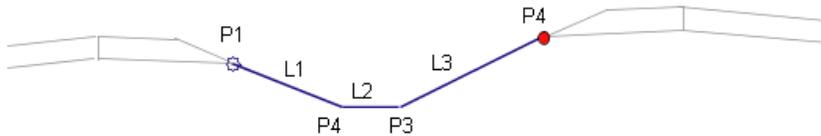
In layout mode, this subassembly calculates and displays the intersecting links and optional ditch bottom based on the input parameters given and the relative locations of the attachment and marked points.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P2	Ditch_In Ditch	For non-zero ditch width, the edge of ditch closest to the attachment point. If the ditch width is zero, use Ditch.
P3	RMedDitch	For non-zero ditch width, the edge of ditch closest to the marked point
L1 – L3	Top Datum	Finish grade on unpaved shoulder and median links

### Coding Diagram



## LinkSlopeToElevation

This subassembly is a general purpose utility to extend a link at a given slope until it reaches a defined elevation or profile.



### Attachment

The attachment point is at the inside edge of the link. This subassembly can be inserted in the left or right direction from the attachment point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the sub-assembly	Left/Right	Right
Slope	% or ratio slope of the link. Negative slopes go downward in the direction inserted.	Numeric, positive	2 (%), (or 2:1)
Target Elevation	Elevation value to extend the link to at the given slope	Numeric	0.0
Point Codes	A list of surface codes to be assigned to the outside edge of the link	Comma-separated string	P2
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link.	Yes\No	No
Use Superelevation	Specifies to use superelevation slope for the shoulder	Selection List: a) Outside Shoulder Slope, b) Inside Shoulder Slope, c) Outside Lane, d) Inside Lane, e) None	None

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Target Elevation	May be used to override the fixed Target Elevation and tie the end-of-link to a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

#### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

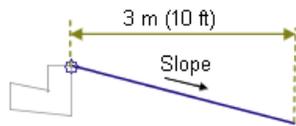
#### Behavior

A link is added from the attachment point in the direction of insertion for the given slope until it reaches the target elevation or profile. The slope value is applied upward if the target elevation is above the attachment point, otherwise a negative slope is used.

This subassembly includes an optional input parameter named Use Superelevation Slope that lets you specify to use the superelevation slope for the shoulder. This parameter can be set to a) Outside shoulder slope, b) Inside shoulder slope, c) Outside Lane, d) Inside Lane, or e) None. None is the default setting.

#### Layout Mode Operation

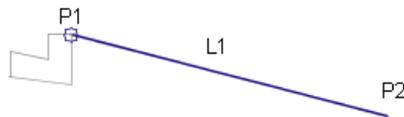
In layout mode, this subassembly displays the link at the given slope for a horizontal distance of 3 meters or 10 feet.



**Point, Link, and Shape Codes**

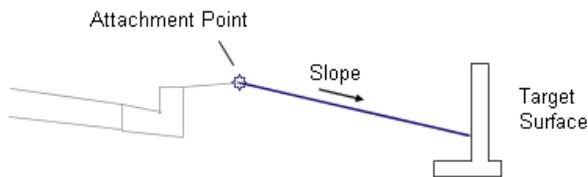
None.

**Coding Diagram**



## LinkSlopeToSurface

This subassembly is a general purpose utility to extend a link from the attachment point at a given slope to the closest intersection with a target surface.



**Attachment**

The attachment point is at the beginning of the link.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left/Right	Right
Use Superelevation	Specifies to use superelevation slope for the shoulder	Selection List: a) Outside Shoulder Slope, b) Inside Shoulder Slope, c) Outside Lane Slope, d) Inside Lane Slope, e) None	None
Slope	% slope of the link	Numeric	2 (%), (or 2:1)
Add Link In	Specifies to add link in cut, fill, or cut and fill conditions	Selection List: a) Cut and Fill, b) Cut Only, c) Fill Only	Cut and Fill
Point Codes	A list of surface codes to be assigned to the outside edge of the link	Comma-separated string	P2
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link	Yes/No	No

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Target Surface	Name of the surface the link is tying to. The following object types can be used as targets for specifying this surface: surfaces.	Required

#### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

#### Behavior

A link is extended to the left or right from the attachment point at the given slope until it intersects the target surface.

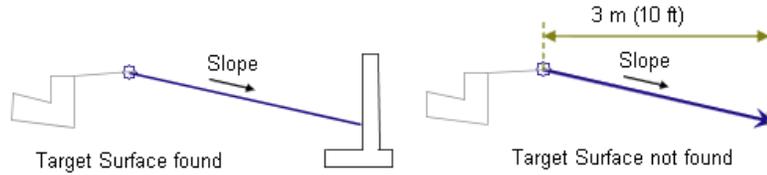
By default, a cut or fill link will be added from the attachment point to the target surface. If the link needs to be added only in cut or fill conditions, specify appropriately a value for the Add Link In property of the subassembly. If the cut link and fill links must be at different slopes, then add this subassembly twice, at the same attachment point, once for Cut Only and then again for Fill Only conditions, with slopes as needed.

This subassembly includes an optional input parameter named Use Superelevation Slope that lets you specify to use the superelevation slope for the shoulder. This parameter can be set to a) Outside shoulder slope, b) Inside shoulder slope, c) Outside Lane Slope, d) Inside Lane Slope, or e) None. None is the default setting.

#### Layout Mode Operation

In layout mode, this subassembly attempts to find the intersection of the link, if the target surface was inserted by a previous subassembly. If an intersection is found, the link is displayed at the given slope to the surface. If not, the link

is displayed at the given slope outward for a horizontal distance of 3 meters or 10 feet, terminating in an arrowhead pointing outward.



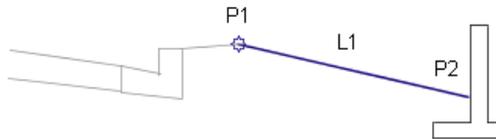
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
L1	Daylight_Cut	If the link is added in cut condition.
L1	Daylight_Fill	If the link is added in fill condition.

**NOTE** You can add other codes for points and links as needed using the input parameters listed for this subassembly.

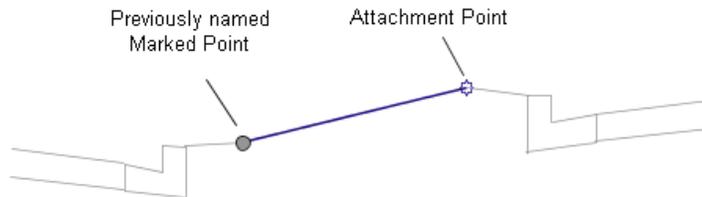
### Coding Diagram



## LinkToLaneMarker

This subassembly is a general purpose utility to mark a point on a lane subassembly from the attachment point to a specified width and slope.

You can assign a percentage of the lane width of the lane subassembly to locate the point. To specify the percentage, on the assembly properties Construction tab, for Parameter Reference, select Get Value From.



### Attachment

The attachment point is at the beginning of the link. The direction is determined by the Inside/Outside input parameter.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Lane Width	Width of the lane on which the lane marker is to be located	Numeric, positive	1.8 m 6.0 ft
Lane Marker Location	Specifies at what percent of the lane width to locate the lane marker	Percent, unitless	50%
Slope	Slope of the link in percent. Negative slopes travel downward from the current baseline.	Numeric	-2 (%; or 2:1)
Insertion Side	Specifies whether the link and point are located away from baseline or towards baseline from attachment point	Inside/Outside	Inside
Point Codes	A list of codes to be assigned to the outside edge of the link	Comma-separated string	Lane_Center
Link Codes	A list of codes to be assigned to the link	Comma-separated string	NONE

Parameter	Description	Type	Default
Omit Link	If False, adds the link, the start point, and the end point. If True, adds the end point only.	True/False	True

### Target Parameters

None.

### Output Parameters

Parameter	Description	Type
Link Width	Distance between the insertion point and the lane marker location	Numeric
Link Slope	Slope of the link (negative if the slope travels downward from the baseline outwards)	Numeric
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

### Behavior

A link is added from the attachment point to the specified width and slope, on the specified side. The width of the link is determined by multiplying the Lane Width parameter by the Lane Marker Location parameter. At the other end of the link, a point is added with the specified code.

You can specify the slope of the link as either a negative or positive value. Typically, the slope travels in the same direction as the lane slope. A typical lane slope is specified as -2% (a negative value), which indicates that the pavement travels downwards from the centerline.

For example, you can add a subassembly from the outside edge of the travel way towards the baseline to mark the midpoint of a lane subassembly, as shown in the image below. In this case: the Insertion Side value is Inside; the Lane Width value is the typical lane width, which is specified using Get Value From as the Parameter Reference value on the assembly properties Construction

tab; the Lane Slope value is the typical lane slope, also specified using the Parameter Reference setting; and Lane Marker Location is 50%.

The lane slope parameter from the previous subassembly is returned as -2% (assuming that is the slope of the lane subassembly). Since the LinkToLaneMarker subassembly is inserted inside, this slope value is multiplied by -1 (that is, the sign value is changed), which means the subassembly travels upwards from the insertion point at the outside edge of the pavement.

If you want to mark a point on the lane relative to the inside edge of the travel way or to the Crown Point of a previous lane subassembly, then set the LinkToLaneMarker subassembly Insertion Side value to Outside. Again, the Lane Width and Lane Slope values are assigned using Get Value From as the Parameter Reference value, the Lane Marker Location is 50%, and the lane slope parameter from the previous subassembly is returned as -2% (assuming that is the slope of the lane subassembly). Since the LinkToLaneMarker subassembly is inserted outside, the slope value is used as is and the subassembly travels downwards from the insertion point at the inside edge of the pavement.

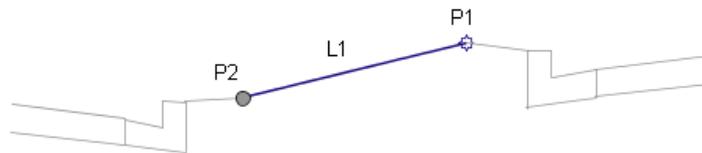
### Layout Mode Operation

In layout mode, the subassembly displays the link calculated using the Lane Width, Lane Marker Location, and Slope parameters. If the subassembly is added to an assembly and the values are assigned using the Get Value From option, then the link and the point are calculated based on the assigned lane subassembly.

### Point, Link, and Shape Codes

None.

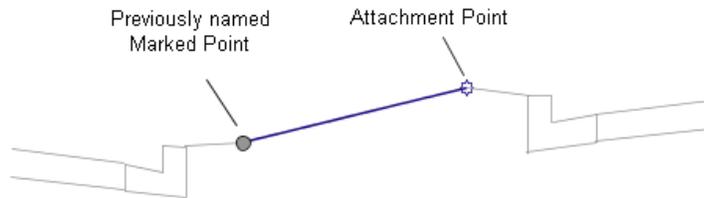
### Coding Diagram



## LinkToMarkedPoint

This subassembly is a general purpose utility to connect a link from the attachment point to a previously named marked point.

It can be used in a variety of situations, including connecting between adjacent roadways where the relative offsets and elevations vary, or across a gore area between converging roadways. Use the MarkPoint subassembly if the connecting point has not already been named.



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**NOTE** In order for the LinkToMarkedPoint subassembly to work (draw) properly, it must be located below the MarkedPoint subassembly on the Construction tab of the Assembly properties. If the LinkToMarkedPoint subassembly is not located below the MarkedPoint subassembly on the Construction tab, you should select the Subassembly Group name in the Construction tab, then right-click and choose Move Up, so that the MarkedPoint subassembly is located above the LinkToMarkedPoint subassembly in the list.

---

### Attachment

The attachment point is at the beginning of the link. The link may go in any direction. The direction is determined by the location of the marked point relative to the attachment point. Be sure to name the marked point and set the marked point name in this subassembly.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Marked Point Name	Name of the marked point to connect to	String	None

Parameter	Description	Type	Default
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link.	Yes\No	No

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Target Parameters: None.

### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

### Behavior

A link is added from the attachment point to the given marked point.

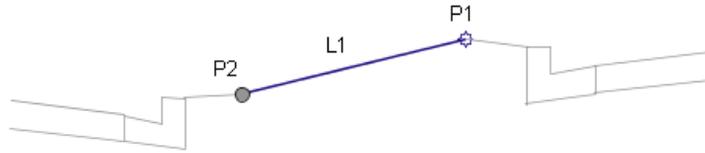
### Layout Mode Operation

In layout mode, this subassembly displays the link between the attachment point and the marked point.

### Point, Link, and Shape Codes

None.

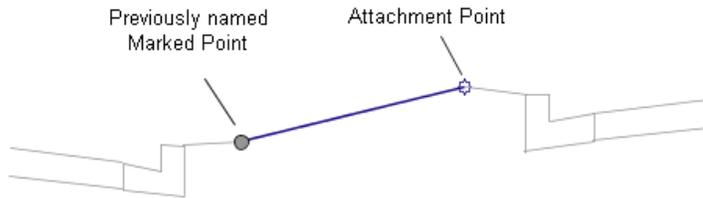
### Coding Diagram



## LinkToMarkedPoint2

This subassembly is a general purpose utility that is similar to the LinkToMarkedPoint subassembly, and connects a link from the attachment point to a previously named marked point.

It can be used in a variety of situations, including connecting between adjacent roadways, where the relative offsets and elevations vary, or across a gore area between converging roadways. Use the MarkPoint subassembly if the connecting point has not already been named.



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**NOTE** The primary difference between the LinkToMarkedPoint2 subassembly and the LinkToMarked point subassembly is in its application, when the marked point is on a different assembly baseline comparing to the link. Particularly if the two baselines in are not parallel, then the subassembly's application will not be in the same plane, making the length of the link to marked point longer than it should be.

---

### Attachment

The attachment point is at the beginning of the link. The link may go in any direction. The direction is determined by the location of the marked point relative to the attachment point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Marked Point Name	Name of the marked point to connect to	String	None
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link. False to add the link, the start point, and the end point. True to add the end point only.	True\False	No

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see [Setting Targets in the AutoCAD Civil 3D User’s Guide Help](#).

Target Parameters: None.

### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

### Behavior

The following diagram illustrates how the LinkToMarkedPoint2 subassembly functions, as well as how it displays in a cross-section for the offset baseline portion of the corridor.

The LinkToMarkedPoint2 subassembly should do either of the following, both of which have the same result:

- Project point #7 onto line beta, resulting in point #6. Then compute the distance from #4 to #6. This would be the marked point distance.
- Project point #4 orthogonally from line beta onto line alpha, resulting in point #5. Then compute the distance from #5 to #7, and multiple by cosine (angle gamma). This would also be the link-to-marked-point distance.

Note that the new LinkToMarkedPoint2 subassembly should not rely on the fact that point #7 will be at a constant offset at all stations along the main alignment.

### **Offset Baseline Corridor Cross-Section**

Note the following:

- The cross-section sample line is orthogonal to the main baseline at point #8 (line alpha).
- The cross-section sample line is composed of one or more segments, with all segments collinear.
- The corridor point data for the offset portion of the corridor has offset values stored relative to the offset baseline.
- To project this corridor point data in the cross-section from line beta to line alpha for display in the cross-section view, the offset will need to be divided by cosine (angle gamma).

Note that using this approach, a lane subassembly on the offset portion of the corridor that is defined to be 3.5 meters in width, will be slightly wider than 3.5 meters in width when shown in the corridor cross-section.

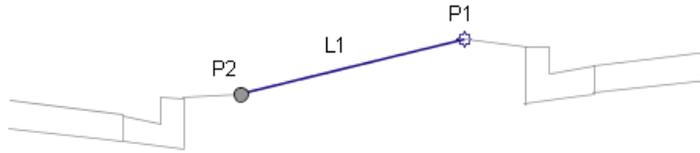
### **Layout Mode Operation**

In layout mode, this subassembly displays the link between the attachment point and the marked point.

### **Point, Link, and Shape Codes**

None.

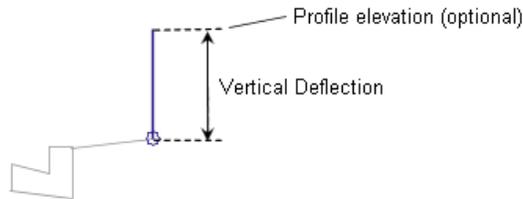
### Coding Diagram



## LinkVertical

This subassembly is a general purpose utility to add a vertical surface link by vertical deflection.

A profile can be used when building a corridor model to allow variable vertical deflection.



### Attachment

The attachment point is at the inside edge of the link. This subassembly can be inserted in the left or right direction from the attachment point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Vertical Deflection	+/- vertical deflection from the attachment point. Negative deflections are downward.	Numeric	3.0 m 10.0 ft
Point Codes	A list of surface codes to be assigned to the outside edge of the link	Comma-separated string	P2

Parameter	Description	Type	Default
Link Codes	A list of codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link.	Yes\No	No

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Vertical Deflection	May be used to override the fixed Vertical Deflection and tie the end-of-link to a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

### Behavior

A vertical link is added from the attachment point for the given vertical deflection. If a profile name is given for the Vertical Deflection, the end of the link will match the profile elevation.

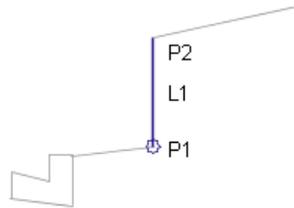
### Layout Mode Operation

In layout mode, this subassembly displays the link for the given +/- vertical deflection.

### Point, Link, and Shape Codes

None.

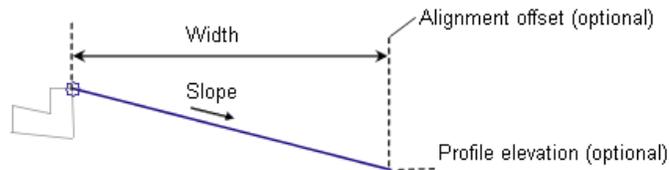
### Coding Diagram



## LinkWidthAndSlope

This subassembly is a general purpose utility to add a surface link by specifying its width and slope.

Either a % slope or ratio slope value may be given. An alignment or profile can be used when building a corridor model to allow variable width and slope.



### Attachment

The attachment point is at the inside edge of the link. This subassembly can be inserted in the left or right direction from the attachment point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side to place the subassembly	Left/Right	Left
Width	Width of the lane from the offset of the inside edge to the offset of the outside edge	Numeric, positive	3.0 10.0 ft

Parameter	Description	Type	Default
Slope	% slope of the link. Negative slopes go downward in the direction inserted.	Numeric	2 (%), (or 2:1)
Point Codes	A list of surface codes to be assigned to the outside edge of the link	Comma-separated string	P2
Link Codes	A list of surface codes to be assigned to the link	Comma-separated string	Top, Datum
Omit Link	This parameter adds or removes the surface link.	Yes\No	No
Use Superelevation	Specifies to use superelevation slope for the shoulder	Selection List: a) Outside Shoulder Slope, b) Inside Shoulder Slope, c)Outside Lane, d)Inside Lane, e) None	None

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Width	May be used to override the fixed link Width and tie the end-of-link to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
%Slope	May be used to override the fixed % Slope and tie the end-of-link to a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Begin Offset	+/- offset of the beginning of the link	Numeric
Begin Elevation	Elevation of the beginning of the link	Numeric
End Offset	+/- offset of the end of the link	Numeric
End Elevation	Elevation of the end of the link	Numeric

### Behavior

The link is added in the direction of insertion starting at the attachment point and going the given width and slope. If an offset horizontal alignment name is assigned to the Width during corridor modeling, the width of the lane will vary to match the offset of the alignment. If a profile name is assigned to the Slope, the slope is adjusted to match the profile elevation at the end of the link.

This subassembly includes an optional input parameter named Use Superelevation Slope that lets you specify to use the superelevation slope for the shoulder. This parameter can be set to a) Outside shoulder slope, b) Inside shoulder slope, c) Outside Lane, d) Inside Lane, or e) None. None is the default setting.

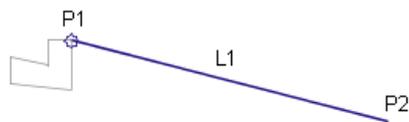
### Layout Mode Operation

In layout mode, this subassembly displays the link at the given width and slope.

### Point, Link, and Shape Codes

None.

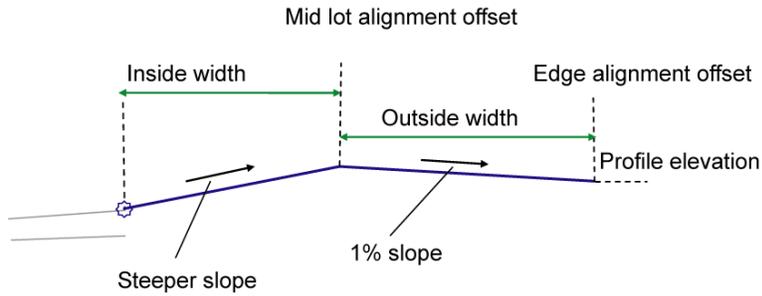
### Coding Diagram



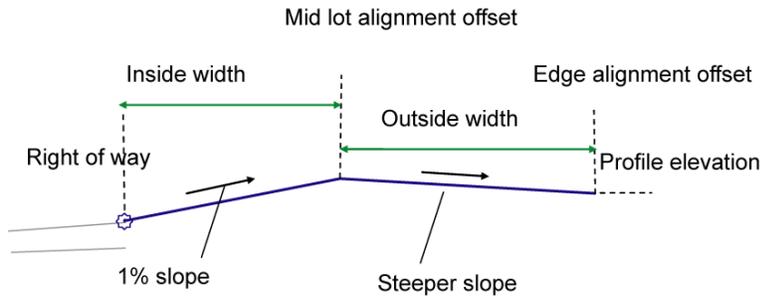
# LotGrade

This subassembly is used to grade lots from a right of way line.

The following illustration shows an example of this subassembly being used when the target profile elevation at the back of the lot is higher than the attachment point.



The following illustration shows an example of this subassembly being used when the attachment point is higher than the target profile elevation at the back of the lot.



## Attachment

The attachment point is at the inside edge of the lane on the finished grade.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Indicates which side the subassembly is inserted towards.	Left \ Right	Right
Inside Width	The inside width of the lot.	Numeric, positive	3.6 m 12.0 ft
Outside Width	The outside width of the lot.	Numeric, positive	3.6 m 12.0 ft
Min Slope	The minimum slope for the outside width of the lot.	Numeric, positive	1 %

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User’s Guide Help.

Parameter	Description	Status
Middle Offset	May be used to override the fixed Inside Width by tying the mid lot line to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Edge Offset	May be used to override the fixed Outside Width by tying end lot line to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Edge Elevation	May be used to override the fixed Elevation by tying end lot line to an elevation. The following object types can be used as targets for specifying this elev-	Required

Parameter	Description	Status
	ation: profiles, 3D polylines, feature lines, or survey figures.	

### Output Parameters

None.

### Behavior

The lot grade assembly tool needs to start at the right of way and, much like the BasicLaneTransition subassembly, it will hold grade and change offset to the middle of the lot at a default slope of 1%. The value of the slope can be input by the user. At the middle of the lot will be an alignment with no profile. So the assembly will be a link from right of way to that mid lot alignment at 1% slope. Then the mid lot alignment will link to the back of lot, which is a fixed elevation; for example, 74.00 feet. We need to maintain a minimum slope of 1% on the back half of the lot as well. Therefore there needs to be a rule in place if the front of the lot grade at 1% slope does not allow for a minimum slope of 1% for the back half of the lot, then the back half of the lot grade needs to change to 1% and the front half lot grade needs to go steeper.

### Layout Mode Operation

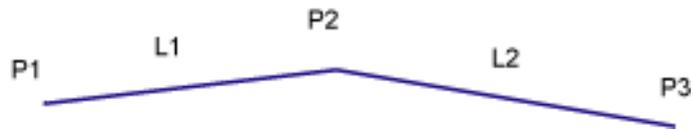
In layout mode, this subassembly draws the lane using the input parameter values. It will use 1% as the steeper slope value.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Crown	Crown of road on finished grade.
P2	Hinge	Lot hinge point.
L1, L2	Top	Finish grade.

## Coding Diagram



## MarkPoint

This subassembly is used to mark an existing point on the assembly with a name.

This is usually done so that other subassemblies can later insert links that attach back to this point (for example, LinkToMarkedPoint). The attachment point is the point that is marked. You can add user-defined point codes to this marked point.

In the example below, there are two roadways with independent profiles. Once the links for the first roadway are created, the point at the left outside edge is being marked. Later, after the links for the second roadway are created, a link can be inserted from its right outside edge back to the marked point.



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**NOTE** If you use the MarkPoint subassembly with the LinkToMarkedPoint subassembly, in order for the LinkToMarkedPoint subassembly to work (draw) properly, it must be located below the MarkedPoint subassembly on the Construction tab of the Assembly properties. If the LinkToMarkedPoint subassembly is not located below the MarkedPoint subassembly on the Construction tab, you should select the Subassembly Group name in the Construction tab, then right-click and choose Move Up, so that the MarkedPoint subassembly is located above the LinkToMarkedPoint subassembly in the list.

---

## Attachment

The marked point name is placed at the attachment point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Point Name	Name to mark the attachment point with	String	None
Point Codes	Specify point codes at this location as needed, comma-separated, if multiple	String	MarkedPoint

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User’s Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

A name is assigned to the selected attachment point. This point can be referenced by name in subassemblies added later to the assembly.

### Layout Mode Operation

In layout mode, this subassembly draws a triangle symbol at the location of the marked point, and labels the marked point name above the point.



### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	MarkedPoint	Marked point code

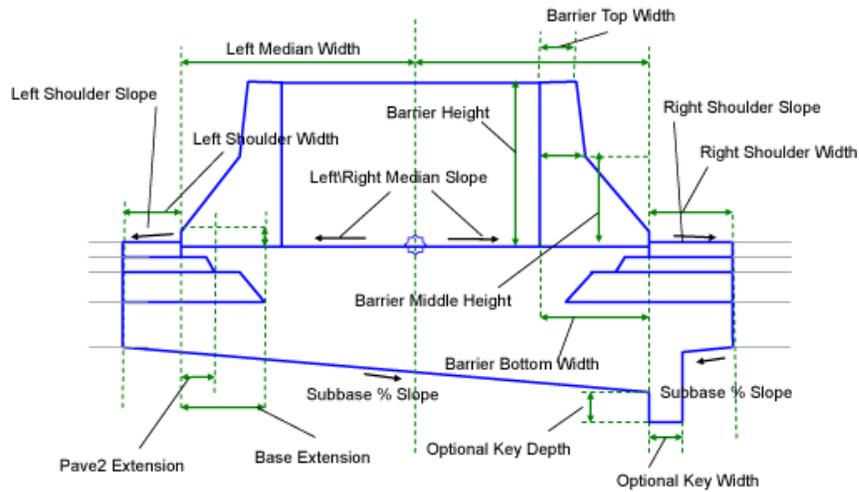
### Coding Diagram

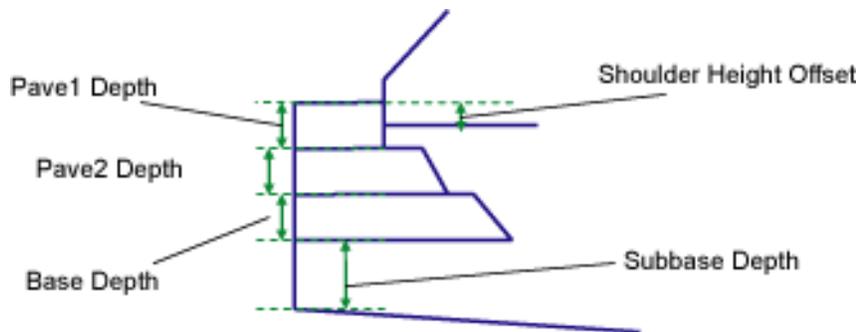
None.

## MedianConstantSlopeWithBarrier

This subassembly is used to insert a median at the centerline, with asymmetrical barriers on either side of the centerline, and a tapered bottom with an optional key.

The pavement structure follows the standards described in "Pavement Structure of Paved Sections" in the AutoCAD Civil 3D Help.





### Attachment

The attachment point is at the middle of the median. The median is placed on either side with appropriate components as specified by the input parameters.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Median Width	Width of the median to the left of attachment point, including barrier area	Numeric, positive	2.0m 6.0 ft
Right Median Width	Width of the median to the right of attachment point, including barrier area	Numeric, positive	2.0m 6.0 ft
Crown Point at Center	Specifies that attachment point will be coded as Crown	Yes/No	No
Left Median Cross Slope	Cross slope of the median to the left of attachment point	Numeric	0%
Right Median Slope	Cross slope of the median to the right of attachment point	Numeric	0%
Barrier Option	Specifies to place barriers on left and/or right sides	String: (a) None, (b) Both Sides, (c) Right (d) Left	Both Sides

Parameter	Description	Type	Default
Barrier Top Width	Width of the top of the barrier	Numeric, positive	0.15 m 0.5 ft
Barrier Middle Width	Width of the middle of the barrier	Numeric, positive	0.225 m 0.75 ft
Curb Height	Height of the curb at the bottom of barrier	Numeric, positive	0.075 m 0.25 ft
Barrier Bottom Width	Width of the bottom of the barrier	Numeric, positive	0.6 m 2.0 ft
Barrier Height	Height to the top of the barrier	Numeric, positive	0.9 m 3.0 ft
Barrier Middle Height	Height to the middle of the barrier	Numeric, positive	0.45 m 1.5 ft
Shoulder Height Offset	Difference in the median edge point elevation with respect to edge of paved shoulder	Numeric	0.015 m 0.05 ft
Left Shoulder Width	Width from the left shoulder from inside edge of pavement to median start point. Zero value can be entered if no shoulder is needed on the left side.	Numeric, Positive	1.2 m 4.0 ft
Left Shoulder Default Slope	Default cross slope of the shoulder surface. This value is used if superelevation slope is not used, or is not specified for the baseline alignment.	Numeric, Positive	-2%
Left Shoulder - Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment	String: List of options: a.) No, b.) Outside shoulder slope, c.) Inside shoulder slope	Inside shoulder slope
Right Shoulder Width	Width from the right shoulder from inside edge of pavement to median start	Numeric, Positive	1.2 m 4.0 ft

Parameter	Description	Type	Default
	point. Zero value can be entered if no shoulder is needed on the right side.		
Right Shoulder Default Slope	Default cross slope of the right shoulder surface. This value is used if superelevation slope is not used, or is not specified for the baseline alignment.	Numeric, Positive	-2%
Right Shoulder - Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	String: List of options: a.) No, b.) Outside shoulder slope, c.) Inside shoulder slope	Inside shoulder slope
Subbase Slope	Cross slope of subbase from each end towards middle. If optional drain key is selected, then it is to that point.	Numeric	-4%
Drain Key	Specifies to add drain key below one of the barriers.	String; (a) None, (b) Below Left Barrier, (c) Below Right Barrier	Below Right Barrier
Key Width	Width of the optional key bottom	Numeric, positive	0.3 m 1.0 ft
Key Depth	Depth of the optional key on the short side	Numeric, positive	0.3 m 1.0 ft
Left Pave1 Depth	Depth between finish grade and Pave1 for the left shoulder	Numeric, positive	0.025 m 0.083 ft
Left Pave2 Depth	Depth second level pavement material for the left shoulder	Numeric, positive	0.025 m 0.083ft
Left Base Depth	Depth of base course (between Pave2 and Base) for the left shoulder	Numeric, positive	0.100 m 0.333 ft
Left Subbase Depth	Depth of the subbase layer at the left inside edge of pavement (start of the left shoulder). If shoulder width is set	Numeric	0.300 m 1.0 ft

Parameter	Description	Type	Default
	to zero , then this is the depth of the subbase at left end of the median.		
Left Pave2 Extension	Width that the Pave2 layer extends beyond the edge of paved shoulder on the left side into the median. This is provided even if the left shoulder width is set to zero.	Numeric, positive	0.1 m 0.33 ft
Left Base Extension	Width that the Base layer extends beyond the edge of paved shoulder on the left side into the median. This is provided even if the left shoulder width is set to zero.	Numeric, positive	0.25 m 0.83 ft
Right Pave1 Depth	Depth between finish grade and Pave1 for the right shoulder	Numeric, positive	0.025 m 0.083 ft
Right Pave2 Depth	Depth second level pavement material for the right shoulder	Numeric, positive	0.025 m 0.083 ft
Right Base Depth	Depth of base course (between Pave2 and Base) for the right shoulder	Numeric, positive	0.100 m 0.333 ft
Right Subbase Depth	Depth of the subbase layer at the right inside edge of pavement (start of the right shoulder). If shoulder width is set to zero, then this is the depth of the subbase at right end of the median.	Numeric	0.300 m 1.0 ft
Right Pave2 Extension	Width that the Pave2 layer extends beyond the edge of paved shoulder on the right side into the median. This is provided even if the right shoulder width is set to zero	Numeric, positive	0.1 m 0.33 ft
Right Base Extension	Width that the Base layer extends beyond the edge of paved shoulder on the right side into the median. This is provided even if the right shoulder width is set to zero.	Numeric, positive	0.25 m 0.83 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Left Paved Shoulder Width	May be used to override the fixed Shoulder Width on the left side and tie the inside edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Paved Shoulder Width	May be used to override the fixed Shoulder Width on the right side and tie the inside edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Barrier Height	Height to the top of the barrier.	Numeric, positive
Left Shoulder Slope	Slope of the left paved shoulder.	Numeric, positive
Right Shoulder Slope	Slope of the right paved shoulder.	Numeric, positive
Median Maximum Depth	Depth of the median at the deepest point, near the optional key location.	Numeric

### Behavior

This subassembly is inserted on both sides of attachment point, starting with the median links, using left/right median widths and other parameters. Edge of paved shoulder will be located (on both right and left sides) using Shoulder Height Offset parameter value. The finish grade of the shoulder is inserted for the given Shoulder Width and Shoulder Slope outward from the attachment point. The subbase link is inserted from the outer most point on the paved shoulders starting at the "Subbase Depth", for left and right sides respectively, below the finish grade.

The Pave1, Pave2, and Base surface links are inserted parallel to the finish grade at the given depths. If the layer Extension values are non-zero, each layer is extended for the given distance beyond the shoulder hinge point. Each layer should be as wide as or wider than the one above it.

Finally, Barrier links are added from the end of the medians using the barrier bottom width, height, middle width, middle height and curb height parameters.

### Layout Mode Operation

In layout mode this subassembly displays all links using the default values for various input parameters.

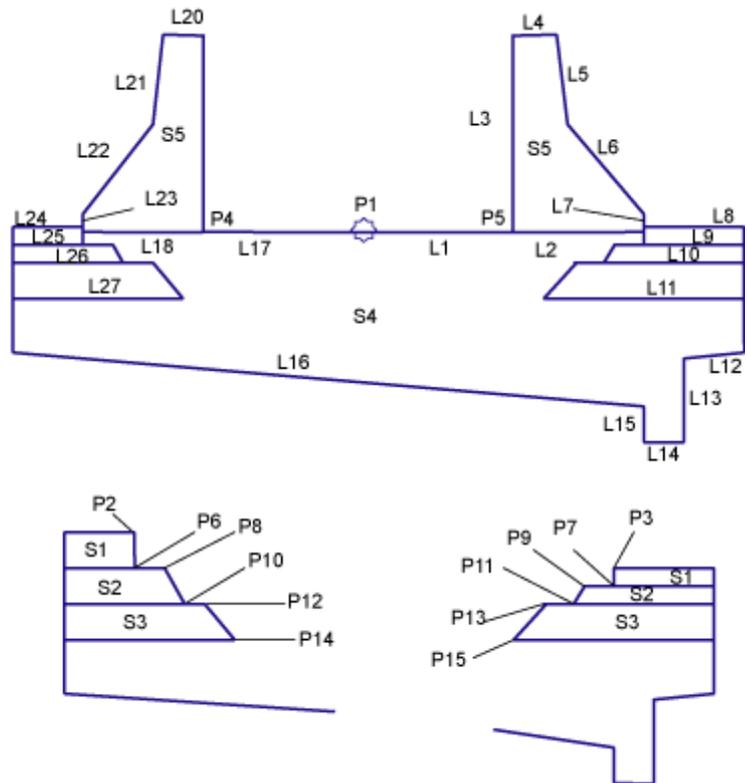
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Type	Codes	Description
P1	Crown	Insertion point and typically at the centerline
P2, P3	EPS	Edge of paved shoulder on top links
P4, P5	Median	Edge of median
P6, P7	EPS_Pave1	Edge of paved shoulder on Pave1
P10, P11	EPS_Pave2	Edge of paved shoulder on Pave2
P14, P15	EPS_Base	Edge of paved shoulder on Base
L1, L2, L17, L18	Top	Top link on the median portion including barriers
L3-L7; L19-L23	Barrier	Barrier Links
L8, L24	Top, Pave	
L9, L25	Pave1	Bottom of first pavement layer
L10, L26	Pave2	Bottom of second pavement layer

<b>Type</b>	<b>Codes</b>	<b>Description</b>
L11, L27	Base	Bottom of base course layer
L12, L14, L16	Subbase	Bottom of subbase course layer
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	
S5	Barrier	

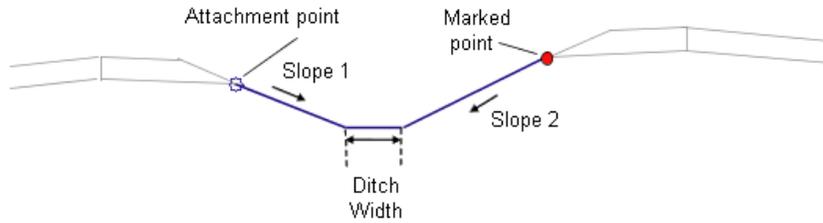
## Coding Diagram



## MedianDepressed

This subassembly creates a cross-sectional representation of a depressed median between the attachment point and a previously named marked point.

Use the MarkPoint subassembly first if the connecting point has not already been marked.



### Attachment

The attachment point is at the outside edge of either the left or right median ditch slope, and the previously defined marked point must be on the opposite outside edge. It does not matter which point is left or right of the other.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Marked Point Name	Name of the previously defined marked point	String	None
Slope 1	Slope (x : 1) of the link extending inward from the attachment point	Numeric	-4 ( : 1)
Slope 2	Slope (x : 1) of the link extending inward from the marked point	Numeric	-4 ( : 1)
Hold Ditch Slopes	For the cases where the top-of-ditch-slope points are at unequal elevations, selects whether to hold the ditch sideslopes and let the position of the ditch shift, or to hold the ditch at the center and adjust the sideslope on the high side.	Selection list	Hold ditch sideslopes, shift ditch from center
Ditch Width	Width of the bottom of the median ditch (zero for a V-ditch)	Numeric, positive	0.6 m 2 ft

### **Target Parameters**

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### **Output Parameters**

None.

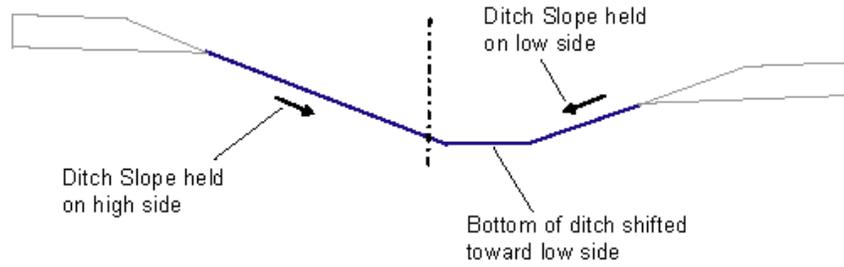
### **Behavior**

The locations of the attachment point and marked point are determined. The marked point may be either to the right or left of the attachment point. Links are extended inward at Slope 1 from the attachment point, and at Slope 2 from the marked point, until they intersect. If a ditch width is given, a horizontal bottom-of-ditch link is fit into the intersecting side slopes.

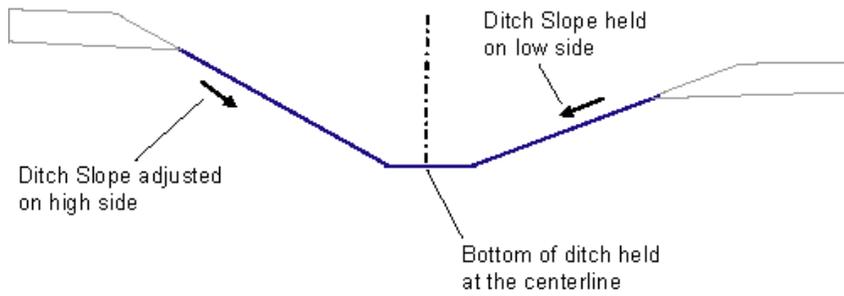
#### Ditch Slopes

The top of the ditch slopes may be at different elevations on the left and right sides, resulting in an asymmetrical ditch. There are two options for handling this situation. If Hold Ditch Slopes is set to True, then the Slope 1 and Slope 2 values are held on both sides, shifting the bottom of ditch away from the centerline towards the lower side. If set to False, the ditch bottom is centered about the midpoint offset between the tops-of-slopes, the given slope is held on the lower side, and the slope is adjusted to match on the higher side.

Hold Ditch Slopes = True



Hold Ditch Slopes = False



### Point, Link, and Shape Codes

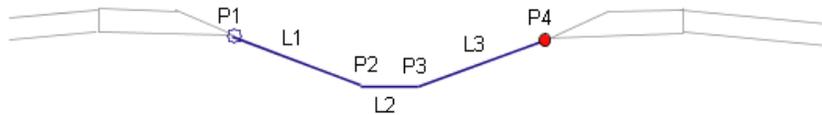
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P2	LMedDitch	Left edge of median ditch
P3	RMedDitch	Right edge of median ditch
L1 – L3	Top Datum	Finish grade on unpaved shoulder and median links

### Layout Mode Operation

In layout mode, this subassembly calculates and displays the median links based on the input parameters given and the relative locations of the attachment point and marked point.

### Coding Diagram

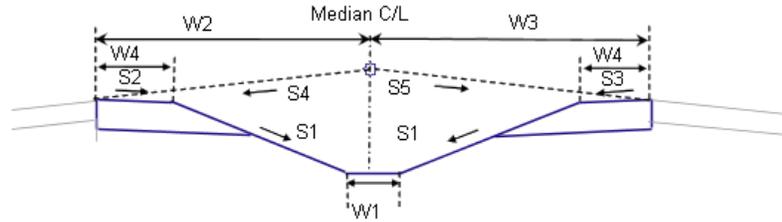


## MedianDepressedShoulderExt

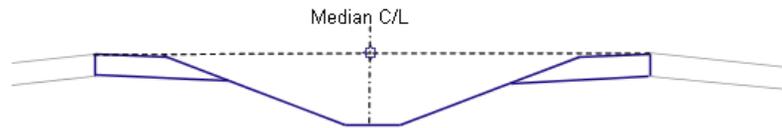
This subassembly creates a cross-sectional representation of a depressed median with inside shoulders, using extended termination of shoulder subbase.

It supports superelevation pivoting about the attachment point at the centerline, or about the attachment point elevation at the inside edges-of-traveled-way. The pavement structure on the paved portions of the shoulder follows the standards described in "Pavement Structure of Paved Sections" in the AutoCAD Civil 3D Help.

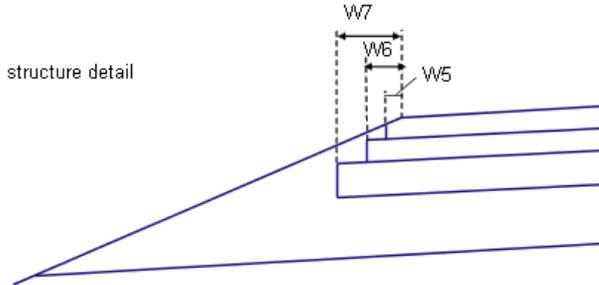
Case 1: Centerline Pivot = True



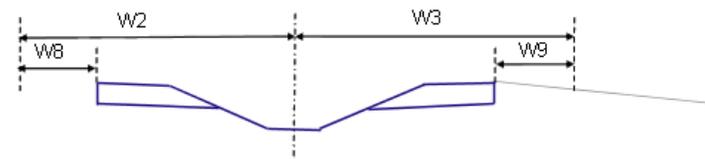
Case 2: Centerline Pivot = False



Pavement structure detail



Non-zero Turn Lane Widths given



### Attachment

The attachment point is above the centerline of the ditch. The location of the median links relative to the attachment point varies depending on the pivot method, and in some cases, the median widths and lane slopes. The attachment point is typically placed on the baseline alignment at the design profile elevation.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Ditch Width	Width of the bottom of the median ditch (zero for a V-ditch)	Numeric, positive	0.6 m 2 ft
Ditch Slope	Inward slope from the shoulders toward the bottom of ditch (x : 1)	Numeric, positive	4 : 1
Hold Ditch Slopes	For the cases where the top-of-ditch-slope points are at unequal elevations, selects whether to hold the ditch sideslopes and let the position of the ditch shift, or to hold the ditch at the center and adjust the sideslope on the high side	Selection list	Hold ditch sideslopes, shift ditch from center
Centerline Pivot?	Select whether the profile grade and pivot point is at the centerline above the median ditch, or if it is held at the inside edges-of-traveled-ways	Selection list	Pivot about centerline
Left Median Width	Width from the median centerline to the left inside edge-of-traveled-way	Numeric, positive	6.6 m 22 ft
Right Median Width	Width from the median centerline to the right inside edge-of-traveled-way	Numeric, positive	6.6 m 22 ft
Paved Shoulder Width	Width of the paved inside shoulder	Numeric, positive	0.6 m 2.0 ft
Pave1 Extension	Width that the Pave1 layer extends beyond the edge-of-shoulder. The bottom of the Pave1 layer may not extend beyond the ditch sideslope.	Numeric, positive	0.0
Pave2 Extension	Width that the Pave2 layer extends beyond the edge-of-shoulder. This should be equal to or greater than the Pave1 extension. The bottom of the Pave2 layer may not extend beyond the ditch sideslope.	Numeric, positive	0.0

Parameter	Description	Type	Default
Base Extension	Width that the Base layer extends beyond the edge-of-shoulder. This should be equal to or greater than the Pave2 extension. If a large value is used, the Base layer is terminated at the intersection with the ditch slope. The Base layer should not extend beyond the ditch sideslope.	Numeric, positive	0.0
Pave1 Depth	Depth between the paved shoulders' finish grade and Pave1 surfaces	Numeric, positive	0.025 m, 0.083 ft
Pave2 Depth	Depth between the paved shoulders' Pave1 and Pave2 surfaces	Numeric, positive	0.025 m, 0.083 ft
Base Depth	Depth between the paved shoulders' Pave2 and Base surfaces	Numeric, positive	0.100 m 0.333 ft
Subbase Depth	Depth between the paved shoulders' Base and Subbase surfaces	Numeric, positive	0.3 m 1 ft
Left Turn Lane Width	Width of the optional turning lane on the left side	Numeric, positive	0
Right Turn Lane Width	Width of the optional turning lane on the right side	Numeric, positive	0

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Ditch Slope	May be used to override the Ditch Slope and tie the median bottom-of-ditch to a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional
Left Median Width	May be used to override the fixed Left Median Width and tie the left inside edge-of-traveled-way to an	Optional

Parameter	Description	Status
	offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	
Right Median Width	May be used to override the fixed Right Median Width and tie the right inside edge-of-traveled-way to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

None.

### Behavior

This subassembly cannot be inserted separately for the left and right sides. It builds the median to both sides of the attachment point.

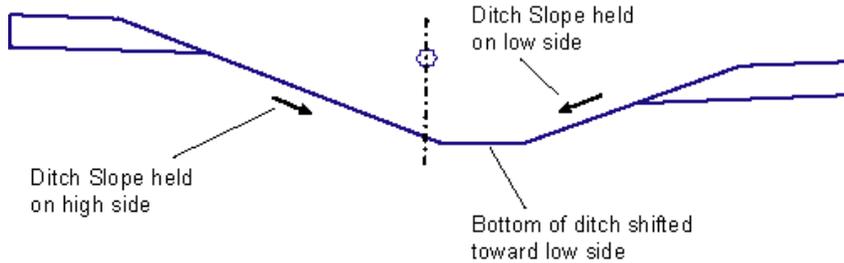
#### Superelevation Pivot Point

The median can be configured to have the pivot point at the centerline, or at the inside edges of traveled ways. If Centerline Pivot is used, the left and right outside lane superelevation slopes are obtained from the baseline's superelevation specifications, and the elevations of the inside edges-of-traveled-ways are calculated by applying these slopes to the left and right median widths from the attachment point. If Centerline Pivot is not used, the edges-of-traveled-ways are held to the elevation of the attachment point.

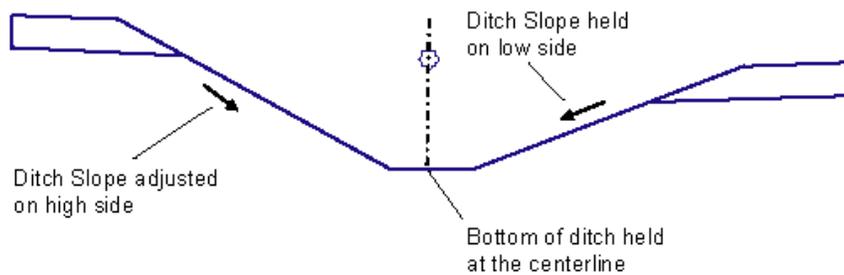
#### Ditch Elevations and Slopes

Superelevation or turning lanes may cause the top of the ditch slopes to be at different elevations on the left and right sides, resulting in an asymmetrical ditch. There are two options for handling this situation. If Hold Ditch Slopes is set to True, then the given ditch slopes are held constant on both sides, which shifts the bottom of ditch away from the centerline towards the lower side. If set to False, the ditch bottom is centered about the median centerline, the given slope is held on the lower side, and the slope is adjusted to match on the higher side.

Hold Ditch Slopes = True



Hold Ditch Slopes = False



#### Shoulder Treatment

The paved shoulders follow the slopes defined for the left and right inside shoulder slopes for the baseline alignment's superelevation specifications. These slopes are applied inward from the inside edges of traveled ways. The subbase surfaces follows the same slope as the finished grade, and is extended inwards to the intersections with the ditch slopes.

#### Layout Mode Operation

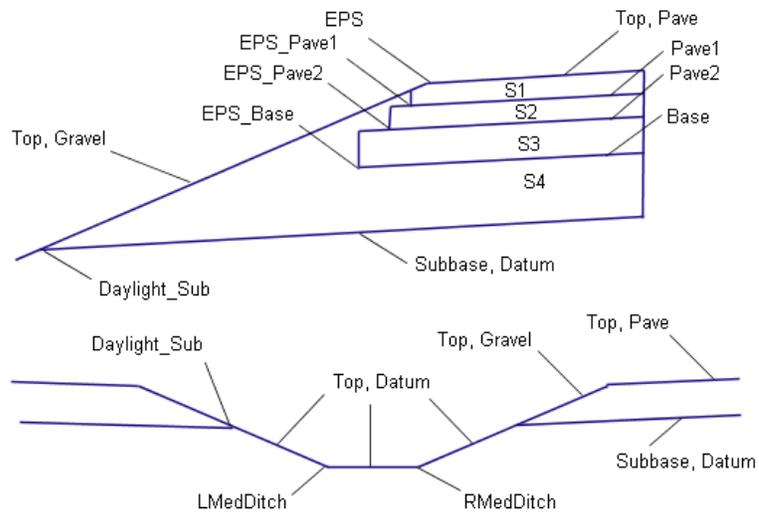
In layout mode, this subassembly calculates and displays the median and shoulders based on the input parameters given, with lane slopes of -2%, paved shoulder slopes of -5%, and turning lane widths of zero.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
Points	As shown below	
Links	As shown below	
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

### Coding Diagram

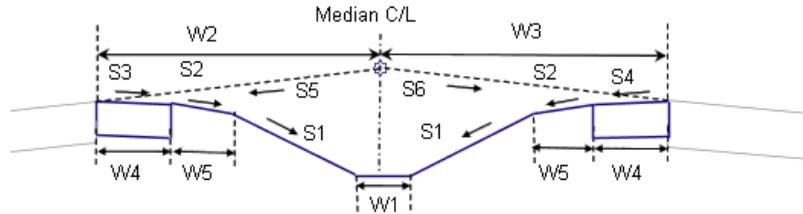


## **MedianDepressedShoulderVert**

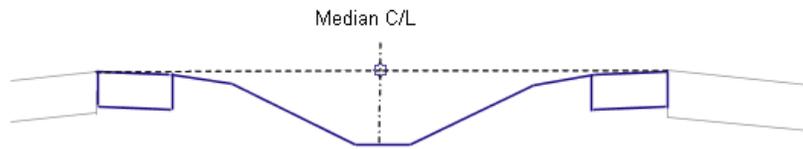
This subassembly creates a cross-sectional representation of a depressed median with inside shoulders, using vertical termination of shoulder subbase.

It supports superelevation pivoting about the attachment point at the centerline, or about the attachment point elevation at the inside edges-of-traveled-way. The pavement structure on the paved portions of the shoulder follows the standards described in "Pavement Structure of Paved Sections" in the AutoCAD Civil 3D Help.

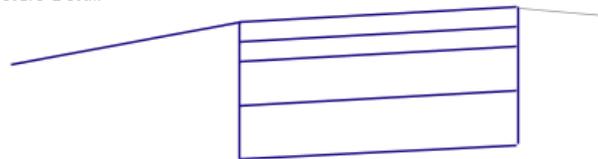
Case 1: Centerline Pivot = True



Case 2: Centerline Pivot = False



Pavement Structure Detail



Non-zero Turn Lane Widths given

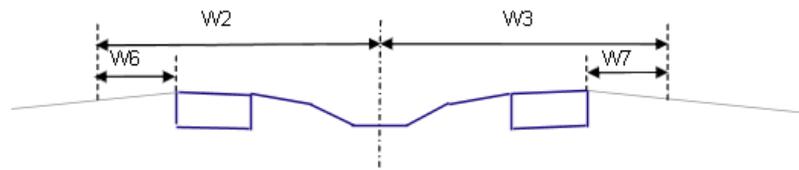


Table of Widths		Table of Slopes	
W1	Ditch	S1	Ditch of Foreslope
W2	Left Median	S2	Unpaved Shoulder Slope
W3	Right Median	S3	Left Inside Superelevation
W4	Paved Shoulder	S4	Right Inside Superelevation Shoulder Slope
W5	Unpaved Shoulder	S5	Left Outside Lane Slope

Table of Widths		Table of Slopes	
W6	Left Turn Lane	S6	Right Outside Lane Slope
W7	Right Turn Lane		

### Attachment

The attachment point is above the centerline of the ditch. The location of the median links relative to the attachment point varies depending on the pivot method, and in some cases, the median widths and lane slopes. The attachment point is typically placed on the baseline alignment at the design profile elevation.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Ditch Width	Width of the bottom of the median ditch (zero for a V-ditch)	Numeric, positive	0.6 m 2 ft
Ditch Slope	Inward slope from the shoulders toward the bottom of ditch (x : 1)	Numeric, positive	4 : 1
Hold Ditch Slopes	For the cases where the top-of-ditch-slope points are at unequal elevations, selects whether to hold the ditch sideslopes and let the position of the ditch shift, or to hold the ditch at the center and adjust the sideslope on the high side.	Selection list	Hold ditch sideslopes, shift ditch from center
Centerline Pivot?	Select whether the profile grade and pivot point is at the centerline above the median ditch, or if it is held at the inside edges-of-traveled-ways	Selection list	Pivot about centerline
Left Median Width	Width from the median centerline to the left inside edge-of-traveled-way	Numeric, positive	6.6 m 22 ft
Right Median Width	Width from the median centerline to the right inside edge-of-traveled-way	Numeric, positive	6.6 m 22 ft

Parameter	Description	Type	Default
Paved Shoulder Width	Width of the paved portion of the inside shoulder	Numeric, positive	0.6 m 2.0 ft
Unpaved Shoulder Width	Width of the unpaved portion of the inside shoulder	Numeric, positive	1.2 m 4.0 ft
Unpaved Shoulder %Slope	% slope of the unpaved portion of the inside shoulder	Numeric	-6 (%)
Pave1 Depth	Depth between the finish grade and Pave1 surface	Numeric, positive	0.025 m 0.083 ft
Pave2 Depth	Depth between the Pave1 and Pave2 surfaces	Numeric, positive	0.025 m 0.083 ft
Base Depth	Depth between the Pave2 and Base surfaces	Numeric, positive	0.100 m 0.333 ft
Subbase Depth	Depth between the paved shoulders' finish grade and subbase surfaces	Numeric, positive	0.3 m 1 ft
Left Turn Lane Width	Width of the optional turning lane on the left side	Numeric, positive	0
Right Turn Lane Width	Width of the optional turning lane on the right side	Numeric, positive	0

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Ditch Slope	May be used to override the Ditch Slope and tie the median bottom-of-ditch to a profile. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Left Median Width	May be used to override the fixed Left Median Width and tie the left inside edge-of-traveled-way to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Median Width	May be used to override the fixed Right Median Width and tie the right inside edge-of-traveled-way to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

None.

### Behavior

This subassembly cannot be inserted separately for the left and right sides. It builds the median to both sides of the attachment point.

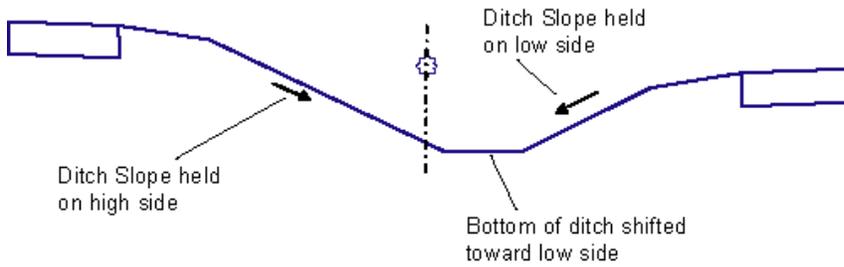
### Superelevation Pivot Point

The median can be configured to have the superelevation pivot point at the centerline, or at the inside edges of traveled ways. If Centerline Pivot is used, the left and right outside lane superelevation slopes are obtained from the baseline's superelevation specifications, and the elevations of the inside edges-of-traveled-ways are calculated by applying these slopes to the left and right median widths from the attachment point. If Centerline Pivot is not used, the edges-of-traveled-ways are held to the elevation of the attachment point.

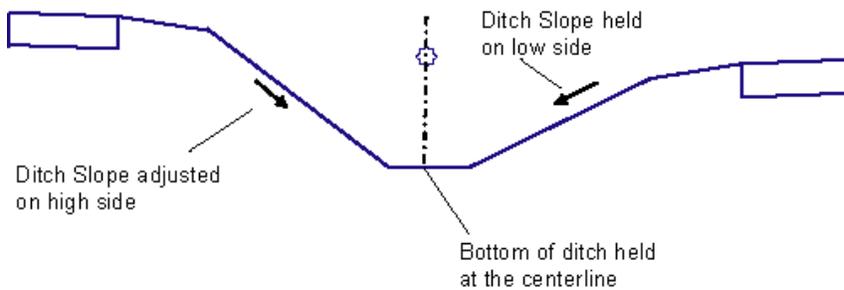
### Ditch Elevations and Slopes

Superelevation or turning lanes may cause the top of the ditch slopes to be at different elevations on the left and right sides, resulting in an asymmetrical ditch. There are two options for handling this situation. If Hold Ditch Slopes is set to True, then the given ditch slopes are held constant on both sides, which shifts the bottom of ditch away from the centerline towards the lower side. If set to False, the ditch bottom is centered about the median centerline, the given slope is held on the lower side, and the slope is adjusted to match on the higher side.

Hold Ditch Slopes = True



Hold Ditch Slopes = False



#### Shoulder Treatment

The paved portions of the shoulders follow the slopes defined for the left and right inside shoulder slopes for the baseline alignment's superelevation specifications. These slopes are applied inward from the inside edges of traveled ways. The unpaved portions of the shoulders are fixed at the given Unpaved Shoulder %Slope value.

#### Layout Mode Operation

In layout mode, this subassembly calculates and displays the median and shoulders based on the input parameters given, and assuming that the lane slopes are -2% and the paved shoulder slopes are -5%.

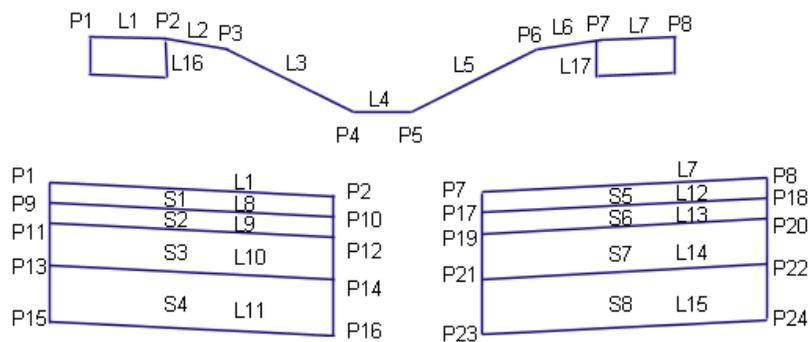
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P2, P7	EPS	Edges of paved shoulder on finish grade
P10, P17	EPS_Pave1	Edges of paved shoulder on Pave1
P12, P19	EPS_Pave2	Edges of paved shoulder on Pave2
P14, P21	EPS_Base	Edges of paved shoulder on Base
P16, P23	EPS_Sub	Edges of paved shoulder on Subbase
P3, P6	ES_Unpaved	Edges of gravel shoulder
P4	LMedDitch	Left edge of median ditch
P5	RMedDitch	Right edge of median ditch
L1, L7	Top Pave	Finish grade on paved shoulders
L2 – L6	Top Datum	Finish grade on unpaved shoulder and median links
L8, L12	Pave1	
L9, L13	Pave2	
L10, L14	Base	
L11, L15	SubBase	
L11, L15, L16, L17	Datum	Subbase and vertical links on paved shoulders
S1, S5	Pave1	
S2, S6	Pave2	

Point, Link, or Shape	Code	Description
S3, S7	Base	
S4, S8	Subbase	

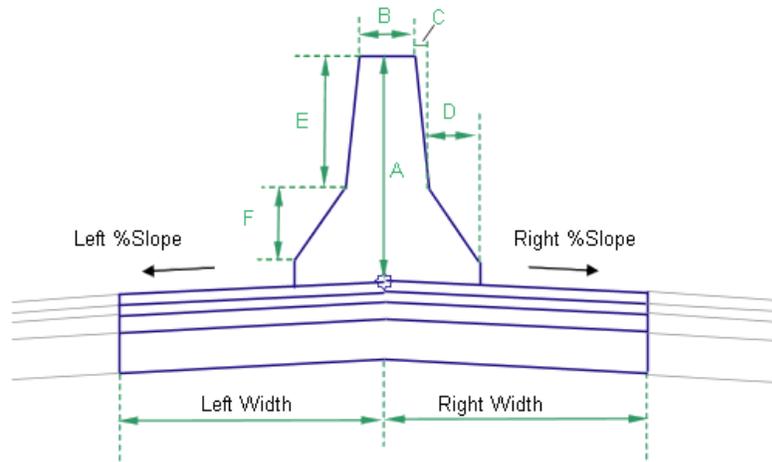
### Coding Diagram



## MedianFlushWithBarrier

This subassembly inserts surfaces to define a flush median with an optional New Jersey Barrier.

The pavement structure follows the standards described in "Pavement Structure of Paved Sections" in the AutoCAD Civil 3D Help.



### Attachment

The attachment point is at the center of median on the finish grade surface. This component inserts to the left and right side simultaneously.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Slope	Slope of the left median surface	Selection list	-2 %
Right Slope	Slope of the right median surface	Selection list	-2 %
Include Barrier	True shows the New Jersey barrier. False omits the barrier.	Selection list	Include Barrier
Left Width	Width from the median centerline to the left edge of median	Numeric, positive	1.2 m 4.0 ft
Right Width	Width from the median centerline to the right edge of median	Numeric, positive	1.2 m 4.0 ft
Left Lane - Use Superelevation	Specifies to use superelevation slope for the left lane	Selection list	Inside Lane Slope

Parameter	Description	Type	Default
Default Left Slope	Specifies the default slope of the left lane, if superelevation slope is not specified	Numeric	- 2 %
Right Lane - Use Superelevation	Specifies to use superelevation slope for the right lane.	Selection list	Inside Lane Slope
Default Right Slope	Specifies the default slope of the right lane, if superelevation slope is not specified	Numeric	- 2 %
Pave1 Depth	Thickness of the Pave1 layer; zero to omit	Numeric, positive	0.025m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer; zero to omit.	Numeric, positive	0.025 m 0.083 ft
Base Depth	Thickness of the base layer	Numeric, positive	0.100 m 0.333 ft
Subbase Depth	Thickness of the subbase layer	Numeric, positive	0.300 m 1.0 ft
Dimension A (mm or inches)	Height of the barrier at the center of median	Numeric, positive	810 mm 32 in
Dimension B (mm or inches)	As shown in diagram	Numeric, positive	232 9 in
Dimension C (mm or inches)	As shown in diagram	Numeric, positive	59 mm 2 in
Dimension D (mm or inches)	As shown in diagram	Numeric, positive	125 mm 5 in
Dimension E (mm or inches)	As shown in diagram	Numeric, positive	557 mm 22 in
Dimension F (mm or inches)	As shown in diagram	Numeric, positive	178 mm 7 in

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Left Width	May be used to override the fixed Left Width and tie the left edge-of-median to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Width	May be used to override the fixed Right Width and tie the right edge-of-median to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

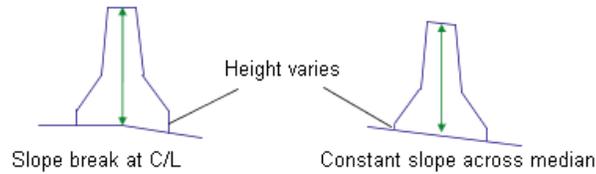
### Output Parameters

Parameter	Description	Type
Left %Slope	% slope of the left side of the median	Numeric
Right %Slope	% slope of the right side of the median	Numeric

### Behavior

The pavement structure links are inserted outward left and right of the attachment point for the given widths and slopes. If the Include Barrier value is True, a New Jersey barrier is inserted symmetrically about the median centerline. If alignments are given as target parameters for the Left and Right Widths, the widths are adjusted to tie to the alignment offsets at each station along the corridor.

If the median is in superelevation with a single constant slope across the entire median, the top of the barrier is slanted to match the median slope. Otherwise the top of the barrier remains horizontal. In all cases, the barrier height (Dimension A) is held constant at the centerline of the barrier.



### Layout Mode Operation

In layout mode, this subassembly displays all pavement links using the width and depth input parameters at a -2% slope. If Include Barrier is True, the barrier is displayed with the given dimensions.

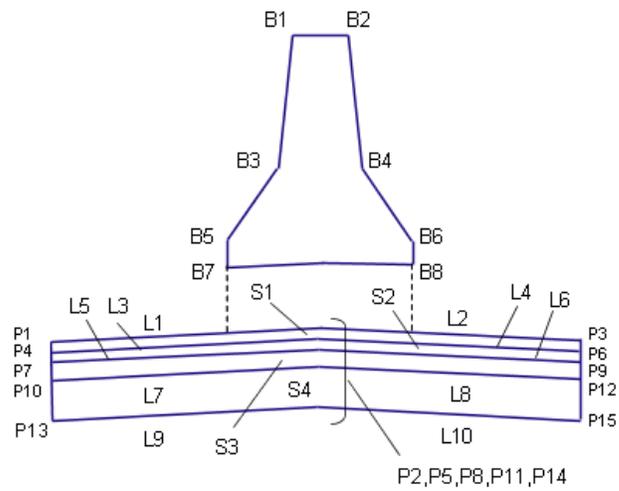
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
All barrier points	Barrier	All points on the concrete barrier
P1, P3	ETW	Inside edge of lane on finish grade
P2	Crown	Crown of median on finish grade
P4, P6	ETW_Pave1	Edge-of-traveled-way on Pave1
P5	Crown_Pave1	Crown on Pave1
P7, P9	ETW_Pave2	Edge-of-traveled-way on Pave2
P8	Crown_Pave2	Crown on Pave2
P10, P12	ETW_Base	Edge-of-traveled-way on Base
P11	Crown_Base	Crown on Base
P13, P15	ETW_Sub	Edge-of-traveled-way on Subbase
P14	Crown_Sub	Crown on Subbase
L1, L2	Top, Pave	

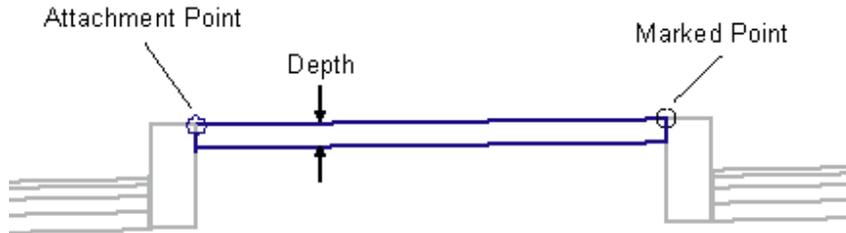
Point, Link, or Shape	Code	Description
L3, L4	Pave1	
L5, L6	Pave2	
L7, L8	Base	
L9, L10	Subbase Datum	
All barrier links	Barrier	
S1	Pave1	Area between finish grade and Pave1
S2	Pave2	Area between Pave1 and Pave2
S3	Base	Area between Pave2 and Base
S4	Subbase	Area between Base and Subbase
S5	Barrier	Shape inclosed by the barrier.

### Coding Diagram



## MedianRaisedConstantSlope

This subassembly inserts links for a constant-slope raised median between two points.



Use the MarkPoint subassembly first if the connecting point has not already been marked.

### Attachment

The attachment point may be at either edge of the median finished grade. The marked point must be at the opposite edge.

### Input Parameters

Note: Subbase dimensions are in meters or feet. Curb-and-gutter dimensions must be given in millimeters or inches.

Parameter	Description	Type	Default
Marked Point	Name of the marked point on the median edge opposite the attachment point	String	None
Depth	Depth of the median cap. May be zero for an unpaved median	Numeric, positive	0.100 m 0.333 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The top of median link is inserted between the attachment point and marked point. If a non-zero Depth is given, the bottom of median link is inserted parallel to the top, and vertical links are added to close the shape.

### Point, Link, and Shape Codes

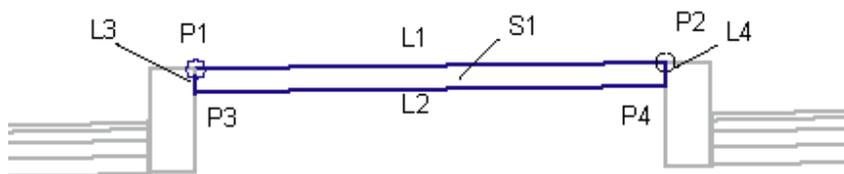
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P2	None	Edges of median on finish grade
P3, P4		
L1	Top	Top of median
L2	Datum	Bottom of median
L3, L4	None	
S1	Median	

### Layout Mode Operation

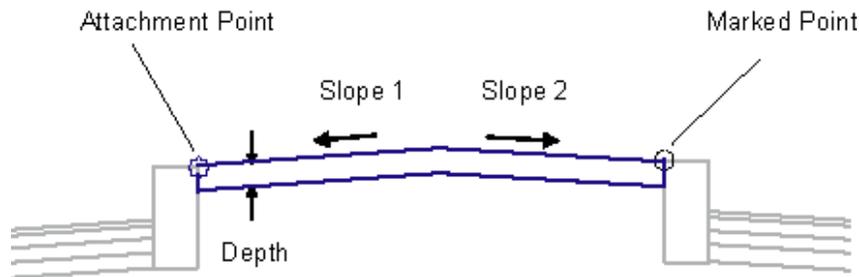
In layout mode, this subassembly shows the generic layout mode display.

### Coding Diagram



## Median Raised With Crown

This subassembly inserts links for a constant-slope raised median between two points.



Use the MarkPoint subassembly first if the connecting point has not already been marked.

### Attachment

The attachment point may be at either edge of the median finished grade. The marked point must be at the opposite edge.

### Input Parameters

Note: Subbase dimensions are in meters or feet. Curb-and-gutter dimensions must be given in millimeters or inches.

Parameter	Description	Type	Default
Marked Point	Name of the marked point on the median edge opposite the attachment point	String	None
Depth	Depth of the median cap. May be zero for an unpaved median.	Numeric, positive	0.100 m 0.333 ft
Slope 1 - Use Superelevation	Specifies to use superelevation slope for median towards crown point	Selection list	No
Slope 1 Default	Specifies default value of slope 1, if superelevation slope is not specified	Numeric	- 2 %
Slope 2 - Use Superelevation	Specifies to use superelevation slope for median towards crown point	Selection list	No
Slope 2 Default	Specifies default value of slope 2, if superelevation slope is not specified	Numeric	- 2 %

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The median crown point is calculated by intersecting lines extended between the attachment point and the marked point at the given slopes. If no intersection is found, the median is not inserted. If a non-zero Depth is given, the bottom of the median links are inserted parallel to the top, and vertical links are added to close the shape.

### Point, Link, and Shape Codes

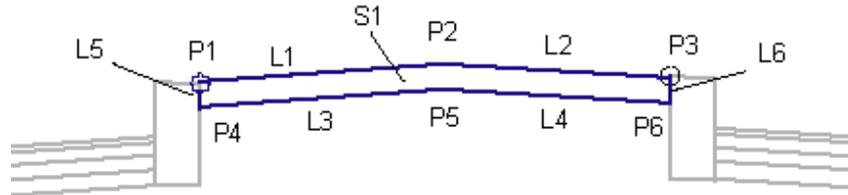
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P3	None	
P2	Median	Crown of median on finish grade
P4 - P6	None	
L1, L2	Top	Top of median
L3, L4	Datum	Bottom of median (if given)
S1	Median	

### Layout Mode Operation

In layout mode, this subassembly shows the generic layout mode display.

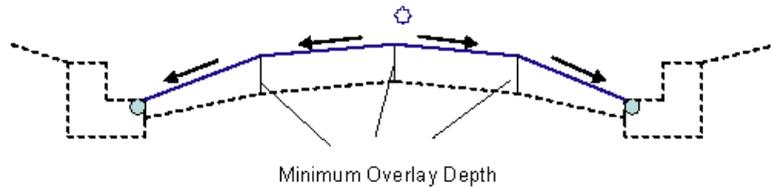
### Coding Diagram



## OverlayBrokenBackBetweenEdges

This subassembly is used to overlay a four-lane crowned corridor between gutter flange points on each side, holding to required slope and breakover ranges. This subassembly differs from `OverlayBrokenBackOverGutter` because it overlays between known flange points, rather than overlaying existing gutter to a known profile on the face of curb.

To use this subassembly, you should have separate alignments defining the left and right edges. Elevations at these points could come from surfaces or profiles. Furthermore, if the component defining the edges (for example, curb and gutter) is also a rehab component, then they could be passed in as marked points, thus transferring offset and elevation information.



### Attachment

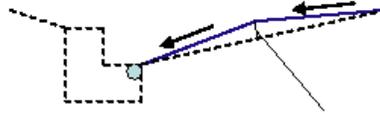
The attachment point is (near) the crown point of the subassembly. This is typically at the assembly baseline point. While in layout mode, this point coincides with crown point, in the corridor state the finished grade profile point (or baseline marker point) may not be same as crown point, since its offset and elevation are computed by edge of pavement data.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Flange Offset	Distance between default attachment point to left edge of pavement. This value is used only if no alignment or marked point is associated to left edge.	Numeric	- 18ft
Right Flange Offset	Distance between default attachment point to right edge of pavement. This value is used only if no alignment or marked point is associated to right edge.	Numeric	6m and 18ft
Left Flange – Marked Point	Provides existing left edge of pavement offset and elevation to start the subassembly. (OPTIONAL)	String	None
Right Flange – Marked Point	Provides existing right edge of pavement offset and elevation to start the subassembly. (OPTIONAL)	String	None
Minimum Overlay	Minimum depth of overlay at the quarter points and crown.	Numeric	0.1m and 0.33ft
Inside Min %Slope	Minimum % slope allowed for the inside lanes, in the outward direction from the attachment point.	Numeric	-1%
Inside Max %Slope	Maximum % slope allowed for the inside lanes, in the outward direction from the attachment point.	Numeric	-4%
Outside Min %Slope	Minimum % slope allowed for the outside lanes, in the outward direction from the attachment point.	Numeric	-2%
Outside Max %Slope	Maximum % slope allowed for the outside lanes, in the outward direction from the attachment point.	Numeric	-6%
Max Breakover	Maximum breakover, in % slope, at the centerline.	Numeric	4%

Parameter	Description	Type	Default
Min Crown Deflections	Minimum crown deflection at the quarter points.	Numeric	0.05m and 0.16ft



Crown deflection at quarter points

Note that if target parameters are provided, the preceding parameters (namely default offsets and marked points) will be ignored as applicable.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Left Flange Point	Provides left edge of pavement offset value with respect to the attachment point. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Right Flange Point	Provides right edge of pavement offset value with respect to the attachment point. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Left Flange Profile	Provides left edge of pavement elevation value with respect to the attachment point. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional
Right Flange Profile	Provides right edge of pavement elevation value with respect to the attachment point. The following object types can be used as targets for specifying this: profiles, 3D polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
EGTopSurf	If profiles are not supplied for left/right edge of pavement elevations, then this surface elevation at that offset will be picked up as elevation value (for left/right) respectively. The following object types can be used as targets for specifying this surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Left Outside Lane %Slope	% slope of the left outside lane	Numeric
Left Inside Lane %Slope	% slope of the left inside lane	Numeric
Right Outside Lane %Slope	% slope of the right outside lane	Numeric
Right Inside Lane %Slope	% slope of the right inside lane	Numeric

### Behavior

This subassembly uses an iterative process to develop acceptable slopes of the inside and outside links. The initial slopes are set as described below. Each time the slope of one link is adjusted, resulting changes in the adjacent links may put them out of design tolerances. If a solution is not obtained within 10 iterations, a message is displayed and the process is aborted.

#### Left Edge of Pavement

From the attachment point, the left edge of the pavement point is located based on: (a) the location of the alignment through the "Left Flange Point" target parameter, (b) if this is not provided, it is based on the assigned marked point (to Left Flange Point), or (c) if both of these are not provided, then it is based on the default (Left Flange Offset) offset value.

Similarly, the elevation for this point is computed based on: (a) the Left Flange profile target parameter, (b) if this is not provided, then the surface elevation is determined from the "EGTopSurf" Logical assignment, or (c) if both of these are not provided, then the assigned marked point determines the elevation.

An error message results if none of these two conditions are met and the corridor fails to build.

#### Right Edge of Pavement

From the attachment point, the right edge of pavement point is located based on: (a) location of alignment through "Right Flange Point" target parameters, (b) if previous is not provided, based on the assigned marked point (to Right Flange Point), or (c) if both are not provided based on the default (Right Flange Offset) offset value.

Similarly, elevation for this point is computed based on: (a) Right Flange profile target parameters assignment, or (b) if previous is not provided then finding out the surface elevation from "EGTopSurf" Logical assignment, or (c) if the previous two are not provided, the assigned marked point determines the elevation. An error message results if none of these two conditions are met and the corridor fails to build.

#### Crown Point

The Crown Point (offset) is located at halfway between the left edge and right edge of pavements.

Elevation of the crown point is the sum of "average elevation of left and right edges" and the "crown height" parameter value.

#### Bottom of Overlay

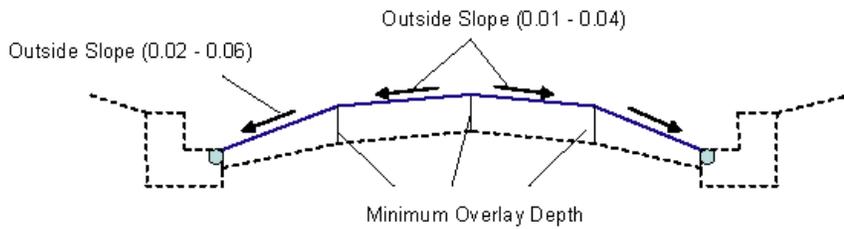
Bottom of overlay surface is computed by offsetting the proposed finish grade (Left Edge point to New Crown Point to Right Edge Point) by Overlay depth value.

#### Quarter Points and Crown Point Offsets

The distance between left and right flange points is divided by four to get the two quarter points and the crown point. These points elevations are computed by adding the minimum overlay depth to the existing ground at these offsets.

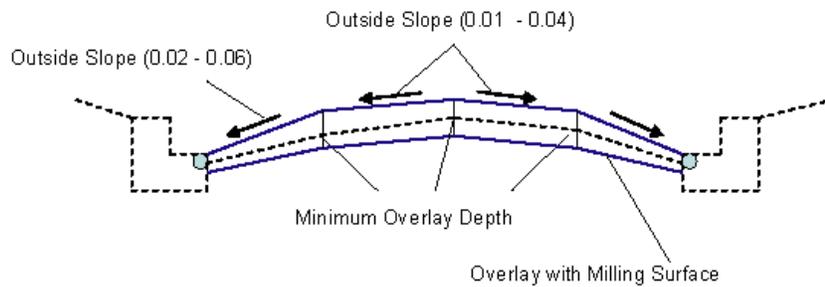
#### Inside and Outside Pavement Slopes

The resulting overlay links from the previous steps are checked for being within the slope tolerances for the outside and inside lanes. If the slopes are within the tolerance, then the case is a simple overlay as shown in the following diagram.



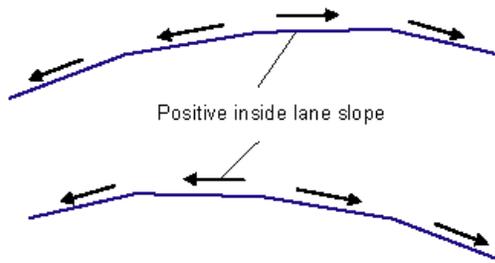
If overlay links are too steep, or if the Maximum Breakover is exceeded at the centerline, or the Min Crown Deflection is not obtained, some or all links are flattened to their maximum slopes. Milling surfaces are inserted to hold the minimum overlay depths at the quarter points and centerline.

If overlay links are too shallow, the depth of overlay is increased to achieve the minimum slopes. If this results in too much breakover, further adjustments and milling may occur. The following diagram explains overlay with milling case:



### Special Cases

A positive slope may be allowed on one inside link if the other inside link has a negative slope, as shown below.



### Layout Mode Operation

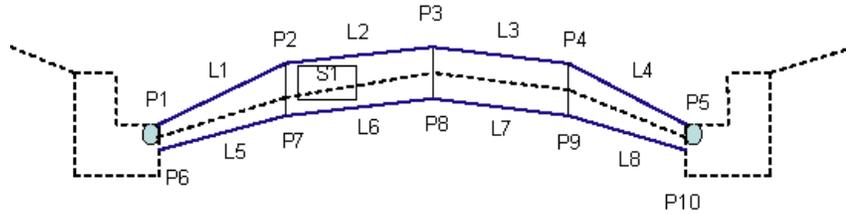
In layout mode, this subassembly inserts two lanes at either side of the attachment point. First two edge points will be located based on left/right offsets. These left and right point elevations are calculated (in layout mode) by subtracting crown height from the ordinate of attachment point. Then the "Crown Point" is located halfway between these two points. However, since the programatic defaults are the same for both left and right, by default the crown point matches with attachment point. Lane slopes in layout mode are equal to the "Min % Outside/Inside Slope" value. Thickness of pavement is equal to Minimum Overlay depth.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P5	ETW	Edges of lane on finish grade
P6, P10	ETW_Overlay	Edges of lane on Overlay
P3	Crown	Crown (grade break) on finish grade
P8	Crown_Overlay	Crown (grade break) on Overlay
P2, P4	LaneBreak	Grade break point at quarter points
P7, P9	LaneBreak_Overlay	Grade break point at quarter points on overlay surface
L1, L2, L3, L4	Top, Pave	Finish grade surface
L5, L6, L7, L8	Overlay	Overlay surface
S1	Overlay	Overlay area

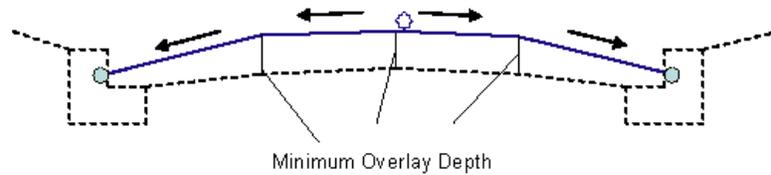
### Coding Diagram



## OverlayBrokenBackOverGutters

This subassembly is used to overlay a four-lane crowned corridor over gutters (between flow lines) on each side, holding to required slope and breakover ranges. This subassembly differs from `OverlayBrokenBackBetweenEdges` because it overlays existing gutters to a known profile on the curb face, rather than overlaying between known flange points.

To use this subassembly, you should have separate alignments defining the left and right curb face points. Elevations at these points could come from surfaces or profiles. Furthermore, if the component defining the edges (for example, curb and gutter) is also a rehab component, then they could be passed in as marked points, thus transferring offset and elevation information.



### Attachment

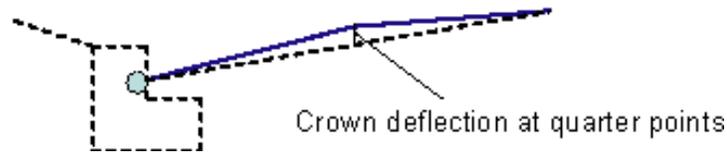
The attachment point is (near) the crown point of the subassembly. Since the subassembly places lanes on either side of the crown, this attachment point is typically at the assembly baseline point. While in layout mode this point coincides with crown point, in the corridor state the finished grade profile point (or baseline marker point) may not be same as crown point, since crown point offset and elevation are computed by input data such as left and right (Curb face) offset values.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Gutter Offset	Distance between attachment point and the left gutter’s curb face. This value is used only if no alignment or marked point is associated to left edge.	Numeric	6m and 18ft
Right Gutter Offset	Distance between attachment point and the right gutter’s curb face. This value is used only if no alignment or marked point is associated to right edge.	Numeric	6m and 18ft
Left Gutter – Marked Point	Provides existing left edge of pavement offset and elevation to start the subassembly. (OPTIONAL)	String	None
Right Gutter – Marked Point	Provides existing right edge of pavement offset and elevation to start the subassembly. (OPTIONAL)	String	None
Minimum Overlay	Minimum depth of overlay at the quarter points and crown.	Numeric	0.1m and 0.33ft
Inside Min %Slope	Minimum % slope allowed for the inside lanes, in the outward direction from the attachment point.	Numeric	-1%
Inside Max %Slope	Maximum % slope allowed for the inside lanes, in the outward direction from the attachment point.	Numeric	-4%
Outside Min %Slope	Minimum % slope allowed for the outside lanes, in the outward direction from the attachment point.	Numeric	-2%
Outside Max %Slope	Maximum % slope allowed for the outside lanes, in the outward direction from the attachment point.	Numeric	-6%
Max Breakover	Maximum breakover, in % slope, at the centerline.	Numeric	4%

Parameter	Description	Type	Default
Min Crown Deflections	Minimum crown deflection at the quarter points.	Numeric	0.05m and 0.16ft



If target parameters are provided, the parameters above (namely default offsets and marked points) will be ignored as applicable.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Left Gutter Point	Provides left edge of pavement offset value with respect to the attachment point. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Right Gutter Point	Provides right edge of pavement offset value with respect to the attachment point. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Left Gutter Profile	Provides left edge of pavement elevation value with respect to the attachment point. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Right Gutter Profile	Provides right edge of pavement elevation value with respect to the attachment point. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
EGTopSurf	If profiles are not supplied for left/right edge of pavement elevations, then this surface elevation at that offset will be picked up as elevation value (for left/right) respectively.	Required

### Output Parameters

Parameter	Description	Type
Left Outside Lane %Slope	% slope of the left outside lane	Numeric
Left Inside Lane %Slope	% slope of the left inside lane	Numeric
Right Outside Lane %Slope	% slope of the right outside lane	Numeric
Right Inside Lane %Slope	% slope of the right inside lane	Numeric

### Behavior

This subassembly uses an iterative process to develop acceptable slopes of the inside and outside links. The initial slopes are set as described below. Each time the slope of one link is adjusted, resulting changes in the adjacent links may put them out of design tolerances. If a solution is not obtained within 10 iterations, a message is displayed and the process is aborted.

#### Left Edge of Pavement

From the attachment point, the left edge of the pavement point is located based on: (a) the location of the alignment through "Left Gutter Point" target parameters, (b) if this is not provided, then it is based on the assigned marked point (to Left Gutter Point), or (c) if both of these are not provided, it is based on the default (Left Gutter Offset) offset value.

Similarly, the elevation for this point is computed based on: (a) Left Gutter profile target parameter, (b) if this is not provided, then it determines the surface elevation from "EGTopSurf" Logical assignment, or (c) if these two are not provided, then the assigned marked point determines the elevation. An error message results if none of these two conditions are met and the corridor fails to build.

### Right Edge of Pavement

From the attachment point, the right edge of the pavement point is located based on: (a) the location of the alignment through "Right Gutter Point" target parameter, (b) if this is not provided, it is based on the assigned marked point (to Right Gutter Point), or (c) if both of these are not provided, then it is based on the default (Right Gutter Offset) offset value.

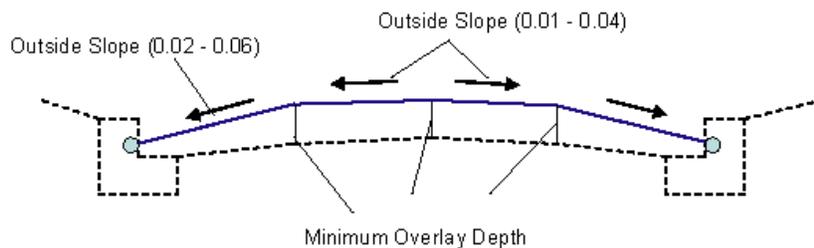
Similarly, the elevation for this point is computed based on: (a) Right Gutter profile target parameter, (b) if this is not provided, then it determines the surface elevation from "EGTopSurf" Logical assignment, or (c) if these two are not provided, then the marked point determines the elevation. An error message results if none of these two conditions are met and the corridor fails to build.

### Quarter Points and Crown Point Offsets

The distance between left and right flange points is divided by four to get the two quarter points and the crown point. These points elevations are computed by adding the minimum overlay depth to the existing ground at these offsets.

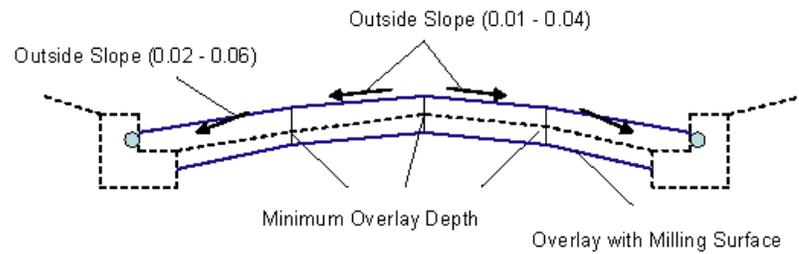
### Inside and Outside Pavement Slopes

The resulting overlay links from the previous steps are checked for being within the slope tolerances for the outside and inside lanes. If the slopes are within the tolerance, then the case is a simple overlay as show in the following diagram.



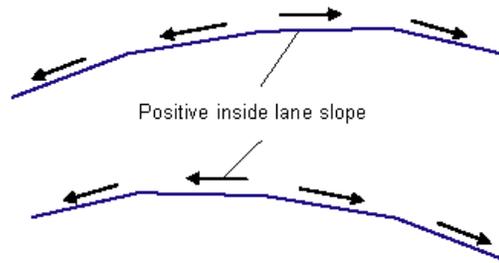
If the overlay links are too steep, or if the Maximum Breakover is exceeded at the centerline, or the Min Crown Deflection is not obtained, some or all links are flattened to their maximum slopes. Milling surfaces are inserted to hold the minimum overlay depths at the quarter points and centerline.

If overlay links are too shallow, the depth of overlay is increased to achieve the minimum slopes. If this results in too much breakover, further adjustments and milling may occur. The following diagram illustrates the overlay with milling case.



### Special Cases

A positive slope may be allowed on one inside link if the other inside link has a negative slope, as shown below.



### Layout Mode Operation

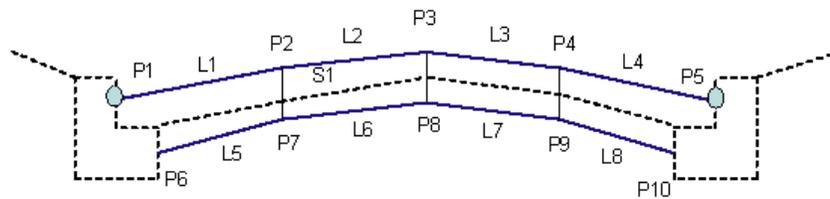
In layout mode, this subassembly inserts two lanes at either side of the attachment point. The first two edge points will be located based on left/right offsets. These left and right point elevations are calculated, in layout mode, by subtracting crown height from the ordinate of attachment point. Then the "Crown Point" is located halfway between these two points. However, since the programmatic defaults are the same for both left and right, by default, the crown point matches the attachment point. Lane slopes in layout mode are equal to the "Min % Outside/Inside Slope" value. Thickness of pavement is equal to Minimum Overlay depth.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P5	ETW	Edges of lane on finish grade
P6, P10	ETW_Overlay	Edges of lane on Overlay
P3	Crown	Crown (grade break) on finish grade
P8	Crown_Overlay	Crown (grade break) on Overlay
P2, P4	LaneBreak	Grade break point at quarter points
P7, P9	LaneBreak_Overlay	Grade break point at quarter points on overlay surface
L1, L2, L3, L4	Top, Pave	Finish grade surface
L5, L6, L7, L8	Overlay	Overlay surface
S1	Overlay	Overlay area

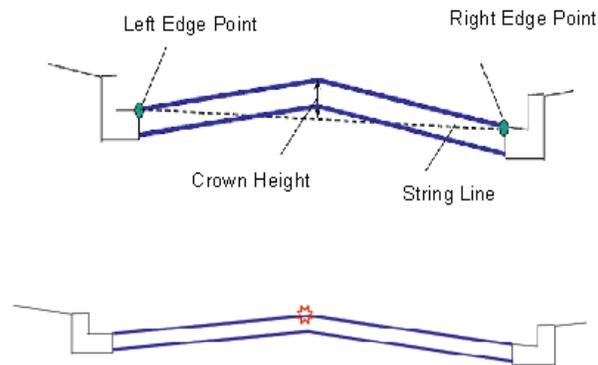
### Coding Diagram



## OverlayCrownBetweenEdges

This subassembly creates a simple crowned roadway between two edge-of-pavement points.

To use this subassembly, you should have separate alignments defining the left and right edges. Elevations at these points could come from surfaces or profiles. Furthermore, if the component defining the edges (for example, curb and gutter) is also a rehab component, then they could be passed in as marked points, thus transferring offset and elevation information.



### Attachment

The attachment point is (near) the crown point of the subassembly. This is typically at the assembly baseline point. While in layout mode, this point coincides with crown point, in the corridor state the finished grade profile point (or baseline marker point) may not be the same as crown point since its offset and elevation are computed by edge of pavement data.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Edge Offset	Distance between default attachment point to left edge of pavement. This value is used only if no alignment or marked point is associated to left edge.	Numeric	3.6m and 12ft

Parameter	Description	Type	Default
Right Edge Offset	Distance between default attachment point to right edge of pavement. This value is used only if no alignment or marked point is associated to right edge.	Numeric	3.6m and 12ft
Left Edge – Marked Point	Provides existing left edge of pavement offset and elevation to start the subassembly. (OPTIONAL)	String	None
Right Edge – Marked Point	Provides existing right edge of pavement offset and elevation to start the subassembly. (OPTIONAL)	String	None
Crown Height	Height from the center point of the string line to the crown point.	Numeric	0.1m and 0.33ft
Min %Slope	Minimum % slope allowed for the outside lanes, in the outward direction from the attachment point.	Numeric	-1%
Max %Slope	Maximum % slope allowed for the outside lanes, in the outward direction from the attachment point.	Numeric	-3%
Overlay Depth	Depth of overlay above existing finish grades.	Numeric	0.1m and 0.30ft

If target parameters are provided, the preceding parameters (namely default offsets and marked points) will be ignored as applicable.

#### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Left Edge	Provides left edge of pavement offset value with respect to the attachment point. The following object types can be used as targets for specifying	Optional

Parameter	Description	Status
	this offset: alignments, polylines, feature lines, or survey figures.	
Right Edge	Provides right edge of pavement offset value with respect to the attachment point. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Edge	Provides left edge of pavement elevation value with respect to the attachment point. . The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Right Edge	Provides right edge of pavement elevation value with respect to the attachment point. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
EGTopSurf	If profiles are not supplied for left/right edge of pavement elevations, then this surface elevation at that offset will be picked up as elevation value (for left/right) respectively. The following object types can be used as targets for specifying this surface: surfaces.	Required

### Output Parameters

Parameter	Description	Type
Left Lane %Slope	% slope of the left lane	Numeric
Right Lane %Slope	% slope of the right lane	Numeric

### Behavior

#### Left Edge of Pavement

From the attachment point, the left edge of the pavement point is located based on: (a) the location of the alignment through "Left Edge" target

parameter, (b) if this is not provided, it is based on the assigned marked point (to Left Edge), or (c) if both of these are not provided, then it is based on the default (Left Edge) offset value.

Similarly, the elevation for this point is computed based on: (a) Left Edge profile target parameter, (b) if this is not provided, then it determines the surface elevation from "EGTopSurf" Logical assignment, or (c) if these two are not provided, the assigned marked point determines the elevation. An error message results if none of these two conditions are met and the corridor fails to build.

#### Right Edge of Pavement

From the attachment point, the right edge of the pavement point is located based on: (a) the location of the alignment through "Right Edge" target parameter, (b) if previous is not provided, based on the assigned marked point (to Right Edge), or (c) if both are not provided based on the default (Right Edge) offset value.

Similarly, the elevation for this point is computed based on: (a) Right Edge profile target parameter, (b) if this is not provided, then it determines the surface elevation from "EGTopSurf" Logical assignment, or (c) if these two are not provided, then the assigned marked point determines the elevation. An error message results if none of these two conditions are met and the corridor fails to build.

#### Crown Point

Crown Point (offset) is located at halfway between the left edge and right edge of pavements.

Elevation of the crown point is the sum of "average elevation of left and right edges" and the "crown height" parameter value.

#### Bottom of Overlay

Bottom of overlay surface is computed by offsetting the proposed finish grade (Left Edge point to New Crown Point to Right Edge Point) by Overlay depth value.

### **Layout Mode Operation**

In layout mode, this subassembly inserts one lane each on either side of the attachment point. First two edge points will be located based on left/right offsets. These left and right point elevations are calculated (in layout mode) by subtracting crown height from the ordinate of attachment point. Then the "Crown Point" is located halfway between these two points. However, since the programmatic defaults are the same for both left and right, by default the

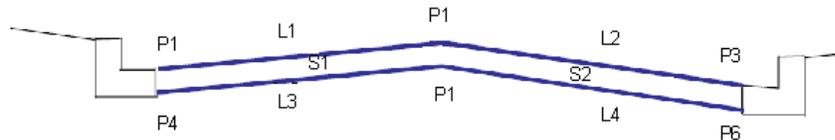
crown point matches with baseline marker point. Lane slopes in layout mode are equal to the "Min % Slope" value. Thickness of pavement is equal to Overlay depth.

**Point, Link, and Shape Codes**

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

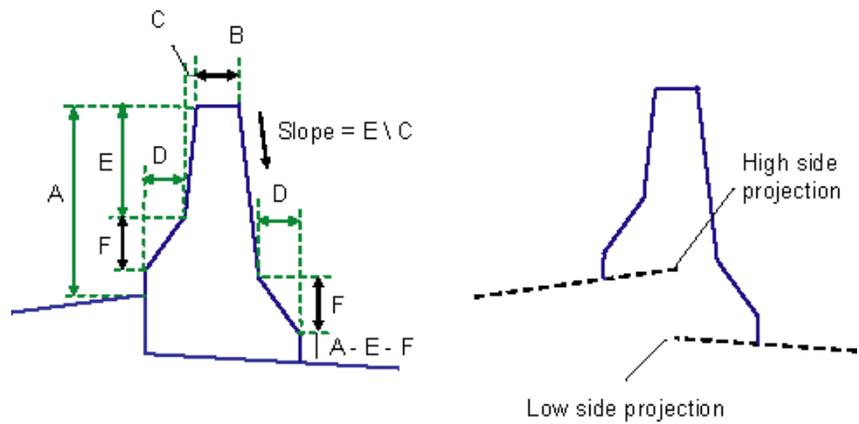
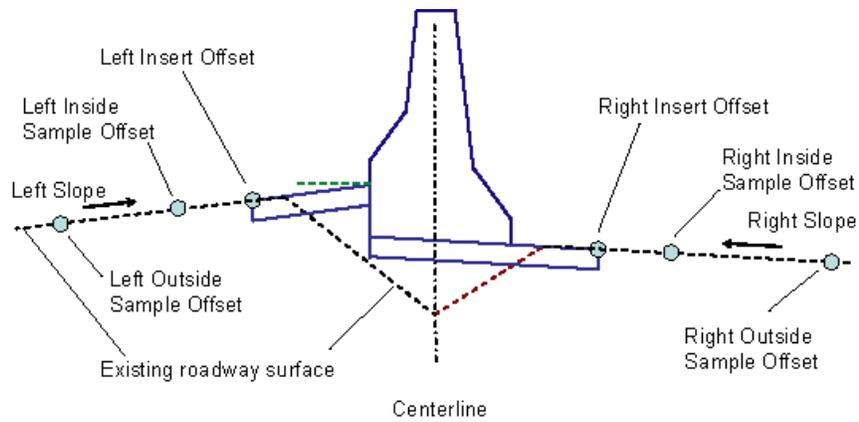
Point, Link, or Shape	Code	Description
P1, P3	ETW	Edges of lane on finish grade
P4, P6	ETW_Overlay	Edges of lane on Overlay
P2	Crown	Crown (grade break) on finish grade
P5	Crown_Overlay	Crown (grade break) on Overlay
L1, L2	Top, Pave	Finish grade surface
L3, L4	Overlay	Overlay surface
S1, S2	Overlay	Overlay area

**Coding Diagram**



## OverlayMedianAsymmetrical

This subassembly widens an existing divided highway by extending from the travel lane edges inward over a depressed median, with an asymmetrical barrier at the centerline to resolve elevation differences. It includes an option to tie the top-of-barrier elevation to a predefined profile.



### Attachment

The attachment point is the center of the base of the barrier.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Overlay Depth	Thickness of the median overlay layers.	Numeric, positive	0.100 m 0.3 ft

Parameter	Description	Type	Default
Left Insert Offset	Offset where the median extension layer begins on the left side.	Numeric	0.0
Left Inside Sample Offset	Offset of the inside sample point on the left side. The slope of the left side is calculated on the existing surface between the sample points.	Numeric	0.0
Left Outside Sample Offset	Offset of the outside sample point on the left side. The slope of the left side is calculated on the existing surface between the sample points.	Numeric	0.0
Right Insert Offset	Offset where the median extension layer begins on the right side.	Numeric	0.0
Right Inside Sample Offset	Offset of the inside sample point on the right side. The slope of the right side is calculated on the existing surface between the sample points.	Numeric	0.0
Right Outside Sample Offset	Offset of the outside sample point on the right side. The slope of the right side is calculated on the existing surface between the sample points.	Numeric	0.0
Dimension A (mm or inches)	Height of the barrier from the base on the high side of the median to the top of the barrier.	Numeric, positive	810 mm 32 in
Dimension B (mm or inches)	As shown in diagram.	Numeric, positive	232 9 in
Dimension C (mm or inches)	As shown in diagram.	Numeric, positive	59 mm 2 in
Dimension D (mm or inches)	As shown in diagram.	Numeric, positive	125 mm 5 in
Dimension E (mm or inches)	As shown in diagram.	Numeric, positive	557 mm 22 in
Dimension F (mm or inches)	As shown in diagram.	Numeric, positive	178 mm 7 in

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Name of the Surface defining the existing roadway. The following object types can be used as targets for specifying this surface: surfaces.	Required
Top of Barrier	May be used to tie the top of barrier to the elevation of a profile. Dimension E may vary to achieve the calculated barrier height. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Left Insert Offset	May be used to calculate the offset of the left insert point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Inside Sample Offset	May be used to calculate the offset of the left inside sample point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Outside Sample Offset	May be used to calculate the offset of the left outside sample point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Insert Offset	May be used to calculate the offset of the right insert point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Right Inside Sample Offset	May be used to calculate the offset of the right inside sample point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Outside Sample Offset	May be used to calculate the offset of the right outside sample point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

None.

### Behavior

The left and right slopes are calculated between the sample points on each side. Lines from the cutout points are extended inward at these slopes to the centerline. The side with the highest elevation at the centerline determines the controlling side for the minimum height of the barrier.

The offset of the barrier base on the high side is calculated from the given dimensions. The overlay layer on the high side is extended from the cutout point to this offset.

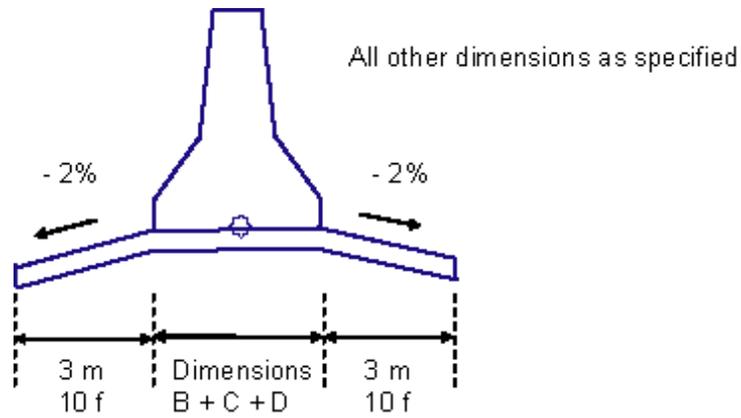
The overlay layer on the low side is extended from the cutout point to the offset of the barrier base on the high side.

The barrier is constructed from the base point on the high side, closing to the top of the overlay layer on the low side, as shown in the diagram.

If a top-of-barrier profile is given as a target parameter, the height of the barrier is controlled by the profile. Dimension E may vary to achieve this height.

### Layout Mode Operation

In layout mode, a symmetrical median and barrier are drawn with the fixed dimensions shown below. This is the same figure that is drawn in layout mode for the OverlayMedianSymmetrical subassembly.



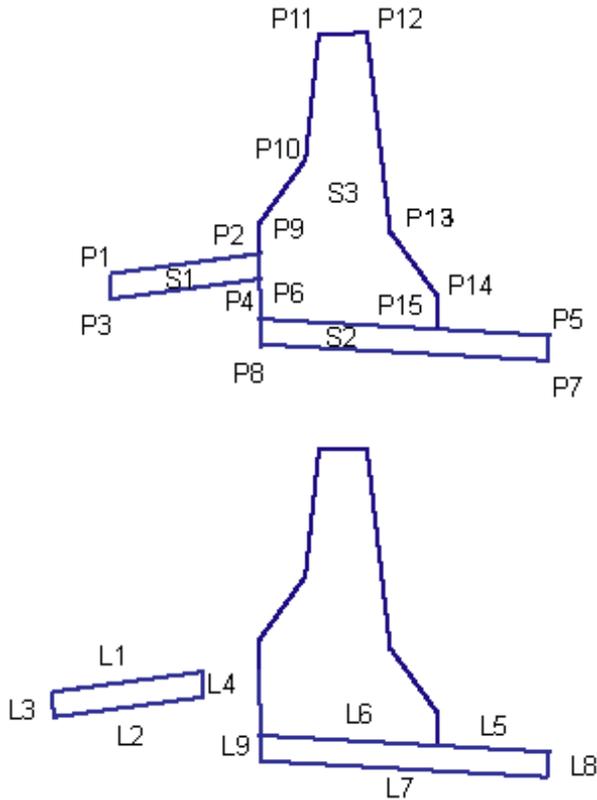
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P5	ETW	Beginning of median extension at top of overlay
P3, P7	ETW_Overlay	Beginning of median extension at bottom of overlay
All barrier points	Barrier	
L1, L5	Top	Exposed top of overlay layers
L2 - L4	Overlay	
L7 - L9	Overlay	
All barrier links	Barrier	
S1, S2	Overlay	
S3	Barrier	

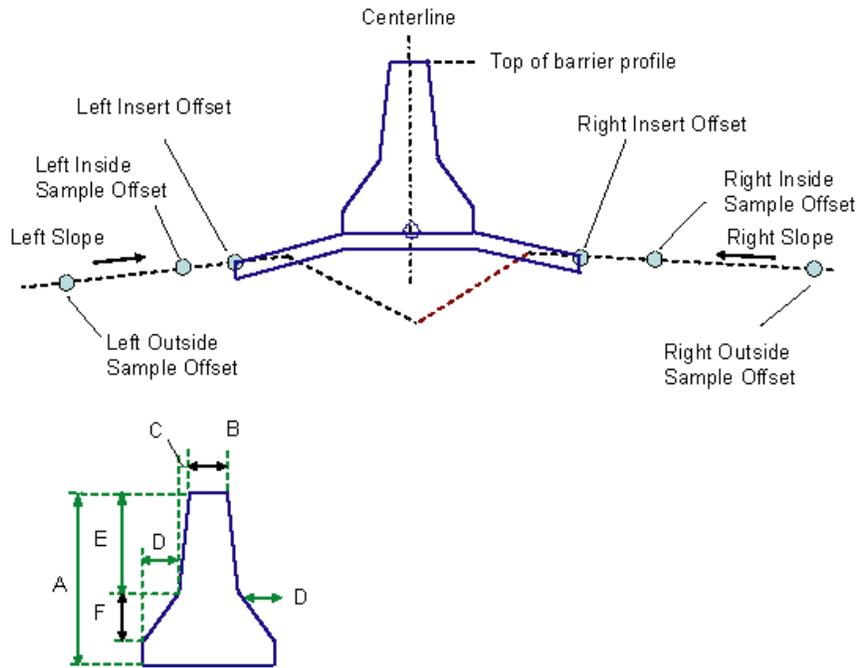
### Coding Diagram

**NOTE** The mirror image will apply when the high side of the median is on the right instead of the left.



## OverlayMedianSymmetrical

This subassembly widens an existing divided highway by extending from the travel lane edges inward over a depressed median, with a symmetrical barrier at the centerline. The median slopes may vary somewhat from the existing slopes to make both sides meet at the centerline, or to hold the top of the barrier to a profile.



### Attachment

The attachment point is at the midpoint of the base of the barrier.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Overlay Depth	Thickness of the median overlay layers.	Numeric, positive	0.100 m 0.3 ft
Slope Tolerance	Amount that the median % slopes are allowed to vary from the calculated existing Left and Right slopes.	Numeric, positive	5%
Left Insert Offset	Offset where the median extension layer begins on the left side.	Numeric	0.0

Parameter	Description	Type	Default
Left Inside Sample Offset	Offset of the inside sample point on the left side. The slope of the left side is calculated on the existing surface between the sample points.	Numeric	0.0
Left Outside Sample Offset	Offset of the outside sample point on the left side. The slope of the left side is calculated on the existing surface between the sample points.	Numeric	0.0
Right Insert Offset	Offset where the median extension layer begins on the right side.	Numeric	0.0
Right Inside Sample Offset	Offset of the inside sample point on the right side. The slope of the right side is calculated on the existing surface between the sample points.	Numeric	0.0
Right Outside Sample Offset	Offset of the outside sample point on the right side. The slope of the right side is calculated on the existing surface between the sample points.	Numeric	0.0
Dimension A (mm or inches)	Height of the barrier from the base on the high side of the median to the top of the barrier.	Numeric, positive	810 mm 32 in
Dimension B (mm or inches)	As shown in diagram.	Numeric, positive	232 9 in
Dimension C (mm or inches)	As shown in diagram.	Numeric, positive	59 mm 2 in
Dimension D (mm or inches)	As shown in diagram.	Numeric, positive	125 mm 5 in
Dimension E (mm or inches)	As shown in diagram.	Numeric, positive	557 mm 22 in
Dimension F (mm or inches)	As shown in diagram.	Numeric, positive	178 mm 7 in

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Name of the Surface defining the existing roadway. The following object types can be used as targets for specifying this surface: surfaces.	Required
Top of Barrier	May be used to tie the top of barrier to the elevation of a profile. Dimension E may vary to achieve the calculated barrier height. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Left Insert Offset	May be used to calculate the offset of the left insert point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Inside Sample Offset	May be used to calculate the offset of the left inside sample point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Outside Sample Offset	May be used to calculate the offset of the left outside sample point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Insert Offset	May be used to calculate the offset of the right insert point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Inside Sample Offset	May be used to calculate the offset of the right inside sample point from an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Outside Sample Offset	May be used to calculate the offset of the right outside sample point from an alignment. The following object types can be used as targets for specifying this	Optional

Parameter	Description	Status
	offset: alignments, polylines, feature lines, or survey figures.	

### Behavior

The left and right slopes are calculated between the sample points on each side.

If the Top of Barrier Profile is not given:

- On each side, a line is calculated that extends from the cutout points to the centerline using the slopes calculated from the sample points.
- If the two lines do not meet at equal elevations, the median slope on the higher side is adjusted down to meet the lower side. The adjustment may not exceed the Slope Tolerance.
- If the high side was adjusted by the slope tolerance and the two sides still do not meet, the low side is adjusted upward. If the adjustment required is greater than the Slope Tolerance, the subassembly exits without storing any points, links, or shapes.

If a Top of Barrier Profile is given as a target parameter:

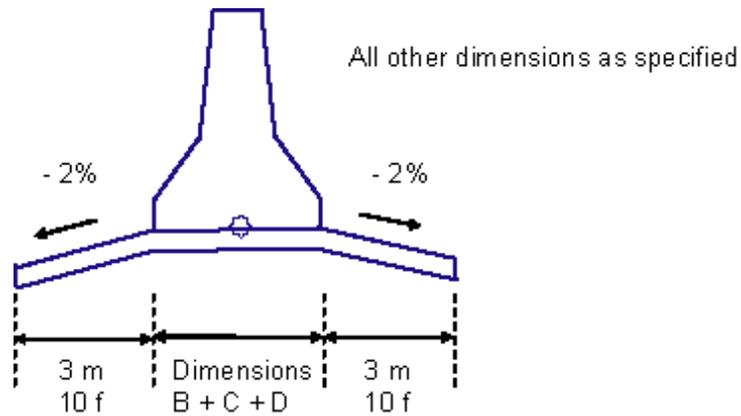
- The left and right barrier base points are calculated from the profile elevation using the given barrier dimensions.
- The slopes between the barrier base points and the insert points are calculated.
- If the difference between the median slope and the existing slope is greater than the slope tolerance on either side, the subassembly exits without storing any points, links, or shapes.
- Otherwise, the median and barrier geometry is added, based on the calculated barrier base point positions, with the median slopes adjusted to tie to the barrier base points.

### Output Parameters

None.

### Layout Mode Operation

In layout mode, a median and barrier are drawn with the fixed dimensions as shown in the following diagram. This is the same figure that is drawn in layout mode for the OverlayMedianAsymmetrical subassembly.

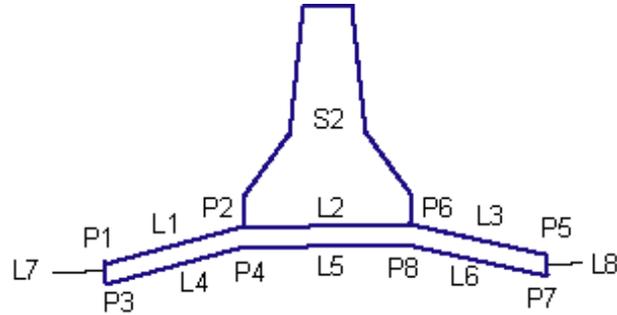


### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P5	ETW	Beginning of median extension at top of overlay
P3, P7	ETW_Overlay	Beginning of median extension at bottom of overlay
All barrier points	Barrier	
L1 - L3	Top	Exposed top of overlay layers
L4 - L8	Overlay	
All barrier links	Barrier	
S1	Overlay	
S2	Barrier	

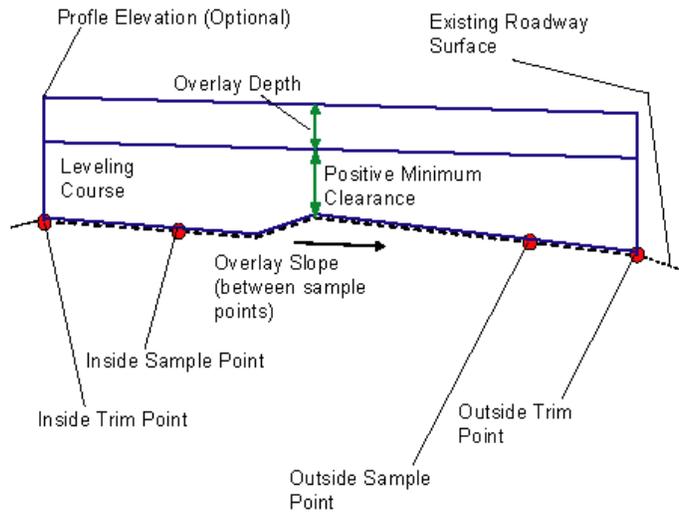
## Coding Diagram



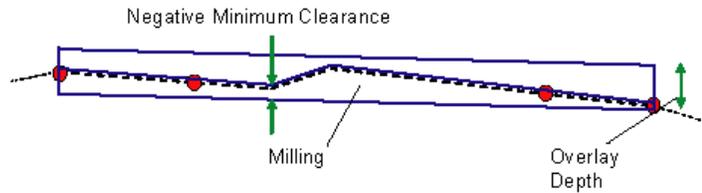
## OverlayMillAndLevel1

This subassembly adds an overlay layer on an existing uncrowned roadway or ramp, with either a leveling and milling layer added as required.

Case 1: Leveling Required



Case 2: Milling Required



### Attachment

The attachment point is the edge of overlay on finish grade at the inside trim point.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Inside Sample Point Offset	Offset of the inside sample point. The sample points are used to calculate the slope of the existing roadway. Specifying a positive value for this parameter inserts this subassembly on the right side of a corridor, or controlling baseline. A negative value inserts it on the left side. For more information, see "Inserting Subassemblies on Right and Left Sides of a Corridor" in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.	Numeric	0.0
Outside Sample Point Offset	Offset of the outside sample point. Specifying a positive value for this parameter inserts this subassembly on the right side of a corridor, or controlling baseline. A negative value inserts it on the left side. For more information, see "Inserting Subassemblies on Right and Left Sides of a Corridor" in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.	Numeric	0.0
Inside Trim Point	Offset of the inside trim point, which defines the inside edge of the overlay layer	Numeric	0.0

Parameter	Description	Type	Default
Outside Trim Point	Offset of the outside trim point, which defines the outside edge of the overlay layer	Numeric	0.0
Overlay Slope Options	Slope of the overlay layer. This can be specified with the following options: a) to match slope from inside sample point to outside sample point or, b) outside lane superelevation slope of the baseline alignment. If the inside points are left of the outside points, then left side superelevation specification is used; otherwise right side. a) User Defined; b) Match slope; c) Outside lane superelevation.	Selection list	Match slope.
Default Slope	Specifies user defined slope. Also can be used if match points or superelevation slope doesn't return appropriate value.	Numeric, grade	- 2.0 %
Slope Tolerance	The value that the Overlay Slope is allowed to vary from its design value. The slope tolerance is not used if the Overlay Slope is given as M (see Behavior below for details).	Numeric, positive	0.5%
Use Profile	Selects whether to hold the top of overlay at the inside trim point to the corridor profile elevation, or to set the vertical placement of the overlay layer based on the Minimum Clearance value	Selection List	Use minimum clearance
Minimum Clearance (+/-)	The minimum vertical clearance between the existing surface and the bottom of the overlay layer. A positive value places the bottom-of-overlay link above the existing surface, creating a Leveling layer beneath the overlay. A negative value places the bottom-of-overlay link below the existing surface, creating a Milling layer that coincides with a portion of the Overlay layer.	Numeric	0.100 m 0.30 ft
Overlay Depth	The thickness of the overlay layer	Numeric, positive	0.100 m 0.30 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Name of the Surface defining the existing roadway. The following object types can be used as targets for specifying this surface: surfaces.	Required
Inside Sample Point Offset	May be used to override the fixed Inside Sample Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Outside Sample Point Offset	May be used to override the fixed Outside Sample Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Inside Trim Point Offset	May be used to override the fixed Inside Trim Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Outside Trim Point Offset	May be used to override the fixed Outside Trim Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

#### Output Parameters

Parameter	Description	Type
%Slope	The slope used for applying the overlay layer.	Numeric

#### Behavior

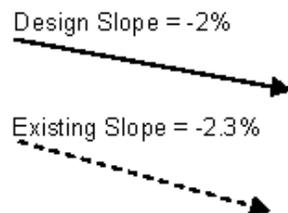
This subassembly inserts parallel links defining the top and bottom of an overlay layer. The links are inserted from the Inside Trim Offset to the Outside Trim Offset.

## Overlay Slopes

The slope of the Existing Surface is determined between the inside and outside sample points. The slope of the overlay layer is determined by the following steps:

- 1 If the Overlay %Slope input is given as M, then the overlay slope matches the slope from the Inside Sample Point to the Outside Sample point.
- 2 If the Overlay %Slope is given as S, then the overlay uses the outside lane superelevation slope defined for the corridor alignment. The left side slope is used if the Outside Sample Point is to the left of the Inside Sample Point, otherwise the right side superelevation slope is used.
- 3 If a numeric value is given for the Overlay %Slope, the given value is used.
- 4 If a numeric value or the superelevation slope is used, the overlay slope is compared to the existing slope between the sample points. If the difference exceeds the Slope Tolerance value, the design slope is adjusted up or down by the Tolerance value to make it more closely match the existing slope and minimize the amount of leveling or milling. Slope adjustment does not occur if the Slope Tolerance is zero.

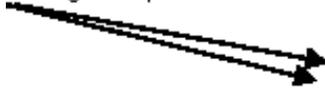
Slope Tolerance Case 1:



Design Slope = -2%  
Existing Slope = -2.3%  
Slope Tolerance = 0.5%  
Difference = -0.3% : Within Tolerance  
Applied Slope = Design Slope = -2%

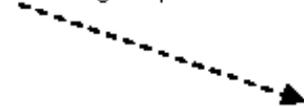
Slope Tolerance Case 2:

Design Slope = -2%



Applied Slope = -2.5%

Existing Slope = -3%



Design Slope = -2%

Existing Slope = -3%

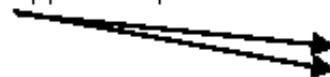
Slope Tolerance = 0.5%

Difference = -1% : Not Within Tolerance

Applied Slope = Design Slope + Slope Tolerance = -2.5%

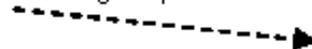
Slope Tolerance Case 3:

Applied Slope = -1.5%



Design Slope = -2%

Existing Slope = -1%



Design Slope = -2%

Existing Slope = -1%

Slope Tolerance = 0.5%

Difference = +1% : Not Within Tolerance

Applied Slope = Design Slope + Slope Tolerance = -1.5%

Overlay Elevations

The elevations of the overlay points are determined as follows:

- 1 If the Use Profile value is True, the elevation of the corridor profile is held at the Inside Trim offset on the top of overlay. The overlay is extended at the overlay slope to the Outside Trim offset, and a parallel link is inserted for the bottom-of-overlay. Any areas above the existing surface

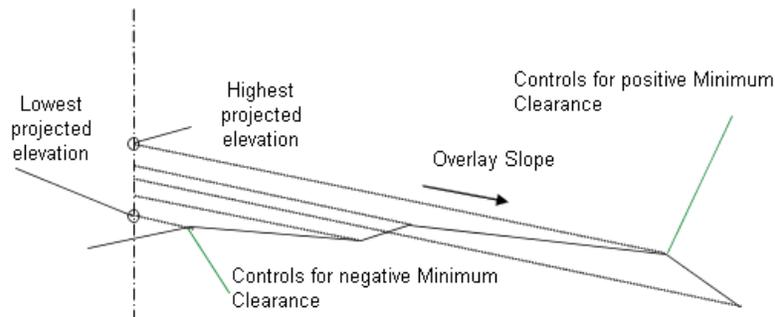
and below the bottom-of-overlay are stored as closed shapes with code "Level". Areas below the existing surface and above the bottom-of-overlay are stored as closed shapes with code "Mill".

- 2 If the Use Profile value is False, the bottom-of-overlay link is shifted vertically to hold to the Minimum Clearance above or below the existing surface. A positive Minimum Clearance creates a leveling area above the existing surface and below the bottom-of-overlay. A negative clearance creates a milling area below the existing surface and above the bottom-of-overlay.

#### Minimum Clearance Point

The method of determining the point where the Minimum Clearance applies is shown in the diagram below.

- 1 A vertical projection line is established at any arbitrary offset.
- 2 Each point on the Existing Surface between the two trim points is projected back to the projection line at the Overlay Slope.
- 3 The point with the highest elevation on the projection line is the control point for a Minimum Clearance value greater than zero. The one with the lowest is the control point for a Minimum Clearance value less than zero.



#### Layout Mode Operation

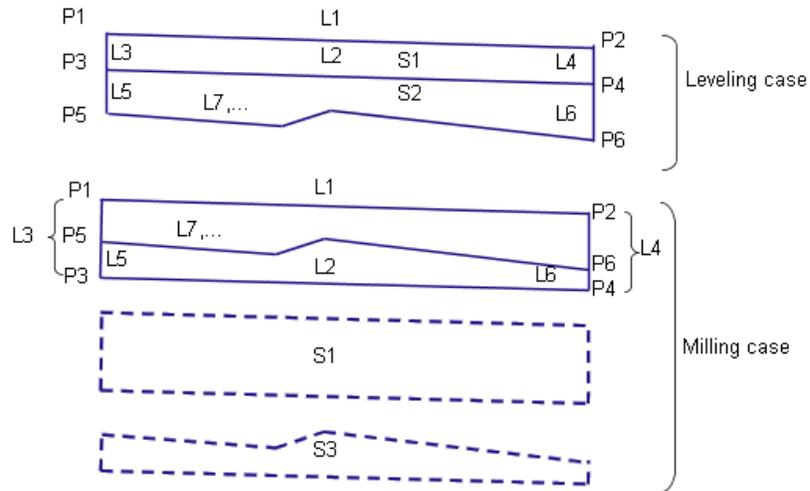
In layout mode, this subassembly displays the overlay layer positioned from any convenient point of attachment at a slope of -2%.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

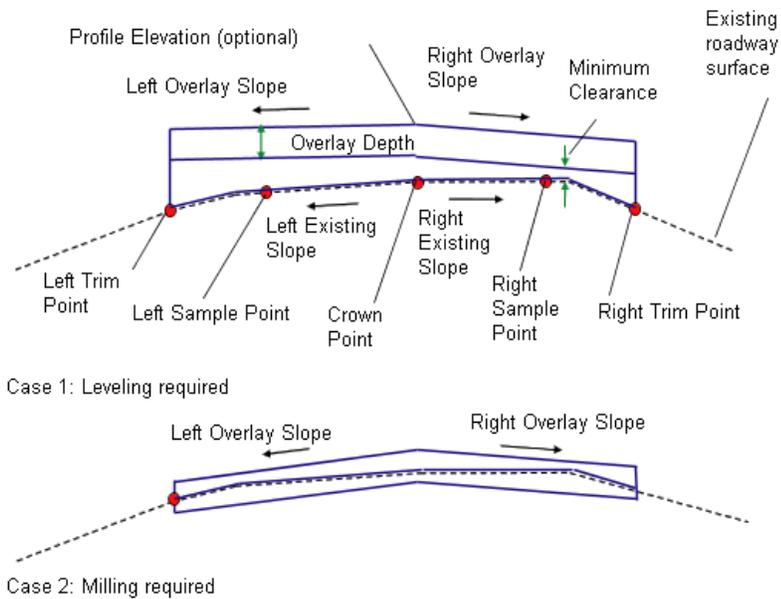
Point, Link, or Shape	Code	Description
P1, P2	EOV	Overlay edges on finish grade
P3, P4	EOV_Overlay	Edges of bottom-of-overlay
L1	Top, Pave	Top of overlay
L2, L3, L4	Overlay	Overlay links. Note that L3, L4 go from the bottom-of-overlay to top-of-overlay in both the Leveling and Milling cases
L5, L6	Level Mill	For the Leveling case For the Milling case
S1	Overlay	Area between the top and bottom of overlay. This overlaps the milling area (S3) for the Milling case as shown in the Coding Diagram below.
S2	Level	Area above existing surface and below the bottom of overlay (Leveling case)
S3	Mill	Area below the existing surface and above the bottom of overlay (Milling case). This area overlaps the Overlay area as shown in the Coding Diagram below.

### Coding Diagram



## OverlayMillAndLevel2

This subassembly adds an overlay layer on an existing crowned roadway, with either a leveling and milling layer added as required.



### Attachment

The attachment point is the crown point on the overlay finish grade.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Crown Point Offset	Offset of the crown point. The crown and sample points are used to calculate the left and right slopes of the existing roadway.	Numeric	0.0
Left Sample Point Offset	Offset of the left sample point	Numeric	0.0
Right Sample Point Offset	Offset of the right sample point	Numeric	0.0
Left Trim Point	Offset of the left trim point, which defines the outside edge of the overlay layer on the left side	Numeric	0.0

Parameter	Description	Type	Default
Right Trim Point	Offset of the right trim point, which defines the outside edge of the overlay layer on the right side	Numeric	0.0
Left Overlay Slope Options	Specifies the left overlay slope with the following options: a) user defined, b) to match slope from inside sample point to outside sample point or, c) use the outside lane superelevation slope of the baseline alignment.	Selection list	Match slope
Default Left Overlay Slope	Specifies user defined slope. Also can be used if match points or superelevation slope doesn't return appropriate value.	Numeric, grade	- 2.0 %
Right Overlay Slope Options	Specifies the right overlay slope with the following options: a) user defined, b) to match slope from inside sample point to outside sample point or, c) use the outside lane superelevation slope of the baseline alignment.	Selection list	Match slope
Default Right Overlay Slope	Specifies user defined slope. Also can be used if match points or superelevation slope doesn't return appropriate value.	Numeric, grade	- 2.0 %
%Slope Tolerance	The value that the Overlay Slopes are allowed vary from their design values. The slope tolerance is not used if the Overlay Slope is given as M (see Behavior below for details).	Numeric, positive	0.5%
Use Profile	Selects whether to hold the top of overlay at the inside trim point to the corridor profile elevation, or to set the vertical placement of the overlay layer based on the Minimum Clearance value	Selection List	Use minimum clearance
Minimum Clearance (+/-)	The minimum vertical clearance between the existing surface and the bottom of the overlay layer. A positive value places the bottom-of-overlay link above the existing surface, creating a Leveling layer beneath the overlay. A negative value places the bottom-of-overlay link below the existing surface, creating a Milling layer that coincides with a portion of the Overlay layer.	Numeric	0.100 m 0.30 ft

Parameter	Description	Type	Default
Overlay Depth	The thickness of the overlay layer	Numeric, positive	0.100 m 0.30 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Name of the Surface defining the existing roadway. The following object types can be used as targets for specifying this surface: surfaces.	Required
Crown Point Offset	May be used to override the fixed Crown Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Sample Point Offset	May be used to override the fixed Left Sample Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Sample Point Offset	May be used to override the fixed Right Sample Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Trim Point Offset	May be used to override the fixed Left Trim Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Trim Point Offset	May be used to override the fixed Right Trim Point Offset and tie the point to an offset alignment. The	Optional

Parameter	Description	Status
	following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	

### Output Parameters

Parameter	Description	Type
Left Overlay %Slope	The slope used for applying the overlay layer on the left side	Numeric
Right Overlay %Slope	The slope used for applying the overlay layer on the right side	Numeric

### Behavior

This subassembly inserts parallel links defining the top and bottom of an overlay layer on each side that join at the crown point. The links are inserted from the Crown Point Offset to the Left and Right Trim Offsets.

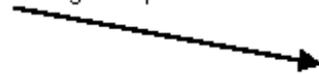
#### Overlay Slopes

The slope of the Existing Surface on each side is determined between the crown and sample points. The slopes of the overlay layers are determined by the following steps:

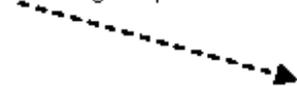
- 1 If the Overlay %Slope input is given as M, then the overlay slope matches the slope from the Crown Point to the Sample point.
- 2 If the Overlay %Slope is given as S, then the overlay uses the outside lane superelevation slope defined for the corridor alignment.
- 3 If a numeric value is given for the Overlay %Slope, the given value is used.
- 4 If a numeric value or the superelevation slope is used, the overlay slope is compared to the existing slope between the sample points. If the difference exceeds the Slope Tolerance value, the design slope is adjusted up or down by the Tolerance value to make it more closely match the existing slope and minimize the amount of leveling or milling. Slope adjustment does not occur if the Slope Tolerance is zero.

Slope Tolerance Case 1:

Design Slope = -2%



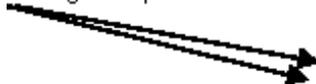
Existing Slope = -2.3%



Design Slope = -2%  
Existing Slope = -2.3%  
Slope Tolerance = 0.5%  
Difference = -0.3% : Within Tolerance  
Applied Slope = Design Slope = -2%

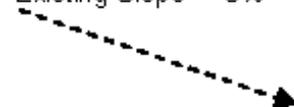
Slope Tolerance Case 2:

Design Slope = -2%



Applied Slope = -2.5%

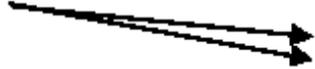
Existing Slope = -3%



Design Slope = -2%  
Existing Slope = -3%  
Slope Tolerance = 0.5%  
Difference = -1% : Not Within Tolerance  
Applied Slope = Design Slope - 0.5% = -2.5%

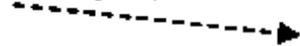
### Slope Tolerance Case 3:

Applied Slope = -1.5%



Design Slope = -2%

Existing Slope = -1%



Design Slope = -2%

Existing Slope = -1%

Slope Tolerance = 0.5%

Difference = +1% : Not Within Tolerance

Applied Slope = Design Slope + 0.5% = -1.5%

### Overlay Elevations

The elevations of the overlay points are determined as follows:

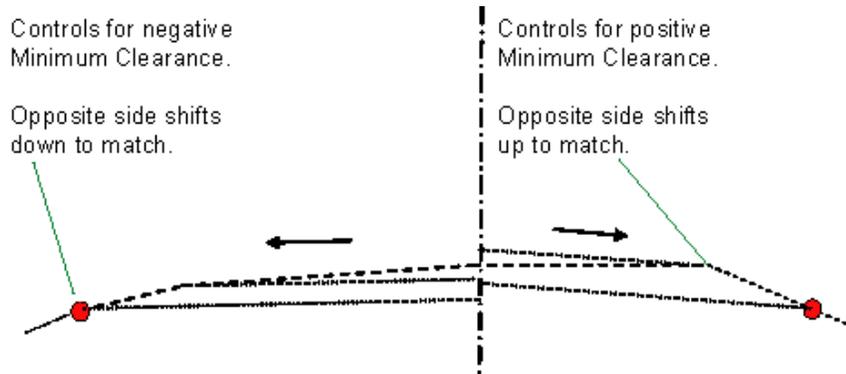
- 1 If the Use Profile value is True, the elevation of the corridor profile is held at the Crown Point offset on the top of overlay. The overlay is extended to each side at the overlay slopes to the Left and Right Trim offsets, and parallel links are inserted for the bottom-of-overlay. Any areas above the existing surface and below the bottom-of-overlay are stored as closed shapes with code "Level". Areas below the existing surface and above the bottom-of-overlay are stored as closed shapes with code "Mill".
- 2 If the Use Profile value is False, the bottom-of-overlay link on each side is shifted vertically to hold to the Minimum Clearance above or below the existing surface. A positive Minimum Clearance creates a leveling area above the existing surface and below the bottom-of-overlay. A negative clearance creates a milling area below the existing surface and above the bottom-of-overlay. The overlay links on one side are shifted vertically so that the links meet at the crown point.

### Minimum Clearance Point

The method of determining the point where the Minimum Clearance applies is shown in the diagram below.

- 1 A vertical projection line is established at any arbitrary offset.
- 2 Each point on the Existing Surface between the two trim points is projected back to the projection line at the Overlay Slope.

- 3 The point with the highest elevation on the projection line is the control point for a Minimum Clearance value greater than zero. The one with the lowest is the control point for a Minimum Clearance value less than zero.



### Layout Mode Operation

In layout mode, this subassembly displays the overlay layer positioned from any convenient point of attachment at a slope of -2%.

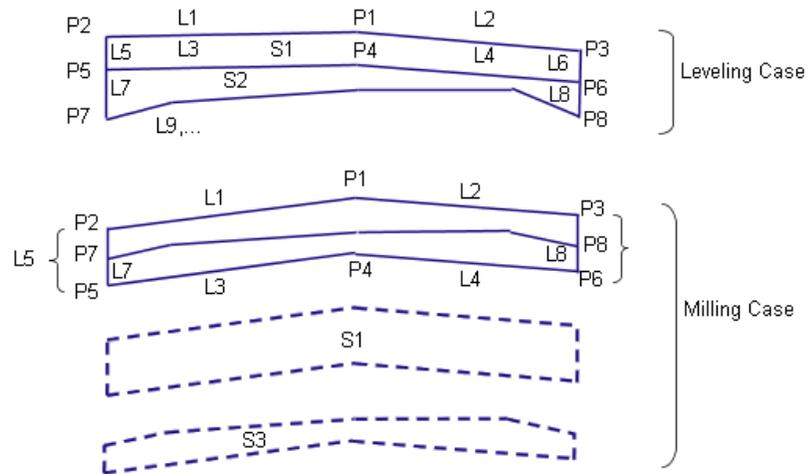
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1	Crown	Crown on finish grade
P2, P3	EOV	Overlay edges on finish grade
P4	Crown_Overlay	Crown on bottom-of-overlay
P5, P6	EOV_Overlay	Edges of bottom-of-overlay
L1, L2	Top, Pave	Top of overlay
L3 – L6	Overlay	Overlay links. Note that L5, L6 go from the bottom-of-overlay to top-of-overlay in both the Leveling and Milling cases.

<b>Point, Link, or Shape</b>	<b>Code</b>	<b>Description</b>
L7, L8	Level Mill	Verticals from existing surface to bottom-of-over- lay: Level - For the Leveling case. Mill - For the Milling case.
S1	Overlay	Area between the top and bottom of overlay. This overlaps the milling area (S3) for the Milling case as shown below.
S2	Level	Area above existing surface and below the bottom of overlay (Leveling case)
S3	Mill	Area below the existing surface and above the bottom of overlay (Milling case). This area overlaps the Overlay area as shown below.

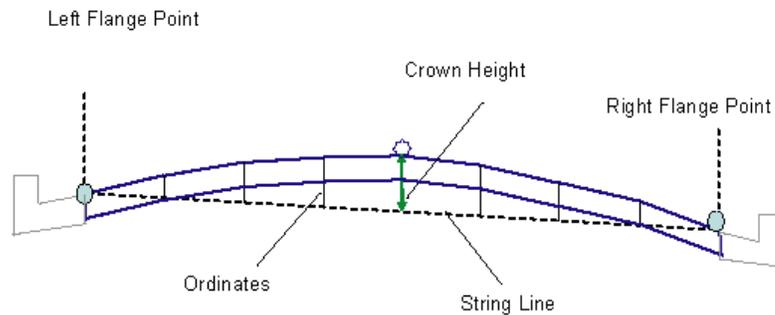
## Coding Diagram



## OverlayParabolic

This subassembly inserts parabolic travel lanes, to represent finish grade, pavement, and subbase for urban, parabolic lanes between known flange points. The parabolic shape is simulated by a series of short, straight-line links.

To use this subassembly, you should have separate alignments defining the left and right flange points. Elevations at these points could come from surfaces or profiles. Furthermore, if the component defining the edges (for example, curb and gutter) is also a rehab component, then they could be passed in as marked points, thus transferring offset and elevation information.



### Attachment

The attachment point is (near) the crown point of the subassembly. Since the subassembly places lanes on either side of the crown, this attachment point is typically at the assembly baseline point. While in the layout mode this point coincides with crown point, in the corridor state the finished grade profile point (or baseline marker point) may not be the same as crown point, as crown point offset and elevation are computed by input data such as left and right (flange point) offset values.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Flange Offset	Distance between attachment point to left edge of pavement. This value is used only if no alignment or marked point is associated to left edge.	Numeric	7.2m 24.0ft
Right Flange Offset	Distance between attachment point to right edge of pavement. This value is used only if no alignment or marked point is associated to right edge.	Numeric	7.2m 24.0ft
Left Flange – Marked Point	To provide existing left edge of pavement offset and elevation to start the subassembly (OPTIONAL)	String	None
Right Flange – Marked Point	To provide existing right edge of pavement offset and elevation to start the subassembly (OPTIONAL)	String	None
Crown Height	Height from the center point of the string line to the crown of road.	Numeric, positive	0.10m 0.3333ft

Parameter	Description	Type	Default
Min %Slope	Minimum % cross slope allowed for the lanes, in the outward direction from the attachment point.	Numeric	-1%
Max %Slope	Maximum % cross slope allowed for the lanes, in the outward direction from the attachment point.	Numeric	-4%
Overlay Depth	Depth of overlay below the finish grade.	Numeric, positive	0.025m 0.083ft
No. Increments	Number of straight line increments simulating the parabolic shape	Numeric, positive, even	8

If target parameters are provided, the parameters above (namely default offsets and marked points) will be ignored as applicable.

#### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Left Gutter Point	This will provide left edge of pavement offset value with respect to the attachment point. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Gutter Point	This will provide right edge of pavement offset value with respect to the attachment point. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Gutter Profile	This will provide left edge of pavement elevation value with respect to the attachment point. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Right Gutter Profile	This will provide right edge of pavement elevation value with respect to the attachment point. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
EGTopSurf	If profiles are not supplied for left/right edge of pavement elevations, then this surface elevation at that offset will be picked up as elevation value (for left/right) respectively. The following object types can be used as targets for specifying this surface: surfaces.	Required

### Output Parameters

None

### Behavior

Initial attachment point is just a place holder (and more applicable in layout mode). First two points to establish are left and right edges, whose offsets and elevations are determined based on input parameters.

Then a string line is defined by joining the left and right flange points (which are newly established edges of travelways). This string line is divided by "number of increments" parameter and middle one is taken as "crown point" offset. Crown point elevation is established by adding the "crown height" parameter to the elevation of midpoint on the string line.

The ordinates of the parabolic curve at other tessellated points are calculated using standard vertical curve equations, based on the assumption that the string line is horizontal. Straight line links are added to connect the ordinate points in a series (from left edge to crown point to right edge) to define the finish grade. A parallel surface is inserted at the overlay depth below this finish grade.

### Layout Mode Operation

In layout mode, this subassembly inserts equal number (based on input parameter) lanes on either side of the attachment point. First two edge points will be located based on left/right offsets. These left and right point elevations are calculated (in layout mode) by subtracting crown height from the ordinate of attachment point. Then the "Crown Point" is located halfway between these

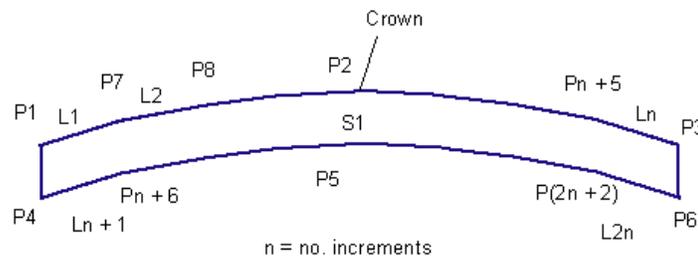
two points. However, since the programatic defaults are the same for both left and right, by default the crown point matches with attachment point. Lane slopes are accepted as they come in. Thickness of pavement is equal to overlay depth.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P1, P3	ETW	Outside edges of lane on finish grade
P4, P6	ETW_Overlay	Outside edges of lane on the Base surface
P2	Crown	Crown point on finish grade
P5	Crown_Overlay	Crown point on Pave1
L1 to Ln	Top, Pave	Links connecting all points on finish grade
L(n+1) to L(2n)	Overlay	Links connecting all points on bottom of overlay surface
S1	Overlay	Area between finish grade and Pave1

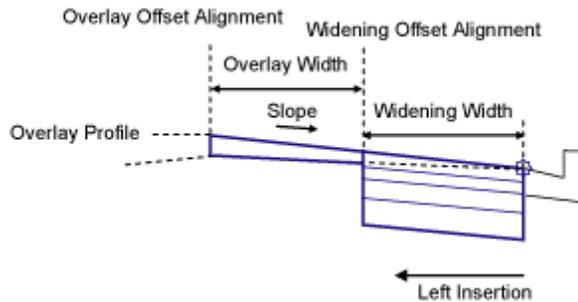
### Coding Diagram



# OverlayWidenFromCurb

This subassembly is used to overlay one side of an existing road, and add one or more travel lanes to the edge going around a curb return.

It is similar to the OverlayWidenMatchSlope1 subassembly, except that it extends inwards from an existing or proposed curb flange point.



## Attachment

The attachment point is at the outside edge of the lane widening section. Typically this subassembly is inserted inwards from the flange of an existing or proposed curb and gutter, or from the outside edge of pavement around a curb return.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies which side of the attachment point this subassembly will be added.	Boolean	Left / Right
Widening Width	Width of the widening lane.	Numeric, positive	3.6 m 12.0 ft
Overlay Width	Width of the pavement overlay.	Numeric, positive	3.6 m 12.0 ft
Slope	Slope of the overlay and widening.	Numeric	- 2%

Parameter	Description	Type	Default
Pave1 Depth	Thickness of the Pave1 layer for the lane widening; zero to omit.	Numeric, positive	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer for the lane widening; zero to omit.	Numeric, positive	0.025 m 0.083 ft
Base Depth	Thickness of the base layer for the lane widening.	Numeric, positive	0.100 m 0.333 ft
Subbase Depth	Thickness of the subbase layer for the lane widening.	Numeric, positive	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Name of the Surface defining the existing roadway. The following object types can be used as targets for specifying this surface: surfaces.	Required
Widening Offset	May be used to override the fixed Widening Width and tie the inside edge of widening to an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Offset Overlay	May be used to override the Overlay Width and tie the inside edge of overlay to an alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Overlay Profile	May be used to override the Slope and tie the elevation of the inside edge of overlay to a profile, resulting in a calculated slope. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

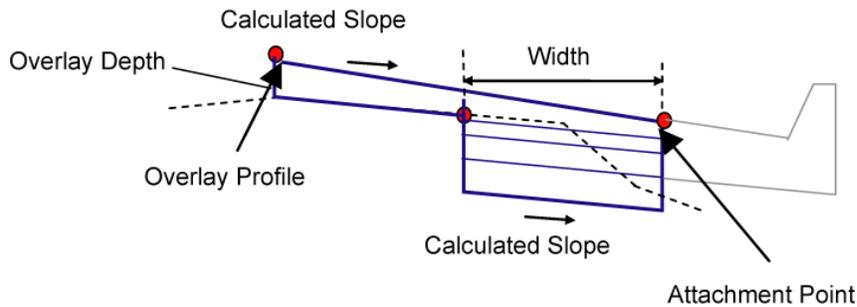
Parameter	Description	Type
%Slope	The calculated slope on the existing surface from the Sample Point to the Insert Point	Numeric

### Behavior

The attachment point determines the offset and elevation of the outside edge of widening. The location of the inside edge of widening and inside edge of overlay are determined using the given widths and slope. Alignments can be used to override the given numeric widths. If the Overlay Profile is given, then the slope is calculated between the profile elevation at the inside edge of the overlay and the attachment point.

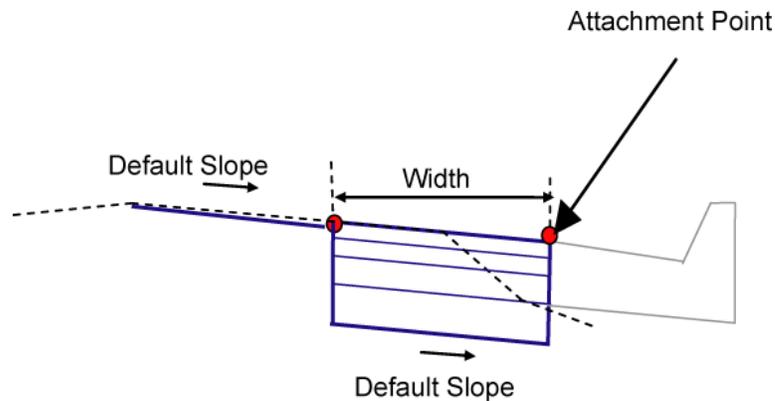
The following illustration shows a situation with an overlay offset profile. (If the Overlay Profile is given, then the slope is calculated between the profile elevation at the inside edge of the overlay and the attachment point.)

This one below was imported at 150dpi.



The following illustration shows a situation with no overlay offset profile.

This one below was imported at 72dpi.



It is important to note that slope from the left to right of this subassembly is the same. Also, the same slope is applied to all subsurfaces.

Finally, if overlay profile is attached, then we have to add vertical links (a) from “overly offset” to target (EG) surface, and (b) from end of overlay and beginning of widening to target (EG) surface, and (c) add links between two points along (tracing) target (EG) surface links.

The area formed by this shape is to be coded as “Overlay” (S1) below in the coding diagram.

The overlay is the area between the top of the overlay and the existing ground, and may be a non-uniform depth.

### Layout Mode Operation

In layout mode this subassembly is attached to any convenient point. The subassembly is shown at the given widths and slope. In modeling mode, the shapes adjust to the actual conditions defined by the existing surface and Runtime Logical alignments and profile.

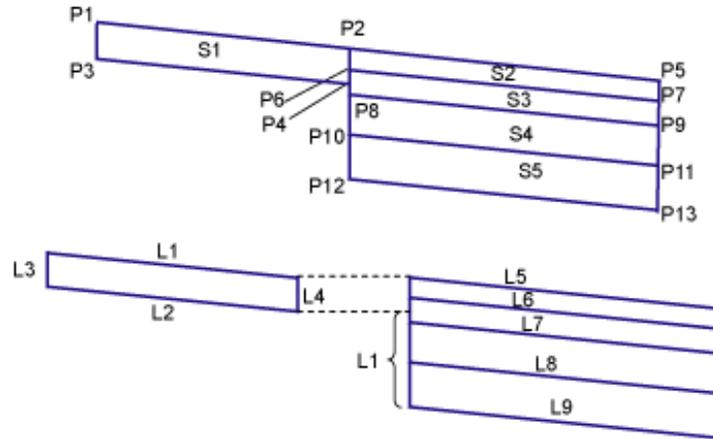
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P5	ETW	Outside edge of widening lane on finish grade
P7	ETW_Pave1	Outside edge of widening lane on Pave1

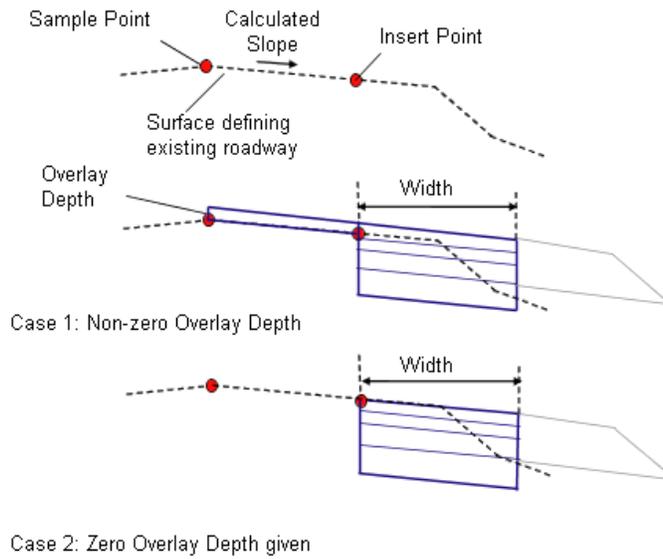
<b>Point, Link, or Shape</b>	<b>Codes</b>	<b>Description</b>
P9	ETW_Pave2	Outside edge of widening lane on Pave2
P11	ETW_Base	Outside edge of widening lane on Base
P13	ETW_Sub	Outside edge of widening lane on Subbase
L1, L5	Top, Pave	Finish grade surface
L2	Overlay	Superimposed over links on the Existing Surface. Note, there may be more than a single link between points P3 and P4.
L6	Pave1	
L7	Pave2	
L8	Base	
L9	Subbase, Datum	
L10	Datum	
S1	Overlay	Area between the overlay and existing lane.
S2	Pave1	
S3	Pave2	
S4	Base	
S5	Subbase	

## Coding Diagram



## OverlayWidenMatchSlope1

This subassembly overlays one side of an existing road, and adds one or more travel lanes to the edge while matching the existing lane slopes.



## Attachment

The attachment point is at the inside edge of the top of the overlay layer.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Sample Point Offset	Offset of the sample point, which may be anywhere between the insertion point and the next slope break on the existing road surface. Typical Sample point locations are the crown of road, or the opposite edge-of-traveled-way if the road is not crowned.	Numeric	0.0
Insert Point Offset	Offset of the insertion point, which is typically at the edge-of-traveled-way where the widening is to occur	Numeric	0.0
Overlay Depth	Depth of the overlay above the existing finish grade	Numeric, positive	0.100 m 0.30 ft
Width	Width of the widening lane	Numeric, positive	3.6 m 12.0 ft
Pave1 Depth	Thickness of the Pave1 layer for the lane widening; zero to omit	Numeric, positive	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer for the lane widening; zero to omit	Numeric, positive	0.025 m 0.083 ft
Base Depth	Thickness of the base layer for the lane widening	Numeric, positive	0.100 m 0.333 ft
Subbase Depth	Thickness of the subbase layer for the lane widening	Numeric, positive	0.300 m 1.0 ft

## Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Name of the Surface defining the existing roadway. The following object types can be used as targets for specifying this surface: surfaces.	Required
Sample Point Offset	May be used to override the fixed Sample Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Insert Point Offset	May be used to override the fixed Insert Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Width	May be used to override the fixed widening lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

#### Output Parameters

Parameter	Description	Type
%Slope	The calculated slope on the existing surface from the Sample Point to the Insert Point	Numeric

#### Behavior

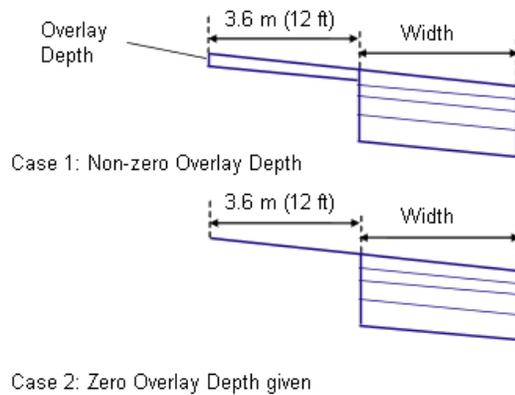
The elevations of the Sample Point and Insert Point on the Existing Surface are determined, and the slope is calculated from the sample point to the insert point. An overlay layer is added above the existing lane at the same slope for the given Overlay Depth. A closed overlay shape is created by superimposing one or more links over the existing grade. The widening lane is attached outward from the overlay at the Insert Offset using the calculated slope.

The pavement layers are closed with vertical links at each end. A single vertical link is also placed from the inside edge of Subbase to the existing surface.

### Layout Mode Operation

In layout mode, this subassembly is attached to any convenient point. The overlay layer is shown at a uniform depth for a width of 3.6 meters or 12 ft at a slope of -2%. The widening lane extends from the edge-of-overlay for the given width and depths at a -2% slope.

In modeling mode the shapes adjust to the actual conditions determined by the Sample Point, Insert Point, and Existing Surface.



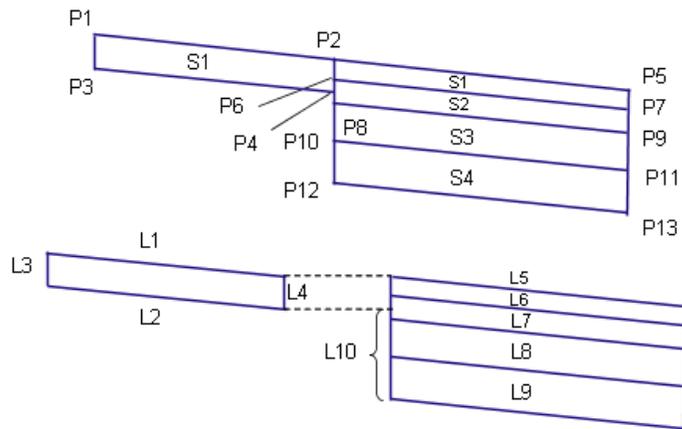
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P5	ETW	Outside edge of widening lane on finish grade
P7	ETW_Pave1	Outside edge of widening lane on Pave1
P9	ETW_Pave2	Outside edge of widening lane on Pave2
P11	ETW_Base	Outside edge of widening lane on Base
P13	ETW_Sub	Outside edge of widening lane on Subbase

<b>Point, Link, or Shape</b>	<b>Code</b>	<b>Description</b>
L1, L5	Top, Pave	Finish grade surface
L2	Overlay	Superimposed over links on the Existing Surface. Note that there may be more than a single link between points P3 and P4.
L6	Pave1	
L7	Pave2	
L8	Base	
L9	Subbase, Datum	
L10	Datum	
S1	Overlay	Area between the overlay and existing lane
S2	Pave1	
S3	Pave2	
S4	Base	
S5	Subbase	

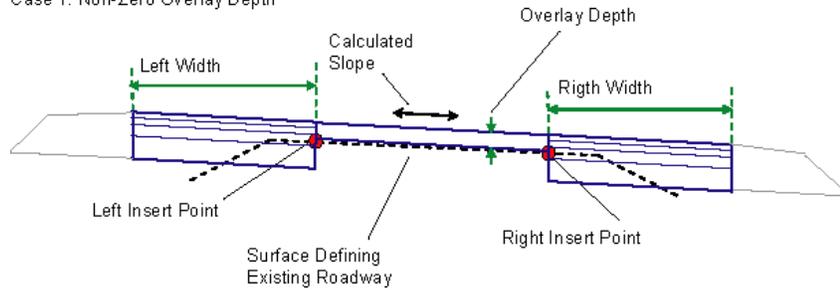
### Coding Diagram



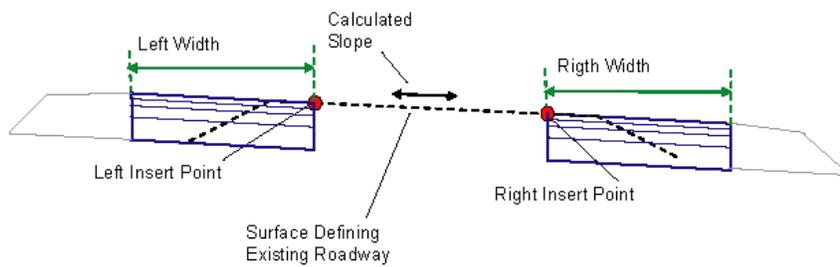
## OverlayWidenMatchSlope2

This subassembly overlays an existing uncrowned road, and adds one or more travel lanes to the left and right edges while matching the existing lane slope.

Case 1: Non-Zero Overlay Depth



Case 2: Zero Overlay Depth Given



### Attachment

The attachment point is at the inside edges of the finish grade on the widening lanes.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Left Insert Point Offset	Offset of the Left Insert Point. This is the point where the widening lane on the left begins, and is typically at the existing left edge-of-traveled-way.	Numeric	0.0
Right Insert Point Offset	Offset of the Right Insert Point, typically at the existing right edge-of-traveled way	Numeric	0.0
Overlay Depth	Depth of the overlay above the existing finish grade	Numeric, positive	0.100 m 0.30 ft

Parameter	Description	Type	Default
Left Width	Width of the left widening lane	Numeric, positive	3.6 m 12.0 ft
Right Width	Width of the right widening lane	Numeric, positive	3.6 m 12.0 ft
Pave1 Depth	Depth between finish grade and Pave1	Numeric, positive	0.025m 0.083 ft
Pave2 Depth	Depth between Pave1 and Pave2	Numeric, positive	0.025 m 0.083 ft
Base Depth	Depth between Pave2 and Base	Numeric, positive	0.100 m 0.333 ft
Subbase Depth	Depth between the subbase and the top of the base layer	Numeric, positive	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Name of the Surface defining the existing roadway. The following object types can be used as targets for specifying this surface: surfaces.	Required
Left Insert Point Offset	May be used to override the fixed Left Insert Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Insert Point Offset	May be used to override the fixed Right Insert Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Left Width	May be used to override the fixed Left Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Right Width	May be used to override the fixed Right Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
%Slope	The calculated slope on the existing surface from the Sample Point to the Insert Point	Numeric

### Behavior

The elevations of the Left and Right Insert Points on the Existing Surface are determined, and the slope is calculated between the two points. If a non-zero Overlay Depth is given, an overlay layer is added above the existing lane at the calculated slope. A closed overlay shape is created by superimposing one or more links over the existing grade. The widening lanes are inserted outward from the overlay edges for the given widths at calculated slope.

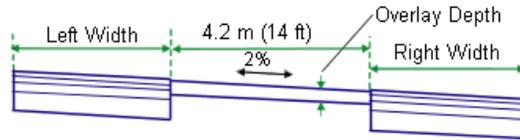
If the Overlay Depth is given as zero, the widening lanes are inserted outward from the insert offsets at the existing grade.

The pavement layers are closed with vertical links at each end. A single vertical link is also placed from the inside edge of Subbase to the existing surface.

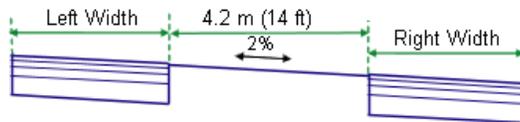
### Layout Mode Operation

In layout mode, this subassembly is attached to any convenient point. The overlay layer is shown at a uniform depth for a width of 4.2 meters or 14 feet at a slope of -2%. The widening lanes extend from the edges-of-overlay at the given widths and depths at the -2% slope.

In modeling mode the subassembly adjusts to the positions and slopes determined by the Insert Points and the Existing Surface.



Case 1: Non-zero Overlay Depth



Case 2: Zero Overlay Depth given

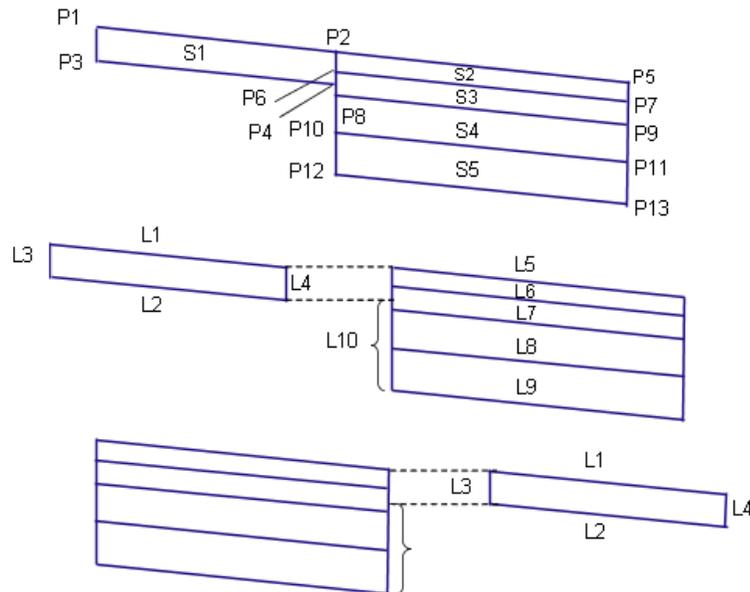
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P5	ETW	Outside edge of widening lane on finish grade
P7	ETW_Pave1	Outside edge of widening lane on Pave1
P9	ETW_Pave2	Outside edge of widening lane on Pave2
P11	ETW_Base	Outside edge of widening lane on Base
P13	ETW_Sub	Outside edge of widening lane on Subbase
L1, L5	Top, Pave	Finish grade surface
L2	Overlay	Superimposed over links on the Existing Surface. Note that there may be more than a single link between points P3 and P4.
L6	Pave1	
L7	Pave2	

Point, Link, or Shape	Code	Description
L8	Base	
L9	Subbase, Datum	
L10	Datum	
S1	Overlay	Area between the overlay and existing lane
S2	Pave1	
S3	Pave2	
S4	Base	
S5	Subbase	

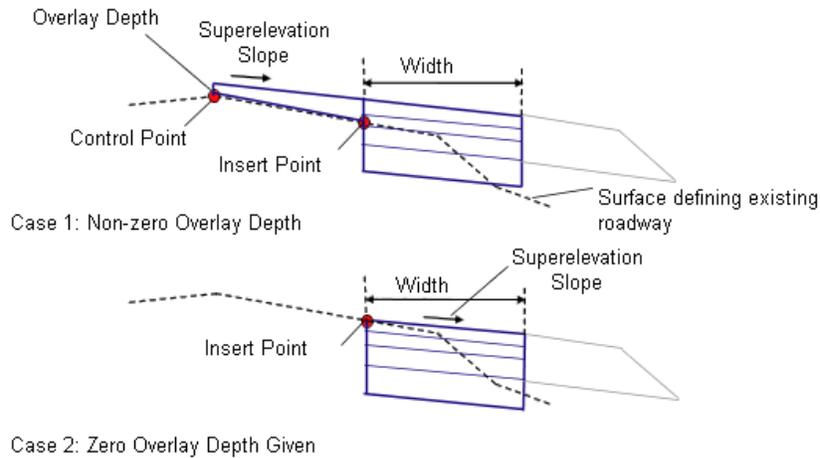
### Coding Diagram



Note: Point, link, and shape codes on the left widening lane mirror those of the right widening lane.

# OverlayWidenWithSuper1

This subassembly overlays one side of an existing road, and adds one or more travel lanes to the edge using the superelevation slope defined for the outside travel lane.



## Attachment

The attachment point is at the inside edge of the top of the overlay layer if the Overlay Depth is non-zero, or at the inside edge on finish grade of the widening lane if the Overlay Depth is zero.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Control Point Offset	Offset of the control point, which defines the beginning of the pavement overlay layer	Numeric	0.0
Insert Point Offset	Offset of the insertion point of the widening lane, which is typically at the existing edge-of-traveled-way. Specifying a positive value for the this parameter inserts this subassembly on the right side of a corridor, or controlling baseline. A negative value	Numeric	0.0

Parameter	Description	Type	Default
	inserts it on the left side. For more information, see "Inserting Subassemblies on Right and Left Sides of a Corridor" in the Corridors chapter of the AutoCAD Civil 3D User's Guide Help.		
Overlay Depth	Depth of the overlay above the existing finish grade at the control point.	Numeric, positive	0.100 m 0.30 ft
Width	Width of the widening lane	Numeric, positive	3.6 m 12.0 ft
Pave1 Depth	Thickness of the Pave1 layer for the lane widening; zero to omit	Numeric, positive	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer for the lane widening; zero to omit	Numeric, positive	0.025 m 0.083 ft
Base Depth	Thickness of the base layer for the lane widening	Numeric, positive	0.100 m 0.333 ft
Subbase Depth	Thickness of the subbase layer for the lane widening	Numeric, positive	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Name of the Surface defining the existing roadway. The following object types can be used as targets for specifying this surface: surfaces.	Required
Control Point Offset	May be used to override the fixed Control Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
Insert Point Offset	May be used to override the fixed Insert Point Offset and tie the point to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Width	May be used to override the fixed widening lane Width and tie the edge-of-lane to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
%Slope	The calculated slope on the existing surface from the Sample Point to the Insert Point	Numeric

### Behavior

The outside lane superelevation is obtained from the alignment properties of the current control alignment, and the elevation on the Existing Surface at the Control Point Offset is determined.

If a non-zero Overlay Depth is given, the overlay depth is applied at the control point. The top of the overlay layer extends to the Insert Point Offset at the superelevation slope, and the overlay shape is closed by superimposing links over the Existing Surface between the control and insert points and adding vertical links at each end. The widening lane is extended outward at the superelevation slope for the given Width from the edge of the overlay surface.

If the Overlay Depth is zero, the widening lane extends outward from the Insert Point Offset on the Existing Surface at the superelevation slope for the given Width.

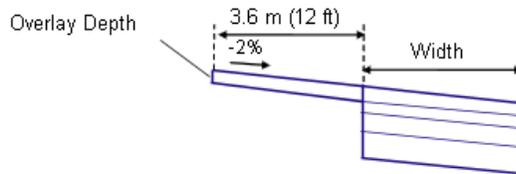
The pavement layers are closed with vertical links at each end. A single vertical link is also placed from the inside edge of Subbase to the existing surface.

### Layout Mode Operation

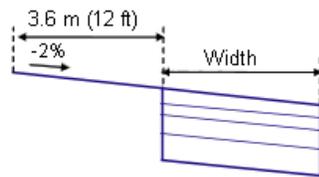
In layout mode, this subassembly may be attached to any convenient point. The overlay layer is shown at a uniform depth, with a width of 3.6 meters or

12 feet and extended at a slope of -2%. If the Overlay Depth is zero, the overlay is shown as a single link. The widening lane extends from the edge-of-overlay at a slope of -2%.

When used in corridor modeling mode, the shapes adjust to the selected control point, insert point, superelevation slope, and existing surface.



Case 1: Non-zero Overlay Depth



Case 2: Zero Overlay Depth given

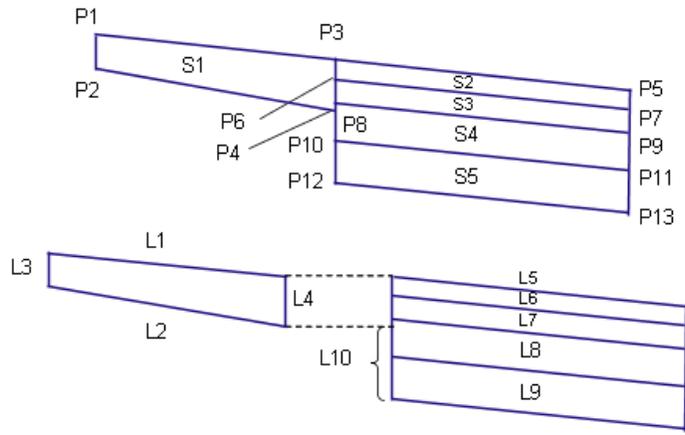
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P5	ETW	Outside edge of widening lane on finish grade
P7	ETW_Pave1	Outside edge of widening lane on Pave1
P9	ETW_Pave2	Outside edge of widening lane on Pave2
P11	ETW_Base	Outside edge of widening lane on Base
P13	ETW_Sub	Outside edge of widening lane on Subbase
L1, L5	Top, Pave	Finish grade surface

<b>Point, Link, or Shape</b>	<b>Code</b>	<b>Description</b>
L2	Overlay	Superimposed over links on the Existing Surface. Note that there may be more than a single link between points P3 and P4.
L6	Pave1	
L7	Pave2	
L8	Base	
L9	Subbase, Datum	
L10	Datum	
S1	Overlay	Area between the overlay and existing lane.
S2	Pave1	
S3	Pave2	
S4	Base	
S5	Subbase	

### Coding Diagram



# Subassembly Reference (continued)

# 3

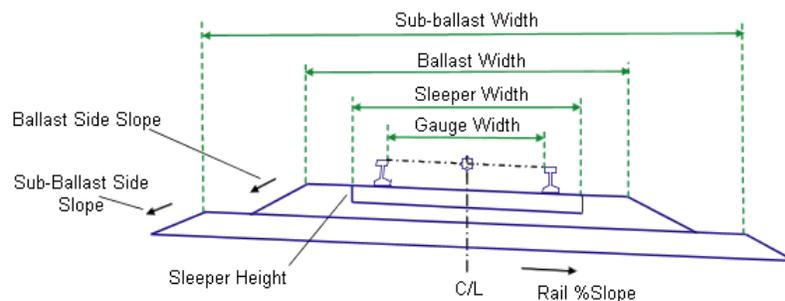
The subassemblies in this subassembly reference are organized alphabetically into the following sections:

- [Subassembly Reference - Introduction through LaneTowardCrown](#) (page 1)
- [Subassembly Reference \(continued\) - LinkMulti through OverlayWidenWithSuper1](#) (page 257)
- [Subassembly Reference \(continued\) - RailSingle through UrbanSidewalk](#) (this section)

## RailSingle

This subassembly inserts the rails, sleeper, ballast, and sub-ballast for a single-track railroad.

It should be followed with a Daylight subassembly on the left and right sides to close to existing ground in cut and fill situations.



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**NOTE** This subassembly is designed for visualization and to demonstrate the use of corridor modeling for rail applications. It is not intended for actual engineering production work.

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### Attachment

The attachment point is at a distance equal to the rail height above the centerline of the sleeper.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Rail % Slope	% slope of the roadbed	Numeric	0 (%)
Gauge Width	Width of the rail gauge from inside-to-inside rail. The rails are placed symmetrically about the centerline alignment.	Numeric, positive	1.435 m 4.7083 ft (4' 8-1/2")
Sleeper Width	Width of the sleeper, placed symmetrically about the centerline	Numeric, positive	2.4 m 8.0 ft
Sleeper Height	Height of the sleeper	Numeric, positive	0.200 m 0.67 ft
Ballast Width	Width of the top of the ballast layer, placed symmetrically about the centerline	Numeric, positive	3.6 m 12.0 ft
Ballast Depth	Thickness of the ballast layer from finish grade	Numeric, positive	0.3 1.0 ft
Ballast Side Slope	Side slope (x : 1) of the ballast layer	Numeric, positive	2 (: 1)
Sub-ballast Width	Width of the top of the sub-ballast layer, placed symmetrically about the centerline	Numeric, positive	6.6 m 22.0 ft
Sub-ballast Depth	Thickness of the sub-ballast layer	Numeric, positive	0.3 1.0 ft

Parameter	Description	Type	Default
Sub-ballast Side Slope	Side slope of the sub-ballast layer	Numeric, positive	2 (: 1)

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

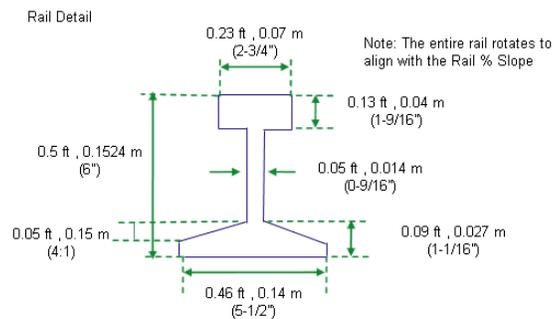
Target Parameters: None.

### Output Parameters

None.

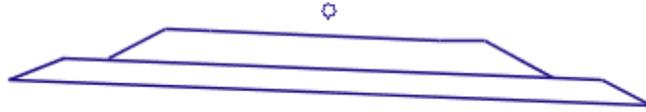
### Behavior

The links for the rails, sleeper, ballast, and sub-ballast are calculated and placed based on the input parameter values provided. If the Rail %Slope is non-zero, the corridor profile elevation is held at the center of the rail on the low side. The finish grade, sleeper, ballast, and sub-ballast links are maintained at the Rail %Slope.



### Layout Mode Operation

In layout mode, this subassembly displays the links comprising the finish grade, ballast, sub-ballast, and side slopes.

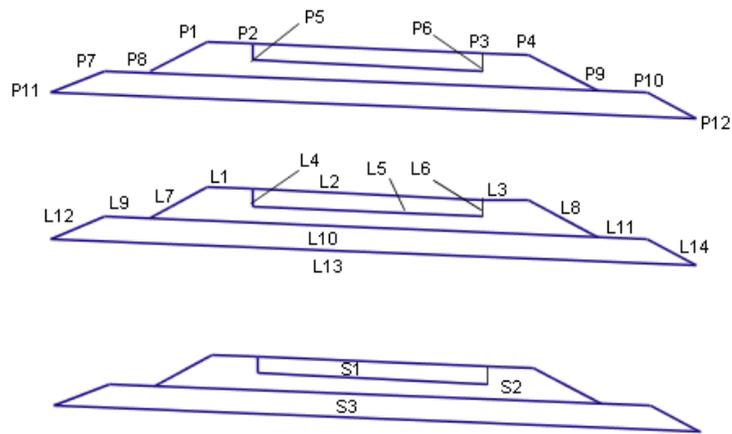


### Constants

Point, Link, or Shape	Constant	Description
P1, P4	EBS	Edge of ballast shoulder
P2, P3	ESL	Edge of sleeper
P8,P9	Daylight_Ballast	Daylight point for the ballast layer
P7, P10	ESBS	Edge of subballast shoulder
P11, P12	Daylight_Subballast	Daylight point for the sub-ballast layer
All rail points	R1, R2, .....	Numbered sequentially for longitudinal connection (not shown in diagram)
L1, L3	Top, Ballast	Finish grade on ballast layer
L2	Top, Sleeper	Finish grade on top-of-sleeper
L4, L6	Sleeper	Sides of sleeper
L7, L8	Top, Ballast	Sideslopes on ballast layer (side slopes)
L10	Ballast	Bottom of ballast
L9, L11, L12, L14	Top, Subballast	Finish grade on subballast layer
L13	Subballast	Bottom of subballast
S1	Sleeper	
S2	Ballast	
S3	Subballast	

Point, Link, or Shape	Constant	Description
Rail shapes	Rail	Not shown in diagram

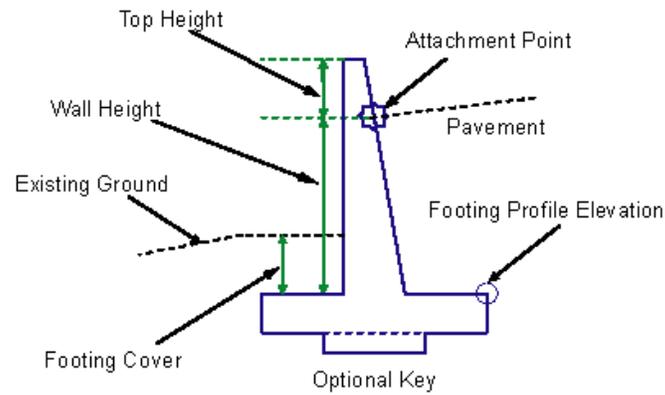
### Coding Diagram



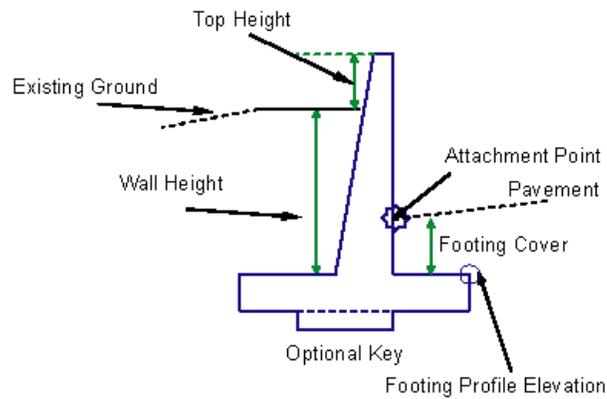
## RetainWallTapered

This subassembly inserts a retaining wall structure with one tapered side and an optional key at the bottom.

Case 1: Fill Condition



Case 2: Cut Condition



### Attachment

The attachment point varies depending on whether the retaining wall is in cut condition or fill. If it is in fill, the attachment point is near the top of the retaining wall. If it is inserted in cut condition, the attachment point is near the footing.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the sub-assembly either on the right or the left side of the attachment point.	Left / Right	Right
Wall Top Width	Specifies the width of the wall at the top	Numeric	0.958 ft 0.292 m
Top Height	The distance between the top-of-the wall and the hook in fill or the new hook in cut.	Numeric	1.320 ft 0.40 m
Footing Cover	The depth of cover from the top-of-footing to the finish grade line on the back side of the wall in fill or to the hook when in cut.	Numeric	1.667 ft 0.50 m
Key	Species to add an optional key below the footing	Boolean	Yes

Wall height is determined from the top of the footing to the insertion point of the ground elevation on the vertical face, whichever is higher. Wall battered slope, width of the footing, offset of wall vertical face, optional key dimensions, and the location of the key center, are all functions of the wall height.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Wall Height	May be used to override the fixed wall height and tie to a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Target Surface	Existing ground surface name to determine retaining wall in cut or fill. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

### Output Parameters

None.

### Behavior

This subassembly can be inserted on either the left or the right sides. The attachment point is different for the fill or cut condition. In fill, the attachment point is assumed to be where the finish grade intersects the inside face of the wall, at a distance of Top Height below the top of the wall. In cut, the attachment point is assumed to be where the finish grade intersects the inside face, at a distance of Footing Cover above the top-of-footing. The wall height is determined from the Wall Height or Profile input.

In fill, the sloping wall face is toward the center of the roadway. In cut, the sloping wall face is away from the roadway. If the Key option is set to No, then the base of the footing is a single horizontal link. If the Key option is used, links to define the optional Key are inserted.

### Layout Mode Operation

In layout mode, the subassembly draws the retaining wall shape as specified by the input parameter values, assuming that the subassembly is in a fill condition.

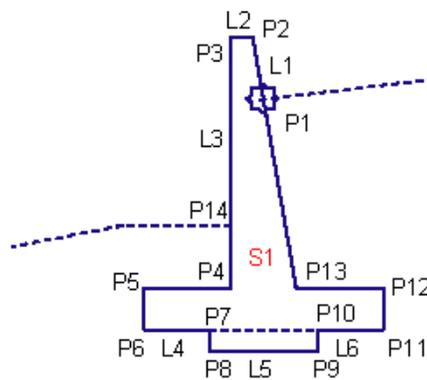
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

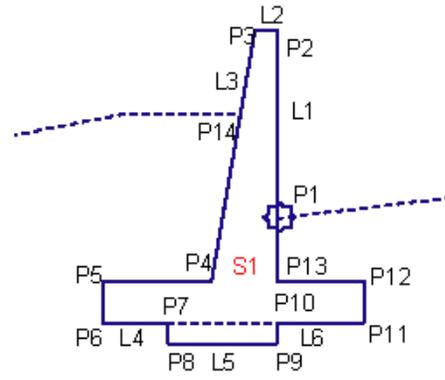
Point/Link	Codes	Description
P1	RW_Front	
P2	RW_Top	
P3	RW_Back	
P14	RW_Hinge	
P12	RW_Inside	Could be used as breaklines in building datum surface
P5	RW_Outside	Could be used as breaklines in building datum surface
L1, L2, L3	Top, Wall	
L4,L5,L6	Footing_Bottom	L4 = P6 to P7; L5 = P8 to P9; L6 = 10 to 11;
S1	RWall	

### Coding Diagram

Fill Condition



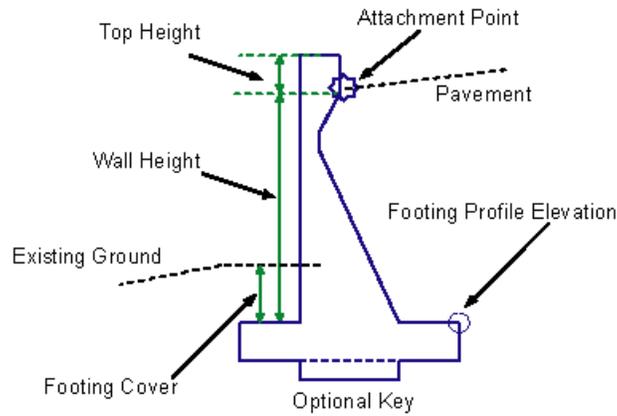
Cut Condition

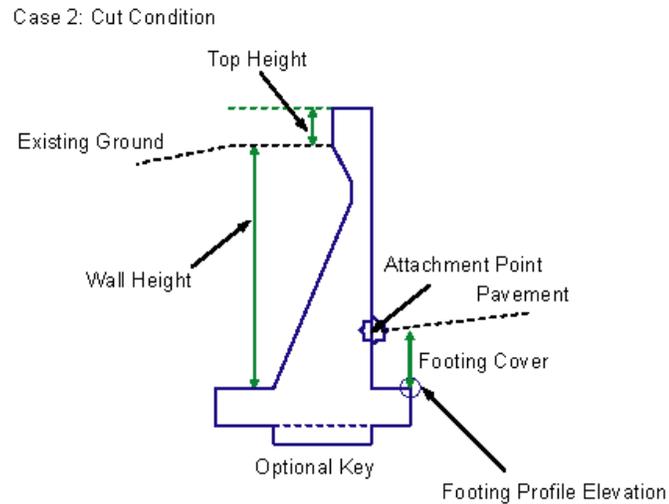


## RetainWallTaperedWide

This subassembly inserts a retaining wall structure with one side tapered, and is typically used if walls are 5.5 meters or higher.

Case 1: Fill Condition





This subassembly also adds an optional key at the bottom.

### Attachment

The attachment point varies depending on whether the retaining wall is in a cut or fill condition. If it is in a fill condition, the attachment point is near the top of the retaining wall. In a cut condition, the attachment point is near the footing.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Wall Top Width	Specifies the width of the wall at the top	Numeric	1.476 ft 0.450 m
Top Height	the distance between the top-of-the wall and the hook in fill or the new hook in cut.	Numeric	1.320 ft 0.40 m

Parameter	Description	Type	Default
Footing Cover	The depth of cover from the top-of-footing to the finish grade line on the back side of the wall in fill or to the hook when in cut.	Numeric	1.667 ft 0.50 m
Key	Species to add an optional key below the footing	Boolean	Yes

Wall height is determined from the top of the footing to the attachment point of ground elevation on the vertical face, whichever is higher. Width and depth of the footing are measured as a function of the wall height. Wall vertical face is located at  $\frac{1}{4}$  of the footing width, and the bottom of battered slope is at 300 mm from the other edge. Optional key is located right at the center of the footing at 300mm deep and 600mm wide.

#### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Wall Height	May be used to override the fixed wall height and tie to a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Target Surface	Existing ground surface name to determine retaining wall in cut or fill. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

#### Output Parameters

None.

#### Behavior

This subassembly can be inserted on either the left or the right sides. The attachment point is different for the fill or cut condition. In fill, the attachment point is assumed to be where the finish grade intersects the inside face of the wall, at a distance below the top of the wall equal to the Top Height parameter. In a cut condition, the attachment point is assumed to be where the finish

grade intersects the inside face, above the top-of-footing at a distance equal to the Footing Cover parameter. The wall height is determined from the Wall Height or Profile input.

In a fill condition, the sloping wall face is toward the center of the roadway. In a cut condition, the sloping wall face is away from the roadway, toward the earth being retained. If the Key option is set to No, then the base of the footing is a single horizontal link. If the Key option is used, links to define the optional key are created.

### Layout Mode Operation

In layout mode, the subassembly draws the retaining wall shape as specified by the input parameter values, assuming that the subassembly is in a fill condition.

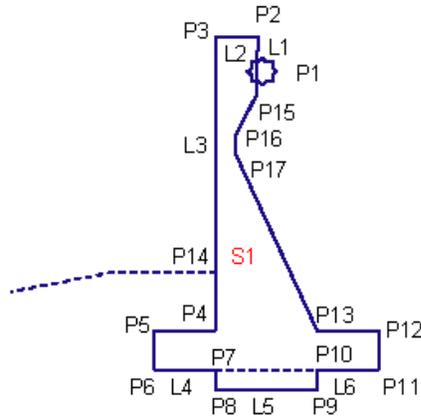
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

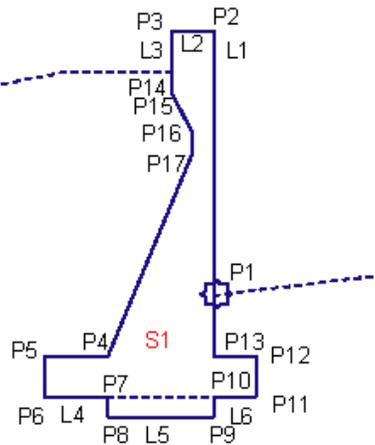
Point/Link	Codes	Description
P1	RW_Front	
P2	RW_Top	
P3	RW_Back	
P14	RW_Hinge	
P12	RW_Inside	Could be used as breaklines in building datum surface
P5	RW_Outside	Could be used as breaklines in building datum surface
L1, L2, L3	Top, Wall	L1=P1 to P2; L2= P2 to P3; L3 = P3 to P14;
L4,L5,L6	Footing_Bottom	L4 = P6 to P7; L5 = P8 to P9; L6 = 10 to 11;
S1	RWall	

## Coding Diagram

Fill Condition

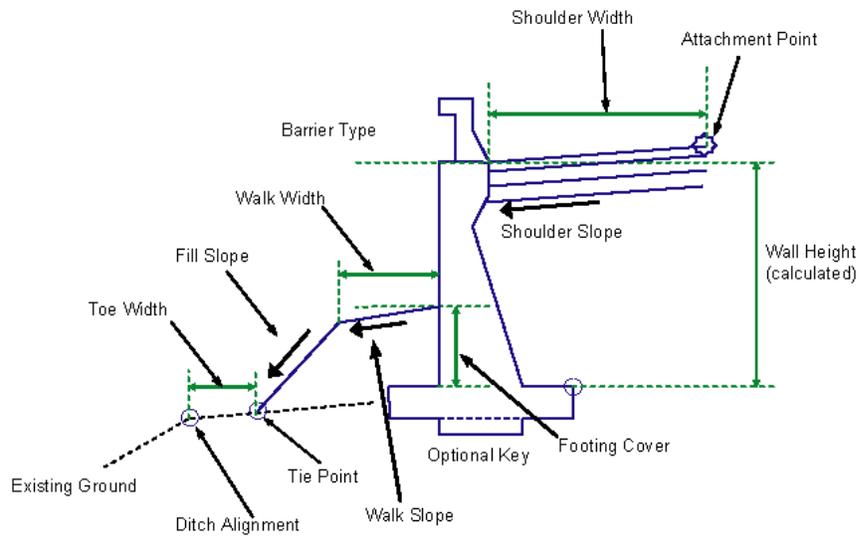


Cut Condition



## RetainWallTieToDitch

This subassembly inserts a retaining wall structure with a paved shoulder and with special tie slopes to tie to an existing ditch.



This subassembly can place an optional barrier on the top of the wall and an optional key below the footing.

### Attachment

The attachment point is on the inside of the shoulder.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Shoulder Width	Width of the shoulder from the attachment point	Numeric, Positive	4.0 ft 1.33 m
Pave 1 Depth	Depth of Pave 1, Enter ZERO if no Pave 1	Numeric, Positive	0.083 ft 0.025 m

Parameter	Description	Type	Default
Pave 2 Depth	Depth of Pave 2, Enter ZERO if no Pave 2	Numeric, Positive	0.083 ft 0.025 m
Base Depth	Depth of base layer	Numeric, positive	0.333 ft 0.1 m
Subbase Depth	Depth of the subbase layer.	Numeric, positive	0.3 m 1.0 ft
Wall Width	Specifies the width of the wall.	Numeric	0.958 ft 0.292 m
Footing Cover	The depth of cover from the top-of-footing to the finish grade line on the back side of the wall in fill or to the hook when in cut.	Numeric	1.667 ft 0.50 m
Key	Species to add an optional key below the footing	Boolean	Yes
Use Barrier	Specifies to use a barrier on the top of the wall	String, (a) Yes, (b) No	Yes
Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	List of option: a) No, b) Outside shoulder slope, c) Inside shoulder slope.	No
Default Shoulder Slope	Default cross slope of the shape surface. The value is used if the superelevation slope is not used or is not specified for the baseline alignment.	Numeric, Positive	- 2.0%
Walk Width	Width of the walkway link on the tie slope	Numeric, Positive	3.300 ft 1.0 m
Walk Slope	Slope of the walkway link (grade/slope type)	Numeric	25 %
Fill Slope	Slope of the fill link from the walkway to the tie point (Slope type)	Numeric	2.00 : 1

Parameter	Description	Type	Default
Toe Width	Width from ditch point to the tie point (to existing inside edge of the ditch)	Numeric, Positive	1.670 ft 0.5 m

Wall height is determined from top of the footing to attachment point of ground elevation on the vertical face, whichever is higher. Wall battered slope, width of the footing, offset of wall vertical face, optional key dimensions, and the location of the key center are all functions of the wall height.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Edge of Shoulder	May be used to override the shoulder slope by tying to a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Ditch Offset	Inside edge of ditch profile used to locate Tie Point. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Required
Tie-in Surface	Existing ground surface to tie in with respect to specified ditch and toe width. The following object types can be used as targets for specifying this surfaces:	Required

### Output Parameters

None.

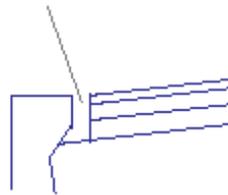
### Behavior

This subassembly can be inserted either on the left or the right sides. The attachment point is assumed to be at the design edge-of-traveled-way, from where the paved shoulders will be drawn as specified by this subassembly.

The top-of-footing elevation is determined by working inwards from the Tie Point to the inside edge of walkway, then subtracting the Footing Cover from the tie link at the offset of the outside footing corner. The height of wall (H) is calculated between the Outside Edge of the Shoulder and the top of footing. If the Key option is set to No, then the base of the footing is a single horizontal link. If the Key option is used, links to define the optional key are inserted.

Note: A very small gap (0.001 for m) is left between the pavement layers and the inside face of wall. This is to facilitate material analysis using the quantity takeoff feature, as shown in the detail below.

0.001 Gap With Vertical Closure Link



### Layout Mode Operation

In layout mode, the subassembly draws the retaining wall shape as specified by the input parameter values, assuming that the subassembly is in a fill condition.

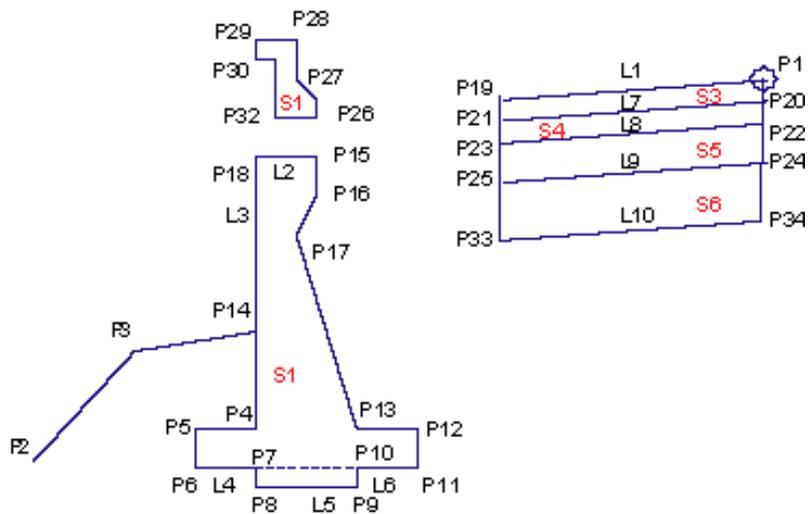
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P2	Daylight	
P3	Walk_Edge	Edge of the walk width
P14	RW_Hinge	
P12	RW_Inside	Could be used as breaklines in building datum surface
P5	RW_Outside	Could be used as breaklines in building datum surface

Point/Link	Codes	Description
L1, L2, L3	Top	
L2, L3	Wall	
L4,L5,L6	Footing	Bottom of the footing
L7	Pave1	
L8	Pave2	
L9	Base, Footing_Bottom	
S1	RWall	
S2	Barrier	
S3	Pave1	
S4	Pave2	
S5	Base	

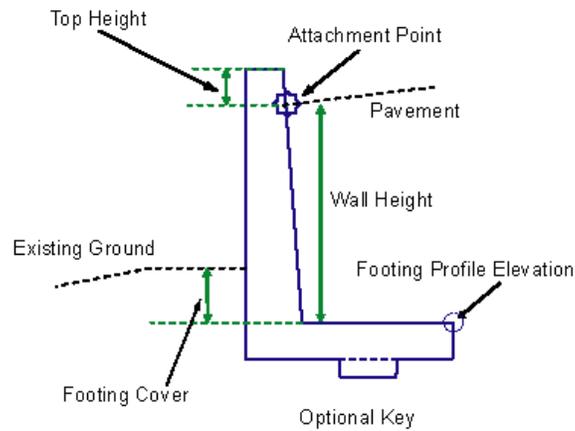
### Coding Diagram



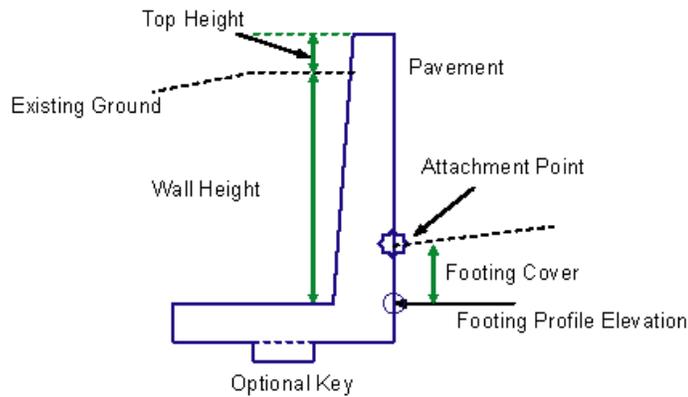
## RetainWallToLowSide

This subassembly inserts a retaining wall structure with one tapered side.

Case 1: Fill Condition



Case 2: Cut Condition



The wall is pushed to a side so that all of the footing is on the high fill side. This subassembly also adds an optional key at the bottom.

### Attachment

The attachment point varies depending on whether the retaining wall is in cut condition or fill. If it is in fill, the attachment point is near the top of the

retaining wall. The attachment point is near the footing if it is inserted in cut condition.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Wall Top Width	Specifies the width of the wall at the top	Numeric	0.958 ft 0.292 m
Top Height	The distance between the top-of-the wall and the hook in fill or the new hook in cut.	Numeric	1.320 ft 0.40 m
Footing Cover	The depth of cover from the top-of-footing to the finish grade line on the back side of the wall in fill or to the hook when in cut.	Numeric	1.667 ft 0.50 m
Key	Species to add an optional key below the footing	Boolean	Yes

Wall height is determined from top of the footing to attachment point of ground elevation on the vertical face, whichever is higher. Wall battered slope, width of the footing, optional key dimensions, and the location of the key center, are all functions of the wall height.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Wall Height	May be used to override the fixed wall height and tie to a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
Target Surface	Existing ground surface name to determine retaining wall in cut or fill. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

### Output Parameters

None.

### Behavior

This subassembly can be inserted on either left or right sides. The attachment point is different for the fill or cut condition. In fill, the attachment point is assumed to be where the finish grade intersects the inside face of the wall, below the top of the wall, at a distance equal to the Top Height parameter. In cut, the attachment point is assumed to be where the finish grade intersects the inside face, above the top-of-footing, at a distance equal to the Footing Cover parameter. The wall height is determined from the Wall Height or Profile input. In fill, the sloping wall face is toward the center of the roadway. In cut, the sloping wall face is away from the roadway, towards the earth being retained. If the Key option is set to No, then the base of the footing is a single horizontal link. If the Key option is used, links to define the optional key are inserted.

### Layout Mode Operation

In layout mode, the subassembly draws the retaining wall shape as specified by the input parameter values, assuming that the subassembly is in a fill condition.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

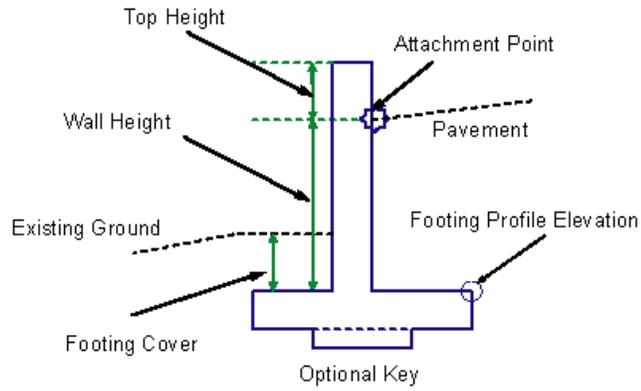
Point/Link	Codes	Description
P1	RW_Front	
P2	RW_Top	
P3	RW_Back	
P14	RW_Hinge	
P12	RW_Inside	Could be used as breaklines in building datum surface
P5	RW_Outside	Could be used as breaklines in building datum surface
L1, L2, L3	Top, Wall	L1=P1 to P2; L2= P2 to P3; L3 = P3 to P14;
L4,L5,L6	Footing_Bottom	L4 = P6 to P7; L5 = P8 to P9; L6 = 10 to 11;
S1	RWall	

### Coding Diagram

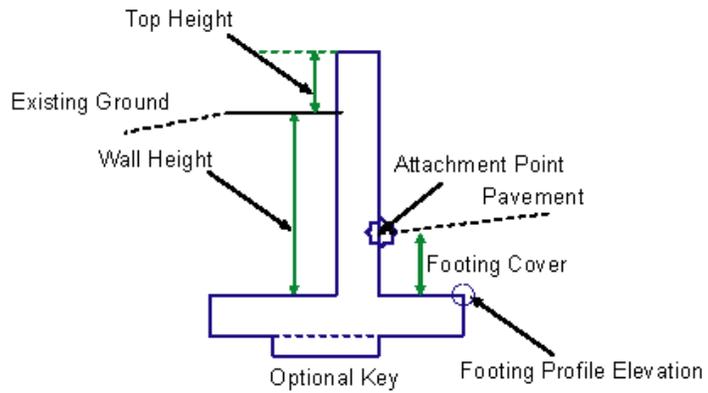
Fill Condition



Case 1: Fill Condition



Case 2: Cut Condition



### Attachment

The attachment point varies depending on whether the retaining wall is in cut condition or fill. If it is in fill, the attachment point is near top of the retaining wall. If it is in cut, the attachment point is near the footing.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the sub-assembly either on the right or the left side of the attachment point.	Left / Right	Right
Wall Width	Specifies the width of the wall.	Numeric	0.958 ft 0.292 m
Top Height	the distance between the top-of-the wall and the hook in fill or the new hook in cut.	Numeric	1.320 ft 0.40 m
Footing Cover	The depth of cover from the top-of-footing to the finish grade line on the back side of the wall in fill or to the hook when in cut.	Numeric	1.667 ft 0.50 m
Key	Species to add an optional key below the footing	Boolean	Yes

Wall height is determined from top of the footing to attachment point of ground elevation on the vertical face, whichever is higher. Width of the footing, offset of wall vertical face, optional key dimensions, and the location of the key center, are all functions of the wall height.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Wall Height	May be used to override the fixed wall height and tie to a profile. The following object types can be used	Optional

Parameter	Description	Status
	as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	
Target Surface	Existing ground surface name to determine retaining wall in cut or fill. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

### Output Parameters

None.

### Behavior

This subassembly can be inserted on either the left or the right sides. The attachment point is different for the fill or cut condition. In fill, the attachment point is assumed to be where the finish grade intersects the inside face of the wall, below the top of the wall, at a distance equal to the Top Height parameter. In cut, the attachment point is assumed to be where the finish grade intersects the inside face, above the top-of-footing at a distance equal to the Footing Cover parameter. The wall height is determined from the Wall Height or Profile input.

In fill, the sloping wall face is toward the center of the roadway. In cut, the sloping wall face is away from the roadway, towards the earth being retained. If the Key option is set to No, then the base of the footing is a single horizontal link. If the Key option is used, links to define the optional key are inserted.

### Layout Mode Operation

In layout mode, the subassembly draws the retaining wall shape as specified by the input parameter values, assuming that the subassembly is in a fill condition.

### Point, Link, and Shape Codes

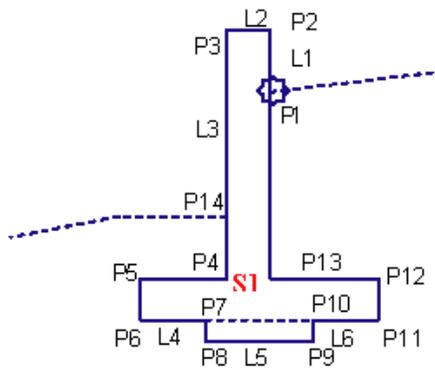
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P1	RW_Front	
P2	RW_Top	

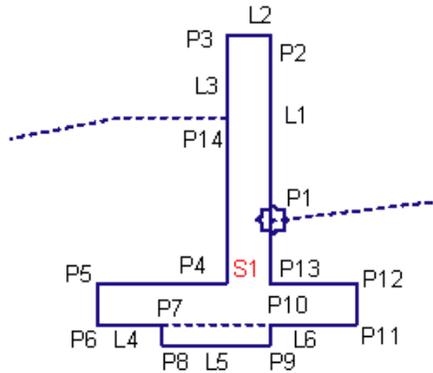
Point/Link	Codes	Description
P3	RW_Back	
P14	RW_Hinge	
P12	RW_Inside	Could be used as breaklines in building datum surface
P5	RW_Outside	Could be used as breaklines in building datum surface
L1, L2, L3	Top	L1=P1 to P2; L2= P2 to P3; L3 = P3 to P14;
L4,L5,L6	Footing_Bottom	L4 = P6 to P7; L5 = P8 to P9; L6 = 10 to 11;
S1	RWall	

### Coding Diagram

Fill Condition



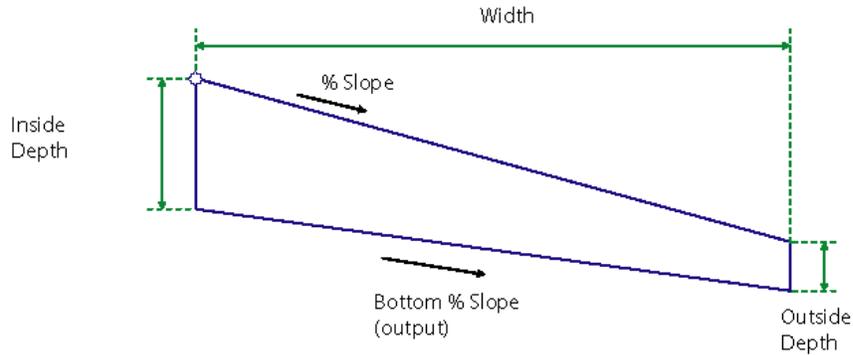
Cut Condition



## ShapeTrapezoidal

This subassembly inserts a trapezoidal shape with flexible parameters and codes.

This shape can be used as a lane or a shoulder using superelevation parameters for the slope. The width and outside edge elevation can be calculated based on an optional alignment and profile. If multiple shapes are stacked, the bottom slope can be used as the top slope of subsequent shapes. If shapes are butted together, the outside depth can be used as the inside depth of the next subassembly. The point, link, and shape codes are left undefined so the shape can be used to represent different materials in various scenarios.



### Attachment

The attachment point is at the inside edge of the shape.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Bottom Slope			0.042
Outside Depth			0.500
Top Slope			-0.020
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Width	Width from the attachment point to the shoulder outside point	Numeric	2.4 m 8.0 ft
Default Cross Slope	Default cross slope of the shape surface. This value is used if the superelevation slope is not used or is not specified for the baseline alignment.	Numeric	-2.0%
Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	List of options: a.) No, b.) Outside Lane Slope, c.) Inside Lane Slope, d.) Outside Shoulder Slope, e.) Inside Shoulder Slope	No
Inside Depth	Depth at the attachment point	Numeric, positive	0.25 m 1.0 ft
Outside Depth	Depth opposite the attachment point	Numeric, positive	0.125 m 0.5 ft
Inside Top Code	User-defined point code		
Outside Top Code	User-defined point code		

Parameter	Description	Type	Default
Inside Bottom Code	User-defined point code		
Outside Bottom Code	User-defined point code		
Top Link Code	User-defined link code		
Bottom Link Code	User-defined link code		
Shape Code	User-defined shape code		

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Type of Assignment	Status
Width	May be used to override the fixed Width and tie the edge-of-shape to an offset aligning. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Outside Elevation	May be used to override the normal shape slope and tie the top outside shape edge to the elevation of a profile. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Top Slope	Slope of the top link	Numeric
Bottom Slope	Slope of the bottom link	Numeric
Width	Width of the shape	Numeric
Outside Depth	Outside depth of the shape	Numeric

### Behavior

The finish grade of the shape is inserted for the given Width and % Slope outward from the attachment point. The bottom link slope is calculated based on the inside and outside depth of the shape. The point, link, and shape codes are set in the input parameters using the user-defined strings.

### Layout Mode Operation

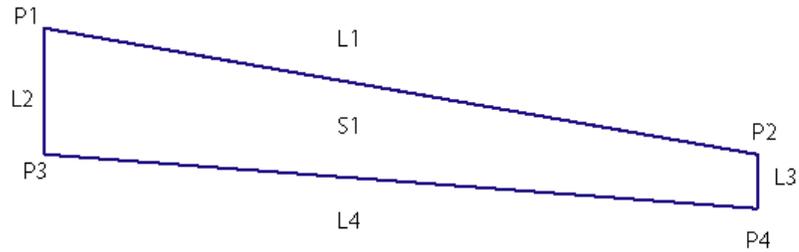
In layout mode, this subassembly displays the links comprising the shape for a normal crown roadway situation, with default cross slope as the top link slope value.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

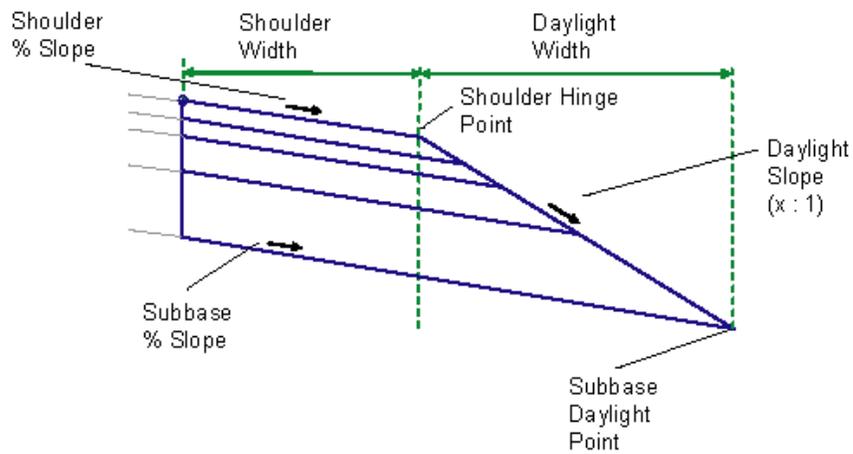
Type	Code	Description
P1	Inside Top Code	User-defined point code
P2	Outside Top Code	User-defined point code
P3	Inside Bottom Code	User-defined point code
P4	Outside Bottom Code	User-defined point code
L1	Top Link Code	User-defined link code
L4	Bottom Link Code	User-defined link code
S1	Shape Code	User-defined shape code

### Coding Diagram



## ShoulderExtendAll

This subassembly inserts a paved shoulder with all pavement, base, and subbase layers extended to the shoulder daylight slope.



### Attachment

The attachment point is at the inside edge of the paved shoulder, which is typically at the outside edge-of-traveled way.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Daylight Elevation		Numeric	- 1.667
Daylight Offset		Numeric	8.377
Daylight Slope	The value of the fixed slope of the daylight link, used if the “hold slope” option is used.	Numeric, positive	4 ( : 1)
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right %
Shoulder Width	The value of the fixed width of the daylight link, used if the “hold width” option is used.	Numeric, positive	8.000 ft
Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment.		No
Default Shoulder Slope	Default cross slope of the shape surface. This value is used if superelevation slope is not used, or is not specified for the baseline alignment.	Numeric	- 2.0 %
Subbase Daylight Type	Select whether to hold the daylight link to a fixed slope with variable width, or hold it to a fixed width with variable slope	Selection list: a) Hold Slope, Adjust Width, b) Hold Width, Adjust Slope	Hold Slope, Adjust Width
Daylight Slope	The value of the fixed slope of the daylight link, used if the “hold slope” option is used.	Numeric, positive	4 ( : 1)
Daylight Width	The value of the fixed width of the daylight link, used if the “hold width” option is used.	Numeric, positive	5.40 ft 1.8 m
Superelevation Sub-base	Specifies to use shoulder superelevation slope to subbase		No

Parameter	Description	Type	Default
Subbase % Slope	Default cross slope of the shape surface. This value is used if superelevation slope is not used or is not specified for the baseline alignment	Numeric	- 2.0 %
Pave 1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.083 ft
Pave 2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.083 ft
Base Depth	Thickness of the Base layer (zero to omit)	Numeric, non-negative	0.0333 ft
Subbase Depth	Thickness of the Subbase layer (zero to omit)	Numeric, non-negative	1.000 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Type of Assignment	Status
Shoulder Width	May be used to override the fixed Shoulder Width and tie the edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Daylight Slope	Slope of the daylight link	Numeric
Daylight Offset	Offset of the subgrade daylight point	Numeric
Daylight Elevation	Elevation of the subgrade daylight point	Numeric
Shoulder Width	Width of the paved shoulder	Numeric

Parameter	Description	Type
Shoulder Slope	Slope of the paved shoulder	Numeric

### Behavior

The finish grade of the shoulder is inserted for the given Shoulder Width and Default Shoulder Slope outward from the attachment point. The subbase link is inserted from the attachment point starting at the Subbase Depth below the finish grade.

The shoulder daylight link can be inserted with either a fixed slope (Hold Daylight Slope = True), or a fixed width (Hold Daylight Slope = False). If a fixed slope is used, the daylight link is extended from the outside edge of the shoulder until it intersects the subbase link. Otherwise, the subbase layer is extended for the Daylight Width beyond the outside edge of the shoulder, and the daylight link is connected to the end of the subbase.

The Pave1, Pave2, and Base surface links are inserted parallel to the finish grade at the given depths until they intersect with the shoulder daylight link.

### Layout Mode Operation

In layout mode, this subassembly displays the links comprising the shoulder for a normal crown roadway situation, using default shoulder and subbase cross slope.

### Point, Link, and Shape Codes

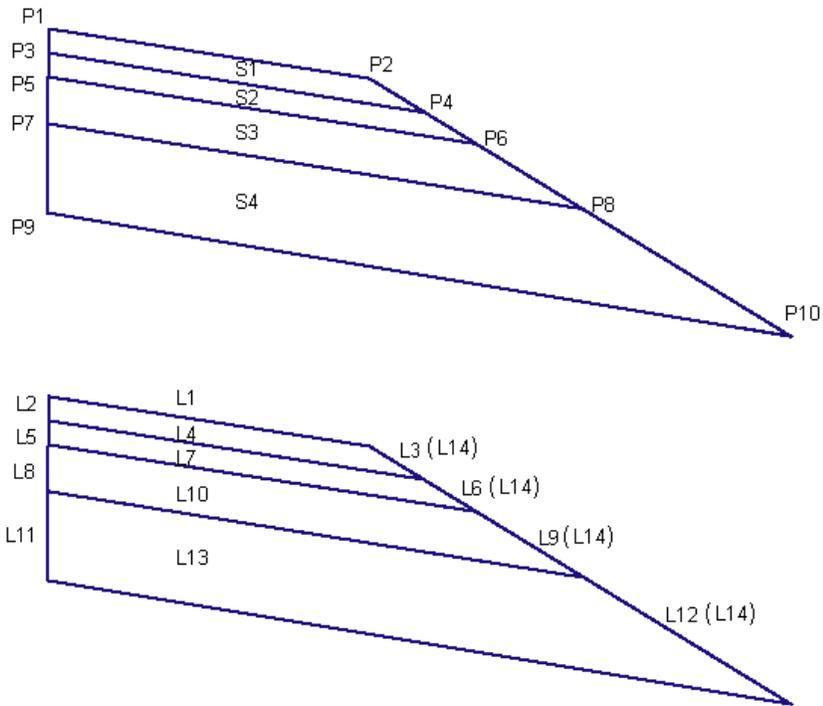
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Type	Code	Description
P2	EPS	Edge of paved shoulder, finish grade
P4	EPS_Pave1	Edge of paved shoulder on Pave1
P6	EPS_Pave2	Edge of paved shoulder on Pave2
P8	EPS_Base	Edge of paved shoulder on Base
P10	Daylight_Sub	Subbase daylight point
L1	Top, Pave	Paved finish grade

Type	Code	Description
L3	Pave	Paved finish grade
L4	Pave1	Top of Pavement2
L6	Pave1	Top of Pavement2
L7	Pave2	Top of Pavement3
L9	Pave2	Top of Pavement3
L10	Base	Top of the base course
L12	Base	Top of the base course
L13	Subbase, Datum	Bottom of subbase, datum
L14	Slope_Link	Top surface formation. L14 is the link connecting P2-P10 or P2-P8 or P2-P6 or P2-P4, depending on which is the lowest link
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

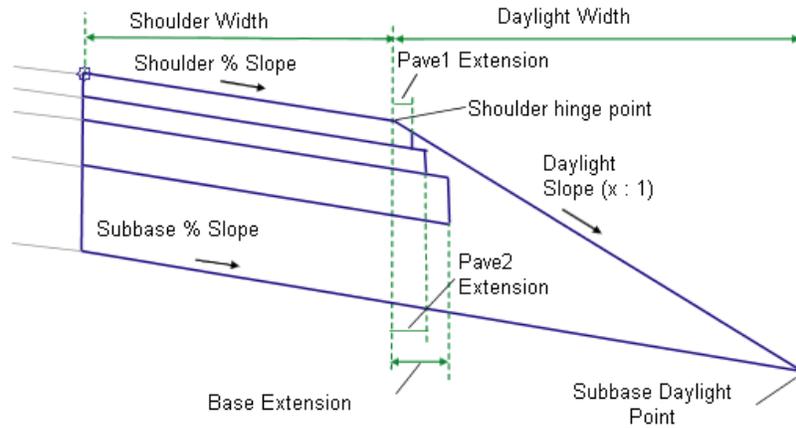
**NOTE** L14 is the new link connecting P2-P10 or P2-P8 or P2-P6 or P2-P4, depending on which is the lowest link.

### Coding Diagram



## ShoulderExtendSubbase

This subassembly inserts a paved shoulder with the subbase layer extended to a daylight point.



### Attachment

The attachment point is at the inside edge of the paved shoulder, which is typically at the outside edge-of-traveled way.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Daylight Elevation		Numeric	- 2.452
Daylight Offset		Numeric	15.889
Daylight Slope	The value of the fixed slope of the daylight link, used if the “hold slope” option is used.	Numeric, positive	4 ( : 1)
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Shoulder Width	Width from the attachment point to the shoulder hinge point	Numeric	2.4 m 8.0 ft

Parameter	Description	Type	Default
Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	Selection List : a) Outside shoulder slope, b) Inside shoulder slope, c) No	Outside Shoulder Slope
Default Shoulder Slope	Default slope of the shoulder if a superelevation slope is not specified.	Numeric, Grade	-6.000%
Subbase Daylight Type	Select whether to hold the daylight link to a fixed slope with variable width, or hold it to a fixed width with variable slope	Selection list: a) Hold Slope, Adjust Width, b) Hold Width, Adjust Slope	Hold Slope, Adjust Width
Daylight Slope / Width	The value of the fixed slope (x : 1) or fixed width of the daylight link, used if the "hold slope" or the "hold width" option is used.	Numeric, positive	4 ( : 1)
Subbase - Use Superelevation	Specifies to use superelevation slope for the subbase slope.	Selection List: a) Outside shoulder slope, b) Inside shoulder slope, c) No	Outside Shoulder Slope
Default Subbase Slope	Default slope of the subbase if a superelevation slope is not specified.	Numeric, Grade	-6.000%

Parameter	Description	Type	Default
Pave1 Extension	Width that the Pave1 layer extends beyond the shoulder hinge point. The bottom of the Pave1 layer may not extend beyond the shoulder sideslope.	Numeric, positive	0.0
Pave2 Extension	Width that the Pave2 layer extends beyond the shoulder hinge point. This should be equal to or greater than the Pave1 Extension. The Pave2 layer may not extend beyond the shoulder sideslope.	Numeric, positive	0.0
Base Extension	Width that the Base layer extends beyond the shoulder hinge point. This should be equal to or greater than the Pave2 Extension. The Base layer may not extend beyond the shoulder sideslope.	Numeric, positive	0.0
Pave1 Depth	Depth between finish grade and Pave1 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Depth between Pave1 and Pave2 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Depth between Pave2 and Base (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Depth of the subbase layer at the attachment point (zero to omit)	Numeric, non-negative	0.300 m 1.000 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Type of Assignment	Status
Shoulder Width	May be used to override the fixed Shoulder Width and tie the edge-of-shoulder to an offset alignment. The following	Optional

Parameter	Type of Assignment	Status
	object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	

### Output Parameters

Parameter	Description	Type
Daylight Slope	Slope of the daylight link	Numeric
Daylight Offset	Offset of the subgrade daylight point	Numeric
Daylight Elevation	Elevation of the subgrade daylight point	Numeric
Shoulder Width	Width of the paved shoulder	Numeric
Shoulder Slope	Slope of the paved shoulder	Numeric

### Behavior

The finish grade of the shoulder is inserted for the given Shoulder Width and Shoulder % Slope outward from the attachment point, and the subbase link is inserted from the attachment point offset starting at the Subbase Depth below the finish grade.

The shoulder daylight link can be inserted with either a fixed slope (Hold Daylight Slope = True) or a fixed width (Hold Daylight Slope = False). If a fixed slope is used, the daylight link is extended from the outside edge of shoulder until it intersects the subbase link. Otherwise the subbase layer is extended for the Daylight Width beyond the outside edge of shoulder, and the daylight link is connected to the end of the subbase.

The Pave1, Pave2, and Base surface links are inserted parallel to the finish grade at the given depths. If the layer Extension values are non-zero, each layer is extended for the given distance beyond the shoulder hinge point. If a layer extends past the daylight slope, the layer is terminated at the daylight slope intersection. Each layer should be as wide or wider than the one above it.

### Layout Mode Operation

In layout mode, this subassembly displays the links comprising the shoulder for a normal crown roadway situation. If numeric slope values are given for

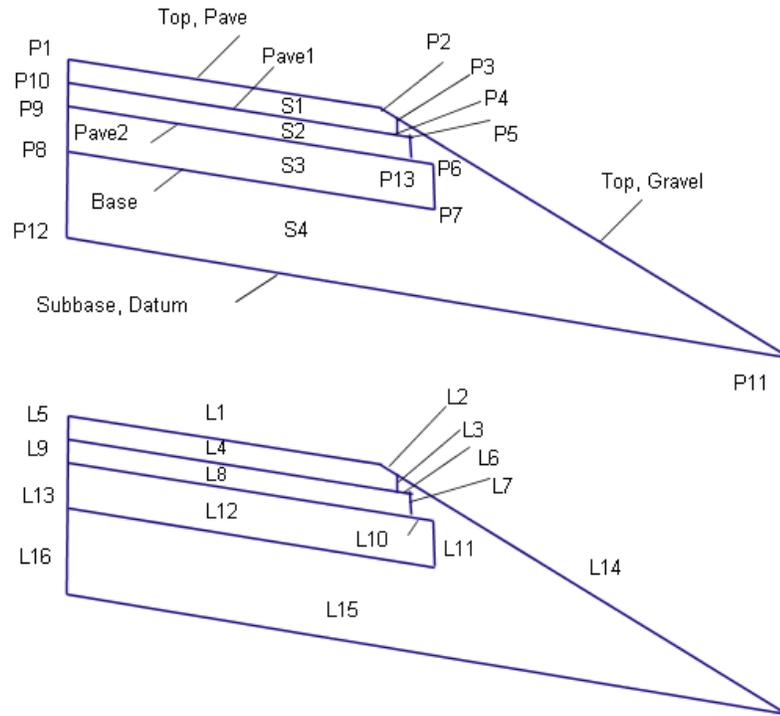
the Shoulder % Slope and Subbase % Slope, the links are shown at the given slope values. Otherwise the default slopes of -6% are used.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

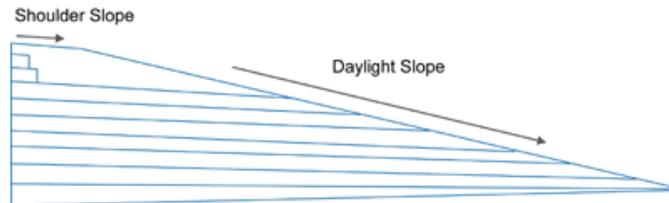
Type	Code	Description
P2	EPS	Edge of paved shoulder, finish grade
P4	EPS Pave1	Edge of paved shoulder on Pave1
P13	EPS Pave2	Edge of paved shoulder on Pave2
P7	EPS Base	Edge of paved shoulder on Base
P11	Daylight Sub	Subbase daylight point
L1, L2	Top, Pave	Paved finish grade
L4	Pave1	
L8	Pave2	
L12	Base	
L15	Subbase Datum	
L14	Top, Gravel	Unpaved finish grade
Other Links	As shown below	Unpaved finish grade
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

### Coding Diagram



## ShoulderMultiLayer

This subassembly inserts a shoulder that you can use to control superelevation. It also supports Pave 2 and Pave 3 Layer extension, as well as varying grade on Datum.



## Attachment

The attachment point is at the inside edge of the paved shoulder, which is typically at the outside edge-of-traveled way.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the sub-assembly either on the right or the left side of the attachment point.	Left / Right	Right
Shoulder Width	Width from the attachment point to the shoulder hinge point	Numeric	2.4 m 8.0 ft
Extension Pave 2	Specifies how far the pave 2 layer extends from the attachment point	Numeric	0.05 m
Extension Pave 3	Specifies how far the pave 3 layer extends from the attachment point	Numeric	0.10 m
Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	Selection list: a) Outside shoulder slope, b) Inside shoulder slope, c) No	Outside Shoulder Slope
Default Shoulder Slope	Default slope of the shoulder if a superelevation slope is not specified.	Numeric, Grade	-2.500%
Subbase Daylight Type	Select whether to hold the daylight link to a fixed slope with variable width, or hold it to a fixed width with variable slope	Selection list: a) Hold Slope, Adjust Width, b) Hold Width, Adjust Slope	Hold Slope, Adjust Width

<b>Parameter</b>	<b>Description</b>	<b>Type</b>	<b>Default</b>
Daylight Slope	The value of the fixed slope of the daylight link, used if old slope option is used	Numeric, positive	4 ( : 1)
Daylight Width	The value of the fixed width of the daylight link, used if old width option is used	Numeric, positive	3m 10 ft
Pave 1 Width	Width of Pave 1 extension	Numeric, positive	0
Pave 2 Width	Width of Pave 2 extension	Numeric, positive	0
Pave Depth	Pave depth (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave 3 Depth	Thickness of the Pave3 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base1 Depth	Thickness of the Base1 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base2 Depth	Thickness of the Base2 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base3 Depth	Thickness of the Base3 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase1 Depth	Thickness of the Subbase1 layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase2 Depth	Thickness of the Subbase2 layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

Parameter	Description	Type	Default
Subbase3 Inner Depth	Thickness of the Subbase3 layer at the attachment point (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase3 Outer Depth	Thickness of the Subbase3 layer at the edge of travelway (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Type	Status
Shoulder Width	May be used to override the fixed Shoulder Width and tie the edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Daylight Slope	Slope of the daylight link	Numeric
Daylight Offset	Offset of the subgrade daylight point	Numeric
Daylight Elevation	Elevation of the subgrade daylight point	Numeric
Shoulder Width	Width of the paved shoulder	Numeric
Shoulder Slope	Slope of the paved shoulder	Numeric

### Behavior

This subassembly is inserted on the side of the attachment point specified. All links follow the slope specified for the top link L1, with the exception of

L10. Link L10 is determined by the Subbase 3 Inner Depth and Super Elevation/Grade on Link L1, if a User specified Grade is not given for L10.

### Layout Mode Operation

In layout mode, this subassembly displays the links comprising the shoulder for a normal crowned roadway situation. If numeric slope values are given for the Shoulder % Slope and Subbase % Slope, the links are shown at the given slope values. Otherwise the default slopes of -2.50% are used.

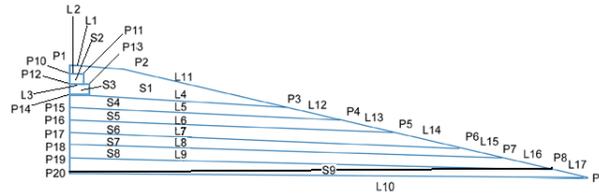
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	ETW	Edg- of-traveledway on top surface
P2	Hinge	
P11	EPS_Pave2	Edge of Pave shoulder on Pave2
P13	EPS_Pave3	Edge of Pave shoulder on Pave3
P3	EPS_Base1	Edge of Paved shoulder on Base1
P4	EPS_Base2	Edge of Paved shoulder on Base2
P5	EPS_Base3	Edge of Paved shoulder on Base3
P6	EPS_SubBase1	Edge of Paved shoulder on SubBase1
P7	EPS_SubBase2	Edge of Paved shoulder on SubBase2
P8	EPS_SubBase3	Edge of Paved shoulder on SubBase3
P9	Daylight_Sub	Subbase daylight point
L1	Top, SR	Finished grade surface
L2	Pave2	

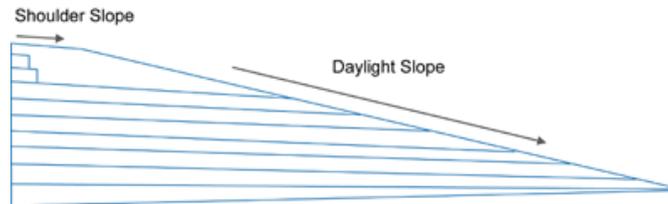
<b>Point, Link, or Shape</b>	<b>Codes</b>	<b>Description</b>
L3	Pave3	
L4	Base1	
L5	Base2	
L6	Base3	
L7	Subbase1	
L8	Subbase2	
L9	Subbase3	
L10	Datum	
L11-L17	Slope_Link	
S1	SR	
S2	Pave2	
S3	Pave3	
S4	Base1	
S5	Base2	
S6	Base3	
S7	Subbase1	
S8	Subbase2	
S9	Subbase3	

## Coding Diagram



## ShoulderMultiLayerVaryingWidth

This subassembly inserts a shoulder that you can use to control superelevation. It is intended to work in combination with the LaneInsideSuperMultiLayer subassembly and supports Pave 1 through Pave 10 layer extension.



### Attachment

The attachment point is at the inside edge of the paved shoulder, which is typically at the outside edge-of-traveled way.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the sub-assembly either on the right or the left side of the attachment point.	Left / Right	Right
Shoulder Width	Width from the attachment point to the shoulder hinge point	Numeric	2.4 m 8.0 ft

Parameter	Description	Type	Default
Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment for the shoulder.	Selection list: a) Outside shoulder slope, b) Inside shoulder slope, c) No	Outside Shoulder Slope
Default Shoulder Slope	Default slope of the shoulder if a superelevation slope is not specified.	Numeric, Grade	-6.000%
Subbase Daylight Type	Select whether to hold the daylight link to a fixed slope with variable width, or hold it to a fixed width with variable slope	Selection list: a) Hold Slope, Adjust Width, b) Hold Width, Adjust Slope	Hold Slope, Adjust Width
Daylight Slope	The value of the fixed slope (x : 1) of the daylight link	Numeric, positive	4 ( : 1)
Width	Value of the fixed width	Numeric, positive	3m 10 ft
Pave 1 Width	Width of Pave 1 extension	Numeric, positive	0
Pave 2 Width	Width of Pave 2 extension	Numeric, positive	0
Pave Depth	Pave depth (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave1 Depth	Thickness of the Pave1 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Depth	Thickness of the Pave2 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave 3 Depth	Thickness of the Pave3 layer (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base1 Depth	Thickness of the Base1 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft

Parameter	Description	Type	Default
Base2 Depth	Thickness of the Base2 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base3 Depth	Thickness of the Base3 layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase1 Depth	Thickness of the Subbase1 layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase2 Depth	Thickness of the Subbase2 layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase3 Inner Depth	Thickness of the Subbase3 layer at the attachment point (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Subbase3 Outer Depth	Thickness of the Subbase3 layer at the edge of travelway (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Type	Status
Shoulder Width	Alignment that defines the edge of the paved portion of the shoulder. May be used to override the fixed Shoulder Width and tie the edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional

### Output Parameters

Parameter	Description	Type
Daylight Slope	Slope of the daylight link	Numeric

Parameter	Description	Type
Daylight Offset	Offset of the subgrade daylight point	Numeric
Daylight Elevation	Elevation of the subgrade daylight point	Numeric
Shoulder Width	Width of the paved shoulder	Numeric
Shoulder Slope	Slope of the paved shoulder	Numeric

### Behavior

The finish grade of the shoulder is inserted for the given Shoulder Width and Default Shoulder Slope outward from the attachment point. The shoulder daylight link can be inserted with either a fixed slope (Daylight Type = Slope), or a fixed width (Daylight Type = Width). If a fixed slope is used, the daylight link is extended from the outside edge of the shoulder until it intersects the bottom link (L11). Otherwise, the bottom layer is extended for the Daylight Width beyond the outside edge of the shoulder, and the daylight link is connected to the end of the bottom. All links follow the slope of top link (L1).

### Layout Mode Operation

In layout mode, this subassembly displays the links comprising the shoulder for a normal crowned roadway situation. If numeric slope values are given for the Shoulder % Slope and Subbase % Slope, the links are shown at the given slope values. Otherwise the default slopes of -6% are used.

### Point, Link, and Shape Codes

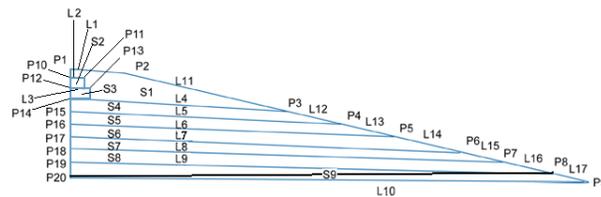
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Codes	Description
P1	ETW	Edg- of-traveledway on top surface
P2	EPS	Edge of Pave Shoulder on top surface
P11	EPS_Pave1	Edge of Pave shoulder on Pave1
P13	EPS_Pave2	Edge of Pave shoulder on Pave2

<b>Point, Link, or Shape</b>	<b>Codes</b>	<b>Description</b>
P3	EPS_Base1	Edge of Paved shoulder on Base1
P4	EPS_Base2	Edge of Paved shoulder on Base2
P5	EPS_Base3	Edge of Paved shoulder on Base3
P6	EPS_SubBase1	Edge of Paved shoulder on SubBase1
P7	EPS_SubBase2	Edge of Paved shoulder on SubBase2
P8	EPS_SubBase3	Edge of Paved shoulder on SubBase3
P9	Daylight_Sub	Subbase daylight point
L1	Top, Pave	Finish grade surface
L2	Pave1	
L3	Pave2	
L4	Pave3	
L5	Base1	
L6	Base2	
L7	Base3	
L8	Subbase1	
L9	Subbase2	
L10	Datum, Subbase3	
L11-L17	Slope_Link	
S1	Pave	
S2	Pave1	

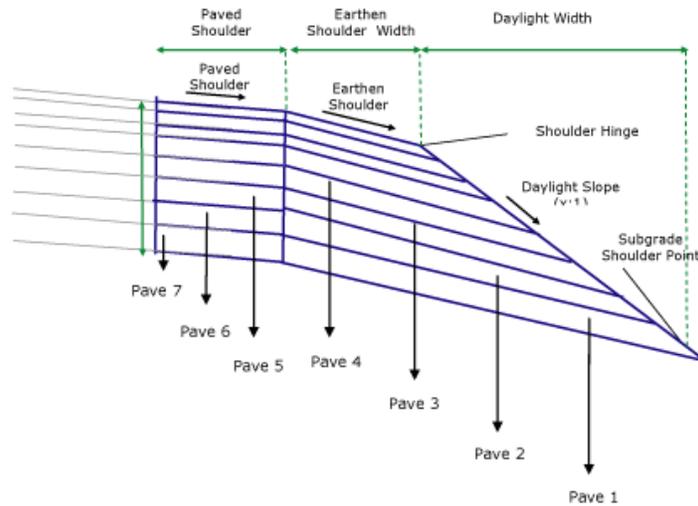
Point, Link, or Shape	Codes	Description
S3	Pave2	
S4	Pave3	
S5	Base1	
S6	Base2	
S7	Base3	
S8	Subbase1	
S9	Subbase2	
S10	Subbase3	

### Coding Diagram



## ShoulderMultiSurface

This subassembly inserts a paved and an earthen (unpaved or gravel) shoulder with all pavement, base, and subbase layers extended to the subgrade shoulder point.



### Attachment

The attachment point is at the beginning of the first link. This subassembly is sensitive to the direction being inserted. Positive widths increase the offset from the attachment point in the direction inserted.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Pavement 1 Depth	Depth of Pavement 1. If there is no Pavement 1 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft
Pavement 2 Depth	Depth of Pavement 2. If there is no Pavement 2 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft

Parameter	Description	Type	Default
Pavement 3 Depth	Depth of Pavement 3. If there is no Pavement 3 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft
Pavement 4 Depth	Depth of Pavement 4. If there is no Pavement 4 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft
Pavement 5 Depth	Depth of Pavement 5. If there is no Pavement 5 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft
Pavement 6 Depth	Depth of Pavement 6. If there is no Pavement 6 layer, a zero depth should be used.	non-negative, positive	0.025 m 0.083 ft
Pavement 7 Depth	Depth of Pavement 7. If there is no Pavement 7 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft
Pavement 8 Depth	Depth of Pavement 8. If there is no Pavement 8 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft
Pavement 9 Depth	Depth of Pavement 9. If there is no Pavement 9 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft
Pavement 10 Depth	Depth of Pavement 10. If there is no Pavement 10 layer, a zero depth should be used.	Numeric, non-negative	0.025 m 0.083 ft
Paved Shoulder Width	Width of the Shoulder that is paved.	Numeric, positive	1.0 m 3 ft
Paved Shoulder Slope Specification	Specifies how the paved shoulder slope will be calculated. User also has the option to set a parameter reference and use the Pavement Slope of an adjacent lane to define the top slopes of the shoulder. The behavior of the top of	List of options: a) Default, b) Use Inside Shoulder SE, c) Use Outside Shoulder SE	Default

Parameter	Description	Type	Default
	shoulder slope when this option is selected is described in the Behavior section.		
Default Paved Shoulder Slope	Default cross slope of the paved shoulder surface	Slope	-4.0%
Earthened Shoulder Width	Width of the Shoulder that is unpaved	Numeric, positive	
Earthened Shoulder Slope Specification	Specifies how the unpaved shoulder slope will be calculated. User also has the option to set a parameter reference and use the Pavement Slope of an adjacent lane to define the top slopes of the shoulder. The behavior of the top of shoulder slope when this option is selected is described in the Behavior section.	List of options: a) Default, b) Use Inside Shoulder SE, c) Use Outside Shoulder SE	Default
Default Earthened Shoulder Slope	Default cross slope of the unpaved shoulder surface.	Slope	-4.0%
Daylight Width	Specifies the shoulder daylight width	Numeric, positive	1.0 m 3 ft
Daylight Slope	Slope of the Foreslope of the shoulder, which extends from the Shoulder Hinge Point to the Subgrade Shoulder Point	Slope	2: 1
Subbase Daylight Type	Select whether to hold the daylight link to a fixed slope with variable width, or hold it to a fixed width with variable slope	Selection list: a) Hold Slope, Adjust Width, b) Hold Width, Adjust Slope	Hold Slope, Adjust Width

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Paved Shoulder Width	Alignment that defines the edge of the paved portion of the shoulder. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Earthened Shoulder Width	Alignment that defines the shoulder hinge point. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Daylight Width	Alignment that defines the location of the subgrade shoulder point.	Optional
Daylight Slope	Profile that defines the elevation of the shoulder subgrade point. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

#### Output Parameters

Parameter	Description	Type
Daylight Slope	Slope of the daylight link	Numeric
Daylight Offset	Offset of the subgrade daylight point	Numeric
Daylight Elevation	Elevation of the subgrade daylight point	Numeric

#### Behavior

The shoulder is inserted using width and depth parameters provided. The slope of the subgrade surface can also be set using a parameter reference that sets the slope equal to that of the subgrade surface of an adjacent lane. You can also enter a fixed slope, if desired. The slopes of all base surfaces will follow the slope of the subgrade surface. When an alignment is used to define the Width to Subgrade Shoulder Point, the Foreslope of the Shoulder parameter is ignored. The shoulder subassembly ties in to the pavement layers (even if the outside edges of the pavement layers are extended).

### Layout Mode Operation

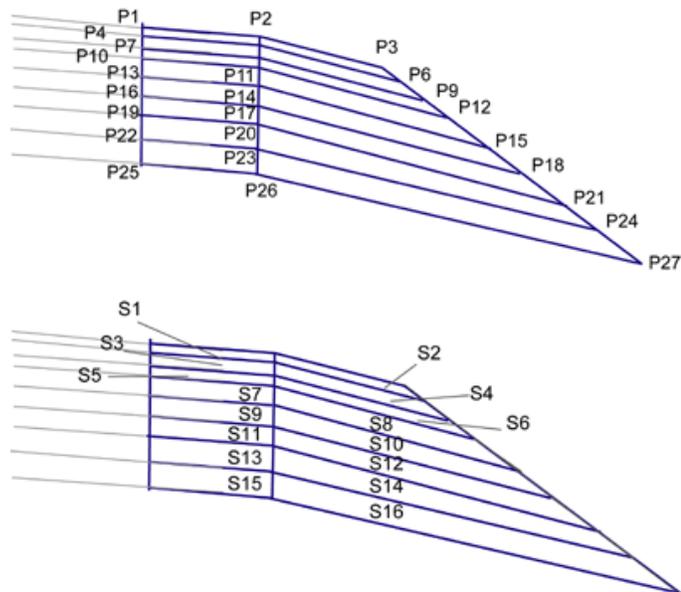
In layout mode, this subassembly displays the links defined by the input parameters.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

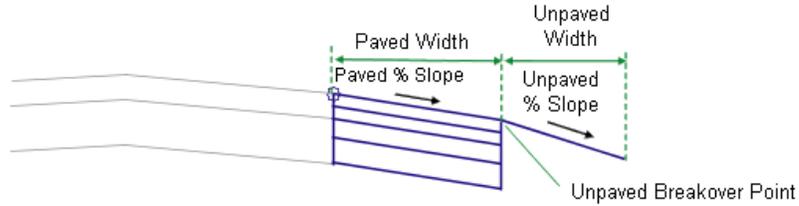
Point, Link, or Shape	Codes	Description
P1	ETW	Edge-of-traveledway on top surface
P2	EPS	Edge of Paved Shoulder
P3 through P27		No codes are assigned to these points.

### Coding Diagram



# ShoulderVerticalSubbase

This subassembly inserts a paved shoulder with the pavement and subbase layers terminating with a vertical link.



### Attachment

The attachment point is at the inside edge of the paved shoulder, which is typically at the outside edge-of-traveled way.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Paved Width	Width from the attachment point to the edge of paved shoulder	Numeric	2.4 m 8.0 ft
Default Paved Slope	Default slope of the paved shoulder, if a superelevation slope is not specified.	Numeric, Grade	-6.000%
Use Superelevation Slope	Specifies to use superelevation slope, from the superelevation specification defined on the baseline alignment, for the paved portion of the shoulder.	Selection List : a) Outside shoulder slope, b) Inside shoulder slope, c) No	Outside Shoulder Slope

Parameter	Description	Type	Default
Unpaved Link Treatment	Determines when or if the unpaved portion of the shoulder is inserted. Value should be one of the following: Code: Treatment 1: Always used 2: Used only if shoulder is in cut 3: Used only if shoulder is in cut, or is in fill on the high side of superelevation.	Numeric, 1 – 3	1
Unpaved Width	Width of the unpaved portion of the shoulder. Set to zero to omit the unpaved link.	Numeric, positive	1.8 m 6.0 ft
Unpaved % Slope	% slope of the unpaved shoulder surface	Numeric, positive	-6 (%)
Unpaved Max Breakover	Maximum breakover between the % slopes of the paved and unpaved portions on the high side of superelevation	Numeric, positive	8 (%)
Pave1 Depth	Depth between finish grade and Pave1 (zero to omit)	Numeric, non-negative	0.025m 0.083 ft
Pave2 Depth	Depth between Pave1 and Pave2 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Depth between Pave2 and Base (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Subbase Depth	Depth between Base and Subbase (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Type of Assignment	Status
Paved Width	May be used to override the fixed Paved Width and tie the edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional
Daylight Surface	Used to determine if the outside edge of paved shoulder is in cut or fill. This parameter is not needed if the Unpaved Link Treatment is 1. The following object types can be used as targets for specifying this surfaces: surfaces.	Conditional; required if Unpaved Link Treatment is 2 or 3.

#### Output Parameters

Parameter	Description	Type
Shoulder Width	Width of the paved shoulder	Numeric
Shoulder Slope	Slope of the paved shoulder	Numeric

#### Behavior

The links for the shoulder finish grade, Pave1, Pave2, Base and Subbase are inserted outward using the given Paved Width, Paved % Slope, material depths. If the Unpaved Link Treatment is 1, the unpaved shoulder link is inserted under all conditions. If the Treatment code is 2, the outside edge of the paved shoulder is checked to determine if it is in cut or fill; the unpaved shoulder link is inserted only in cut. Treatment code 3 uses the unpaved link in cut, or when the paved shoulder link has a positive %slope. The unpaved finish grade link is inserted at the given Unpaved % Slope, unless the difference between the Paved %Slope and Unpaved %Slope exceeds the Unpaved Max Breakover value. In that case the slope of the unpaved link is adjusted to hold the difference to the given breakover..

#### Layout Mode Operation

In layout mode, this subassembly displays the links comprising the shoulder for the normal crown roadway condition, based on the input parameters provided. If a numeric value is given for the Paved %Slope, the paved portion

of the shoulder is calculated based on that value. Otherwise the default value of -6% is used.

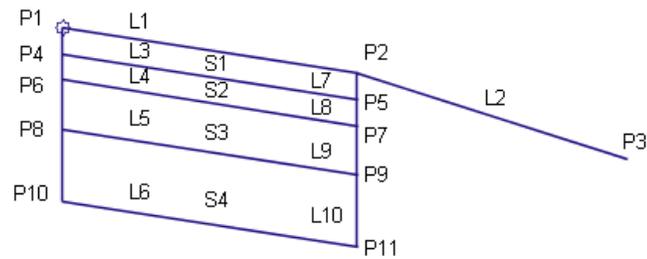
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P2	EPS	Edge of paved shoulder
P3	ES_Unpaved	Edge of the unpaved shoulder
P5	EPS_Pave1	Edge of paved shoulder on Pave1
P7	EPS_Pave2	Edge of paved shoulder on Pave2
P9	EPS_Base	Edge of paved shoulder on Base
P11	EPS_Sub	Edge of paved shoulder on Subbase
L1	Top, Pave	Paved finish grade
L2	Top, Datum	Unpaved finish grade
L3	Pave1	
L4	Pave2	
L5	Base	
L6	Subbase, Datum	
L7 – L10	Datum	
S1	Pave1	
S2	Pave2	

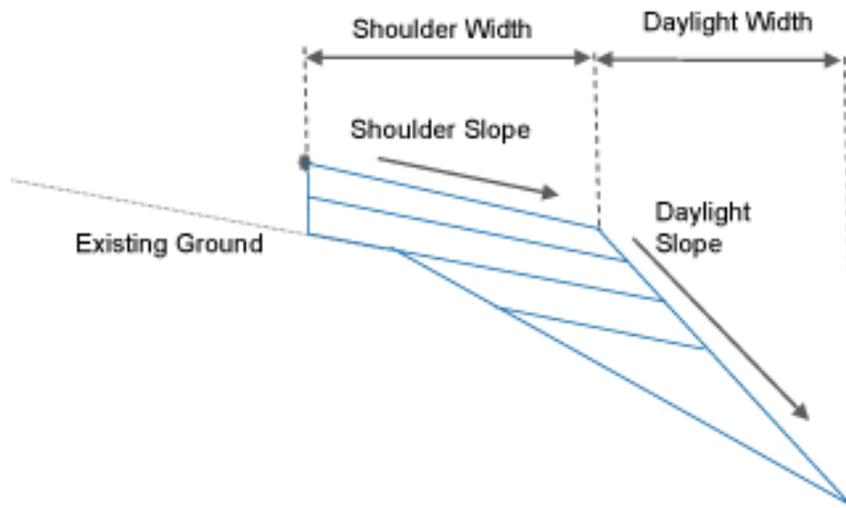
Point, Link, or Shape	Code	Description
S3	Base	
S4	Subbase	

### Coding Diagram



## ShoulderWidening

This subassembly inserts a shoulder for widening situations that will trim the base and subbase layers based on the location of the existing ground surface.



## Attachment

The attachment point is at the inside edge of the shoulder on the finish grade surface.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Default Shoulder Slope	Default cross slope of the shape surface. This value is used if superelevation slope is not used, or is not specified for the baseline alignment.	Numeric	- 2.0 %
Subbase Daylight Type	Select whether to hold the daylight link to a fixed slope with variable width, or hold it to a fixed width with variable slope	Selection list: a) Hold Slope, Adjust Width, b) Hold Width, Adjust Slope	Hold Slope, Adjust Width
Daylight Slope	The value of the fixed slope of the daylight link, used if the “hold slope” option is used	Numeric, positive	4 ( : 1)
Daylight Width	The value of the fixed width of the daylight link, used if the “hold width” option is used	Numeric, positive	5.40 ft 1.8 m
Pave 1 Depth	Depth of Pave 1 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave 2 Depth	Depth of Pave 2 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Base Depth	Depth of base layer (zero to omit)	Numeric, non-negative	0.100 m 0.333 ft

Parameter	Description	Type	Default
Subbase Depth	Depth of Subbase Layer (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Default Subbase Slope	Default cross slope of the shape surface. This value is used if superelevation slope is not used, or is not specified for the baseline alignment.	Numeric	- 2.0 %

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Shoulder Width	May be used to override the fixed Shoulder Width and tie the edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this: alignments, polylines, feature lines, or survey figures.	Optional
Existing Surface	May be used to specify an existing surface to trim base and subbase layers to. The following object types can be used as targets for specifying this surface: surfaces.	Optional

### Output Parameters

Parameter	Description	Type
Daylight Slope	Slope of the daylight link	Numeric
Daylight Offset	Offset of the subgrade daylight point	Numeric
Daylight Elevation	Elevation of the subgrade daylight point	Numeric
Shoulder Width	Width of the paved shoulder	Numeric
Shoulder Slope	Slope of the paved shoulder	Numeric

### Behavior

When inserted, this subassembly checks for the presence of the target existing ground surface. If this surface exists, then the base and subbase surfaces will be trimmed to the existing ground.

If the surface does not exist, then this shoulder behaves the same as the ShoulderExtendAll subassembly.

### Layout Mode Operation

In layout mode, this subassembly displays the links defined by the input parameters.

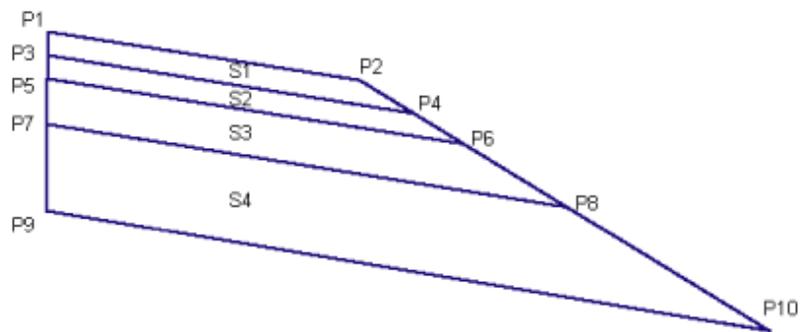
### Point, Link, and Shape Codes

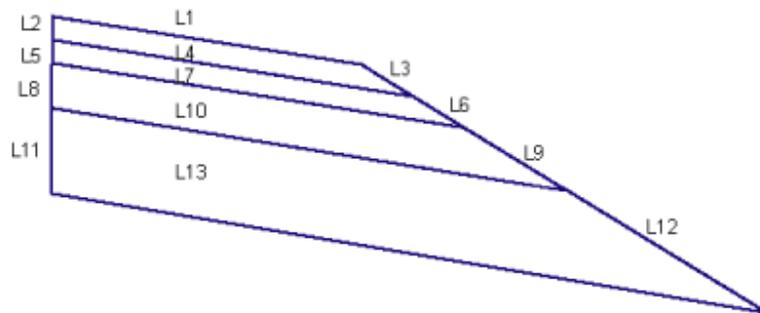
The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point, Link, or Shape	Code	Description
P2	EPS	Edge of paved shoulder, finish grade
P4	EPS_Pave1	Edge of paved shoulder on Pave1
P6	EPS_Pave2	Edge of paved shoulder on Pave2
P8	EPS_Base	Edge of paved shoulder on Base
P10	Daylight_Sub	Subbase daylight point
L1	Top, Pave	Paved finish grade
L3	Pave	Paved finish grade
L4	Pave1	Top of Pavement2
L6	Pave1	Top of Pavement2
L7	Pave2	Top of Pavement3
L9	Pave2	Top of Pavement3
L10	Base	Top of the base course

Point, Link, or Shape	Code	Description
L12	Base	Top of the base course
L13	Subbase, Datum	Bottom of subbase, datum
L14	Top	Top surface formation
S1	Pave1	
S2	Pave2	
S3	Base	
S4	Subbase	

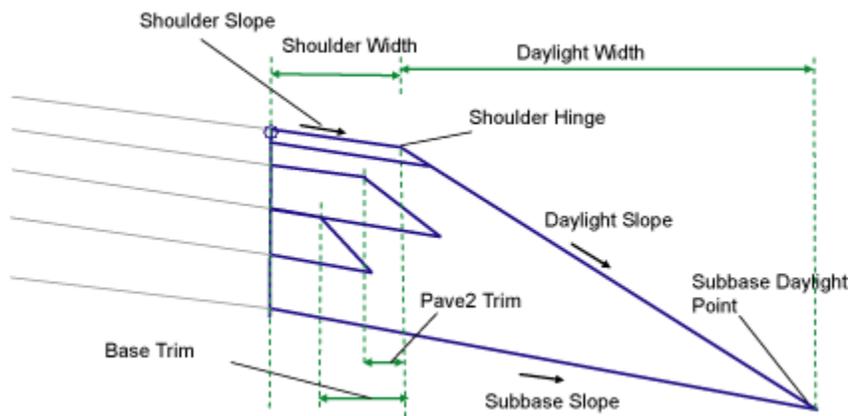
### Coding Diagram





## ShoulderWithSubbaseInterlaced

This subassembly inserts a paved shoulder with all layers including subbase extended to a daylight point. Optionally you can reduce the depths of various sublayers to interlace subbase material around some of the select material layers.



### Attachment

The attachment point is at the inside edge of the paved shoulder, which is typically at the outside edge-of-traveled way.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Shoulder Width	Width from the attachment point to the shoulder hinge point.	Numeric	2.4 m 8.0 ft
Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	List of options: a.) No, b.) Outside shoulder slope, c.) Inside shoulder slope	No
Default Shoulder Slope	Default cross slope of the shoulder surface. This value is used if superelevation slope is not used, or is not specified for the baseline alignment.	Numeric	-4.0%
Subbase Daylight Type	Select whether to hold the daylight link to a fixed slope with variable width, or hold it to a fixed width with variable slope	Selection list: a) Hold Slope, Adjust Width, b) Hold Width, Adjust Slope	Hold Slope, Adjust Width
Daylight Slope / Width	The value of the fixed width or fixed slope (x : 1) of the daylight link.	Numeric, positive	4 ( : 1)
Subbase Superelevation	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	List of options: a.) No, b.) Outside shoulder slope, c.) Inside shoulder slope	No
Default Subbase Slope	Default cross slope of the subbase surface. This value is used if superelevation slope	Numeric	-4.0%

Parameter	Description	Type	Default
	is not used, or is not specified for the baseline alignment.		
Pave1 Depth	Depth between finish grade and Pave1 (zero to omit)	Numeric, non-negative	0.025 m (0.083 ft)
Gap between Pave1 and Pave2	Depth reduction of Pave1 to interlace subbase material between Pave1 and Pave2	Numeric, positive	0.000m 0.000 ft
Pave2 Depth	Depth second level pavement material (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Trim	Reduced width of Pave 2 material to enable subbase interlacing. Side edge of the material layer will have same slope as shoulder daylight slope.	Numeric, positive	0.4 m 1.32 ft
Gap between Pave2 and Base	Depth reduction of pave2 to interlace subbase material between Pave2 and Base Course	Numeric, positive	0.01 m (.033 ft)
Base Depth	Depth of base course (between Pave2 and Base; zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base Trim	Reduced width of Base course material to enable subbase interlacing. Side edge of the material layer will have same slope as shoulder daylight slope.	Numeric, positive	0.4 m 1.32 ft
Subbase Depth	Depth of the subbase layer at the attachment point from bottom of base course (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Topsoil Thickness	Specifies depth of material lining along daylight link. If a value of ZERO is entered - then no lining material is added.	Numeric, non-negative	0.0
Topsoil Shape Code	Specifies shape code for the topsoil material	String	Topsoil

Parameter	Description	Type	Default
Pave1 Shape Code	Specifies shape code for the top layer (below topsoil if enabled) material	String	Pave1
Pave2 Shape Code	Specifies shape code for the second layer material (above base course)	String	Pave2

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Shoulder Width	Can be used to override the fixed Shoulder Width and tie the edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional

### Output Parameters

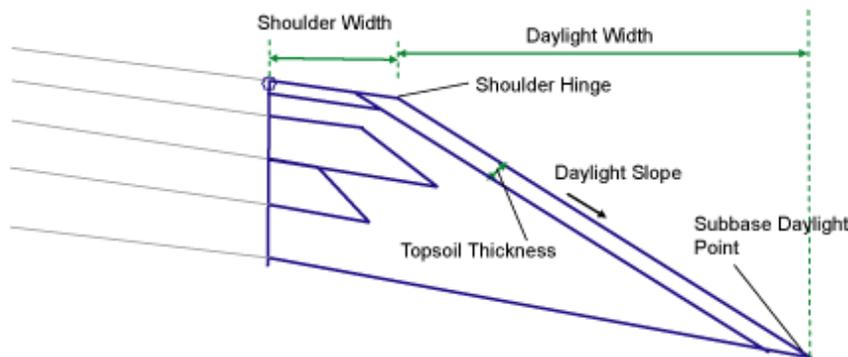
Parameter	Description	Type
Daylight Slope	Slope of the daylight link	Numeric
Daylight Offset	Offset of the subgrade daylight point	Numeric
Daylight Elevation	Elevation of the subgrade daylight point	Numeric
Shoulder Width	Width of the paved shoulder	Numeric
Shoulder Slope	Slope of the paved shoulder	Numeric

### Behavior

The finish grade of the shoulder is inserted for the given Shoulder Width and Default Shoulder Slope outward from the attachment point. The subbase link is inserted from the attachment point starting at the Subbase Depth below the finish grade.

The shoulder daylight link can be inserted with either a fixed slope (Hold Daylight Slope = True), or a fixed width (Hold Daylight Slope = False). If a fixed slope is used, the daylight link is extended from the outside edge of the shoulder until it intersects the subbase link. Otherwise, the subbase layer is extended for the Daylight Width beyond the outside edge of the shoulder, and the daylight link is connected to the end of the subbase.

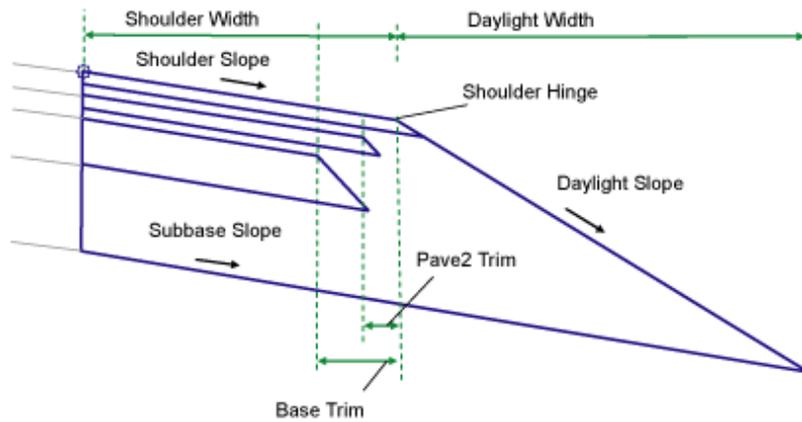
If topsoil material is set to “a positive” value then a new material layer is introduced to the specified thickness right below the daylight link. The thickness is measured perpendicular to the shoulder daylight link. This layer extends from the top layer of the shoulder to the subgrade daylight link at the bottom. Due to this new layer provision, width of the shoulder top layer will be adjusted as shown in the following illustration.



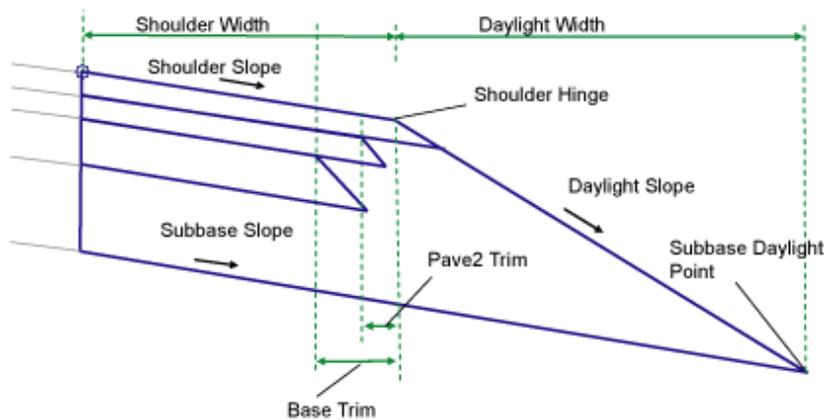
The Pave1, Pave2, and Base surface links are inserted parallel to the finish grade at the given depths until they intersect with the shoulder daylight link.

If the above trim values are set for a positive value then top of respective material will be shortened by that value and the bottom link will be derived with material side slope equal to the daylight slope.

Further, if the “gap between Pave1/Pave2 and/or Pave2/Base” is set to a positive value – then those layers will be separated by that gap as shown in the illustration below.



If the gaps between Pave1/Pave2 and Pave2/Base are set to ZERO then the subassembly will be drawn as shown below.



If the sub-layers are set with zero trim values, then this subassembly will be similar to the ShoulderExtendAll subassembly with optional topsoil lining.

### Layout Mode Operation

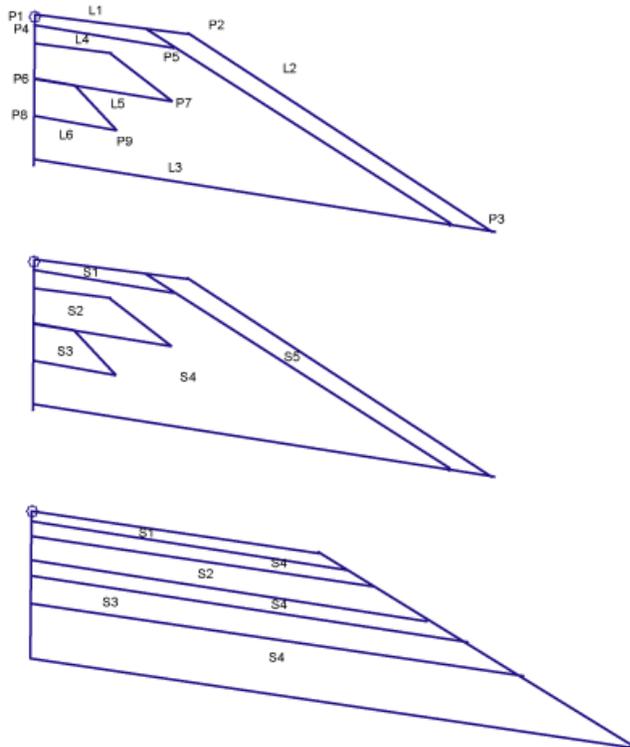
In layout mode this subassembly displays the links comprising the shoulder with default parameters assigned to it.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

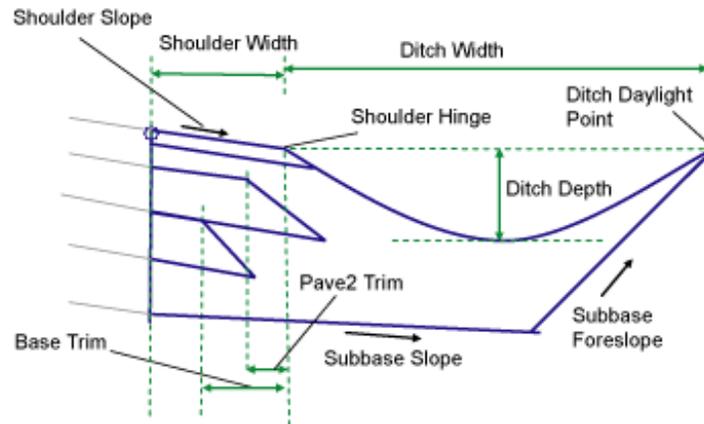
Type	Codes	Description
P2	EPS	Edge of paved shoulder, finish grade
P3	Daylight_Sub	Subbase daylight point
P5	EPS_Pave1	Edge of paved shoulder on Pave1
P7	EPS_Pave2	Edge of paved shoulder on Pave2
P9	EPS_Base	Edge of paved shoulder on Base
L1, L2	Top	Finish grade of the shoulder
L4	Pave1	
L5	Pave2	
L6	Base	
L3	Datum, Subbase	
S1	User Defined Code	User defined code for top layer of shoulder (default - Pave1)
S2	User Defined Code	User defined code for second layer of shoulder (default - Pave2)
S3	Base	
S4	Subbase	
S5	User Defined Code	User defined code for topsoil material (default - Topsoil)

### Coding Diagram



## ShoulderWithSubbaseInterlacedAndDitch

This subassembly inserts a paved shoulder with all pavement, base, and subbase layers extended to the shoulder daylight slope.



### Attachment

The attachment point is at the inside edge of the paved shoulder, which is typically at the outside edge-of-traveled way.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Shoulder Width	Width from the attachment point to the shoulder hinge point.	Numeric	2.4 m 8.0 ft
Use Superelevation Slope	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	List of options: a.) No, b.) Outside shoulder slope, c.) Inside shoulder slope	No
Default Shoulder Slope	Default cross slope of the shoulder surface. This value is used if superelevation slope is	Numeric	-6.0%

Parameter	Description	Type	Default
	not used, or is not specified for the baseline alignment.		
Ditch Width	Specifies width of the ditch from shoulder hinge point.	Numeric, positive	3.00m 9.00ft
Ditch Depth	Specifies depth of the ditch.	Numeric, Positive	0.40m 1.20ft
Subbase Foreslope	The value of the subbase foreslope to tie in the ditch top.	Numeric, positive	2 (: 1)
Subbase Superelevation	Specifies to use the slope from the superelevation specification defined on the baseline alignment.	List of options: a.) No, b.) Outside shoulder slope, c.) Inside shoulder slope	No
Default Subbase Slope	Default cross slope of the subbase surface. This value is used if superelevation slope is not used, or is not specified for the baseline alignment.	Numeric	-4.0%
Pave1 Depth	Depth between finish grade and Pave1 (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Gap between Pave1 and Pave2	Depth reduction of Pave1 to interlace subbase material between Pave1 and Pave2	Numeric, positive	0.000m 0.000 ft
Pave2 Depth	Depth second level pavement material (zero to omit)	Numeric, non-negative	0.025 m 0.083 ft
Pave2 Trim	Reduced width of Pave 2 material to enable subbase interlacing. Side edge of the material layer will have same slope as shoulder daylight slope.	Numeric, positive	0.4 m 1.32 ft
Gap between Pave2 and Base Course	Depth reduction of pave2 to interlace subbase material between Pave2 and Base Course	Numeric, positive	0.01 m 0.033 ft

Parameter	Description	Type	Default
Base Depth	Depth of base course (between Pave2 and Base; zero to omit)	Numeric, non-negative	0.100 m 0.333 ft
Base Trim	Reduced width of Base course material to enable subbase interlacing. Side edge of the material layer will have same slope as shoulder daylight slope.	Numeric, positive	0.4 m 1.32 ft
Subbase Depth	Depth of the subbase layer at the attachment point from bottom of base course (zero to omit)	Numeric, non-negative	0.300 m 1.0 ft
Topsoil Thickness	Specifies depth of material lining along daylight link. If a value of ZERO is entered - then no lining material is added.	Numeric, non-negative	0.0
Topsoil Shape Code	Specifies shape code for the topsoil material	String	Topsoil
Pave1 Shape Code	Specifies shape code for the top layer (below topsoil if enabled) material	String	Pave1
Pave2 Shape Code	Specifies shape code for the second layer material (above base course)	String	Pave2

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Description	Status
Shoulder Width	Can be used to override the fixed Shoulder Width and tie the edge-of-shoulder to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional

### Output Parameters

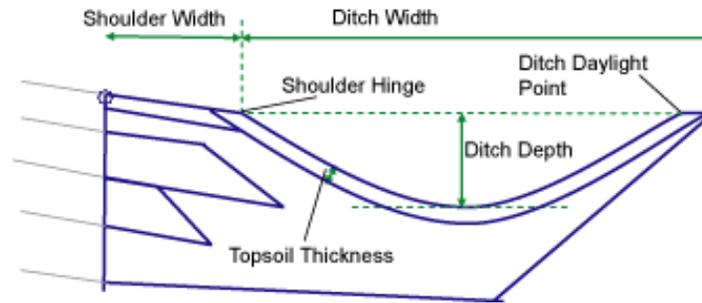
Parameter	Description	Type
Ditch End Slope	Slope of the ditch at the end	Numeric
Ditch End Offset	Offset of the end point of the ditch	Numeric
Ditch End Elevation	Elevation of the end point of the ditch	Numeric
Shoulder Width	Width of the paved shoulder	Numeric
Shoulder Slope	Slope of the paved shoulder	Numeric

### Behavior

The finish grade of the shoulder is inserted for the given Shoulder Width and Shoulder Slope outward from the attachment point. Then parabolic ditch links are added as a series of 6 links from the end of the shoulder to the specified width, using the ditch bottom depth as low point of the parabola.

Now the subbase link is inserted from the attachment point offset starting at the Subbase Depth below the finish grade, using default shoulder slope (or the superelevation slope). Other end of the subbase is found by drawing a link from the end of the ditch with the subbase foreslope as shown in the illustration.

If topsoil material is set with “a positive” value then a new material layer is introduced to the specified thickness right below the daylight link. The thickness is measured perpendicular to the parabolic ditch shape. Top of the ditch is drawn from the shoulder hinge point to the specified width and the ditch depth. On inside edge of the ditch a link offset link is added (along the shoulder link) so that the specified ditch topsoil depth is achieved. Similarly a horizontal link is added on the outside end of the ditch. Now using these two and the topsoil thickness, remainder of the parabolic topsoil bottom is created. Due to this new layer provision, width of the shoulder top layer will be adjusted as shown in the following illustration.



The Pave1, Pave2, and Base surface links are inserted parallel to the finish grade at the given depths. Bottom of the Pave1 link is always extended to the daylight link. If Pave 2 and/or Base Trim values are set to zero value – then the top links of these layers will be extended to the offset of “bottom link of the previous layer”. Bottom links of these layers are extended such that slope of the wedge formed on the side is same as the ditch start grade (Note: compute the start grade of the parabolic ditch using three known points of the parabolic equation).

If the above trim values are set for a positive value then top of respective material will be shortened by that value and the bottom link will be derived with material side slope equal to the daylight slope.

Further, if the “gap between Pave1/Pave2 and/or Pave2/Base” is set to a positive value – then those layers will be separated by that gap as explained in ShoulderWithSubbaseInterlaced subassembly.

### Layout Mode Operation

In layout mode this subassembly displays the links comprising the shoulder with default parameters assigned to it.

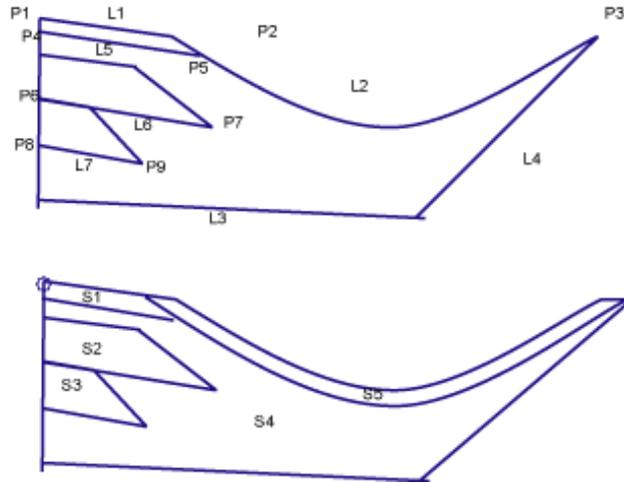
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Type	Codes	Description
P2	EPS	Edge of paved shoulder, finish grade
P3	Daylight_Sub	Subbase daylight point
P5	EPS_Pave1	Edge of paved shoulder on Pave1

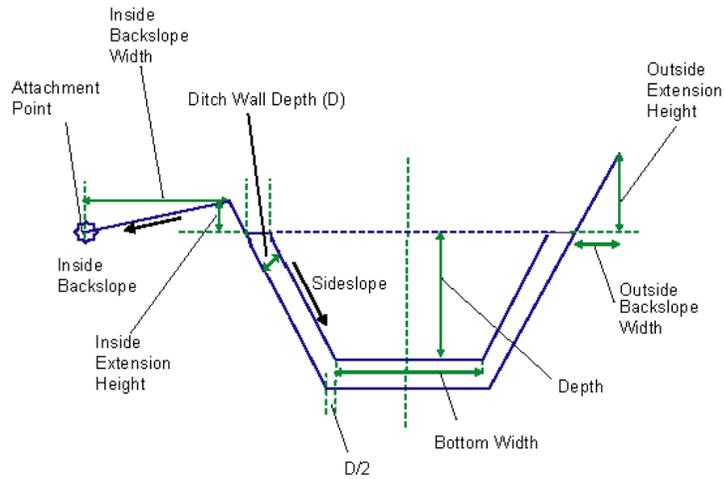
<b>Type</b>	<b>Codes</b>	<b>Description</b>
P7	EPS_Pave2	Edge of paved shoulder on Pave2
P9	EPS_Base	Edge of paved shoulder on Base
L1, L2	Top	Finish grade of the shoulder
L3, L4	Datum, Subbase	
L5	Pave1	
L6	Pave2	
L7	Base	
S1	User Defined Code	User defined code for top layer of shoulder (default - Pave1)
S2	User Defined Code	User defined code for second layer of shoulder (default - Pave2)
S3	Base	
S4	Subbase	
S5	User Defined Code	User defined code for topsoil material (default - Topsoil)

## Coding Diagram



## SideDitch

The subassembly is used to create a ditch structure with optional backslope and foreslopes.



### Attachment

The attachment point is the innermost point on the grading links preceding the ditch structure. If grading links are omitted, then the attachment point is the innermost point on the inside wall of the ditch structure (shown in blue circle).

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Depth	Inside depth of the ditch.	Numeric, Positive	0.45 m 1.5 ft
Bottom Width	Width of bottom of the channel.	Numeric, Positive	0.5 m 1.5 ft
Sideslope	Ditch sideslopes	Numeric	1:2
Ditch Wall Depth	Depth of the ditch wall. This is measured perpendicular to the side of the slope, as shown in the previous diagram.	Numeric, Positive	0.1 m 0.33 ft
Inside Extension Height	Non-lined extension of ditch inside over the attachment point	Numeric, Positive	0.15 m 0.45 ft
Inside Backslope Width	Ditch backfill width on the inside	Numeric, Positive	1.5 m 5.0 ft
Outside Backslope Width	Width of non-lined width beyond the outer point of the ditch structure	Numeric, Positive	0.1 m 0.33 ft

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The subassembly builds the shape for a ditch structure, as shown in the above illustration.

---

**NOTE** In Civil 3D 2010 and previous versions, the Ditch Wall Depth parameter was measured vertically. In Civil 3D 2011 and later, this parameter is measured perpendicular to the side of the slope. Therefore, if you open a drawing containing these subassemblies that was created in Civil 3D 2010 or prior in Civil 3D 2011 or later, and then rebuild the corridor(s), this parameter will be changed to reflect the new behavior. Any volume reports that use this subassembly will be updated to reflect the new behavior.

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### Layout Mode Operation

In layout mode, this subassembly is created outward, starting from the attachment point, as defined using the input parameters.

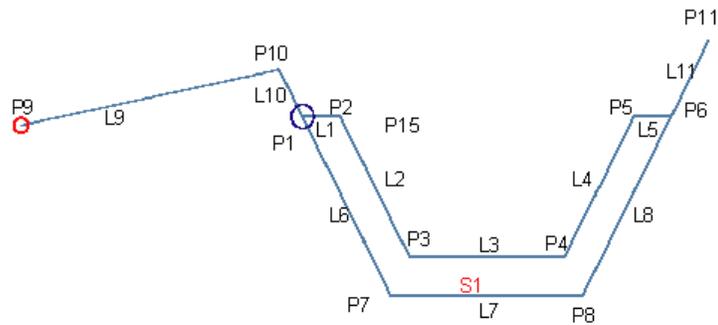
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P1, P6	Ditch_Back	
P2, P5	Ditch_Face	
P10	Ditch_In	
P11	Ditch_Out	
L9, L10, L11	Top, Datum	
L1 to L5	Top, Ditch_Top	

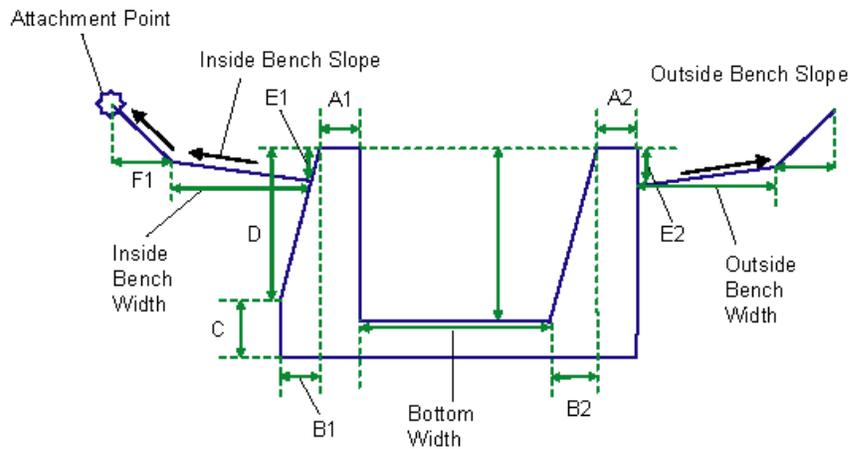
Point/Link	Codes	Description
L6, L7, L8	Datum, Ditch_Bottom	
S1	Ditch	Ditch structure shape area

### Coding Diagram



## SideDitchUShape

This subassembly creates a ditch structure with optional bench and backslopes on the inside and the outside of the structure.



## Attachment

The attachment point is the innermost point of the optional inside bench. If inside benches are omitted, the attachment point is on the innermost point of the inside wall of the ditch structure.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Bottom Width	Bottom width of the ditch	Numeric, Positive	2.0 ft 0.6 m
Ditch Depth	Depth of the ditch	Numeric, Positive	2.0 ft 0.6 m
A1	Thickness of the inside wall at the top	Numeric, Positive	0.45 ft 0.15m
B1	Increased wall thickness of the inside wall at the bottom	Numeric, Positive	0.6 ft 0.2m
C	Thickness of ditch bottom lining	Numeric, Positive	0.5 ft 0.15 m
D	Depth of the tapered face on the inside wall	Numeric, Positive	2.0 ft 0.6 m
E1	Depth of the hinge point where the start of inside bench/backslope links is located	Numeric, Positive	0.0 ft 0.0 m
Inside Bench Width	Width of the (optional) inside bench. Enter ZERO for no bench	Numeric, positive	1.5 ft 0.5 m
Inside Bench Grade	Cross grade of the (optional) inside bench. It is measured away from the	Numeric, Grade type	4%

Parameter	Description	Type	Default
	ditch structure edge, and a positive slope indicates rising bench from the ditch		
F1	Inside backslope link (optional) width. Enter ZERO value for no backslope link	Numeric, Positive	1.0 ft 0.3 m
G1	Slope of the (optional) inside backslope link. It is measured away from the ditch structure, and a positive slope indicates rising link from the start point	Numeric, Slope type	1:1
A2	Thickness of the inside wall at the top	Numeric, Positive	0.45 ft 0.15 m
B2	Tapered width of the outside wall	Numeric, Positive	0.6 ft 0.2 m
E2	Depth of the hinge point for the start of outside bench/backslope links	Numeric, Positive	1.0 ft 0.3 m
Outside Bench Width	Width of the (optional) outside bench. Enter ZERO for no bench	Numeric, positive	3.0 ft 1.0 m
Outside Bench Grade	Cross grade of the (optional) outside bench. It is measured away from the ditch structure edge, and a positive slope indicates rising bench from the ditch	Numeric, Grade type	4%
F2	Outside backslope link (optional) width. Enter ZERO value for no backslope link	Numeric, Positive	1.0 ft 0.3 m
G2	Slope of the (optional) outside backslope link. It is measured away from the ditch structure, and a positive slope indicates rising link from the start point	Numeric, Slope type	1:1

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

#### Behavior

The subassembly builds the shape for a ditch structure, as shown in the illustration. To omit benching and foreslope links, enter zero for the appropriate width parameters.

#### Layout Mode Operation

In layout mode, this subassembly draws as it is defined using the input parameters, starting from the attachment point.

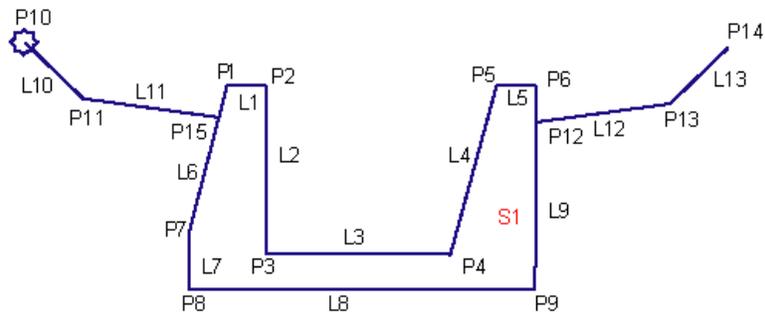
#### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P10	Ditch_In	
P1, P6	Ditch_Back	
P2, P5	Ditch_Face	
P14	Ditch_Out	
L10, L13	Top	
L10, L13	Datum	If the offsets of P11 is < P8; and P13 is > P9 respectively
L11	Top	
L12	Top	

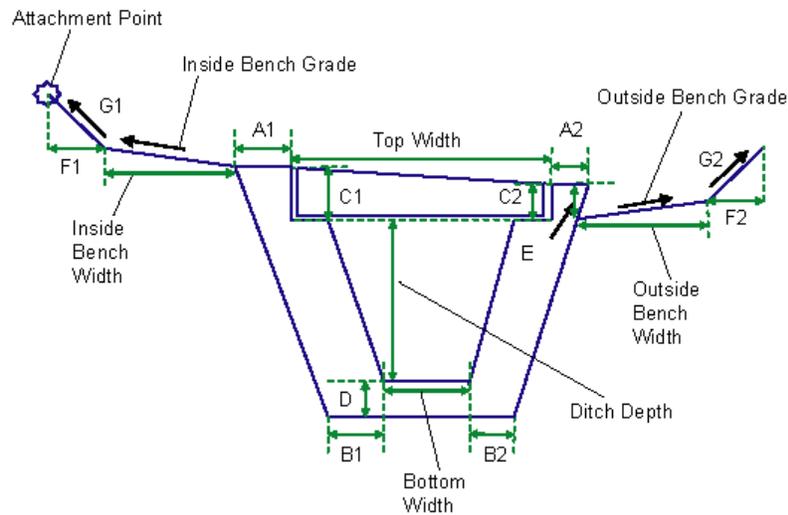
Point/Link	Codes	Description
L1 and L5	Top	
L1 to L5	Ditch_Top	
L8 and L9	Datum	
L10, to L13	Backfill	
L6	Backfill_Face	
S1	Ditch	Ditch structure shape area

### Coding Diagram



## SideDitchWithLid

This subassembly creates a ditch structure to add to either the left or the right sides of the assembly.



Optionally, this subassembly can add daylight links on either side of the structure.

### Attachment

The attachment point is at the innermost point on the grading links preceding the ditch structure. If the grading links on the inside are omitted, then the attachment point is on the innermost point of the inside wall.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the sub-assembly either on the right or the left side of the attachment point.	Left / Right	Right
Ditch Depth	Depth of the ditch on the inside	Numeric, Positive	2.0ft 0.6m
Bottom Width	Bottom width of the ditch	Numeric, Positive	1.0ft 0.3m

Parameter	Description	Type	Default
Top Width	Ditch opening at the lid	Numeric, Positive	2.0ft 0.6m
Lid Gap	Gap between the lid sides and the inside walls	Numeric, Positive	0ft 0m
A1	Top inside wall thickness near the lid	Numeric, Positive	0.45ft 0.15m
B1	Inside wall thickness of the ditch structure	Numeric, Positive	0.6ft 0.2m
C1	Lid depth on the inside	Numeric, Positive	0.6 ft 0.2 m
D	Ditch bottom bed depth	Numeric, Positive	0.6 ft 0.2 m
Inside Bench Width	Width of the (optional) inside bench. Enter ZERO for no bench	Numeric, positive	1.5 ft 0.5 m
Inside Bench Grade	Cross grade of the (optional) inside bench. It is measured away from the ditch structure edge, and a positive slope indicates rising bench from the ditch	Numeric, Grade type	4%
F1	Inside backslope link (optional) width. Enter ZERO value for no backslope link	Numeric	1.0 ft 0.3 m
G1	Slope of the (optional) inside backslope link. It is measured away from the ditch structure, and a positive slope indicates rising link from the start point	Numeric, Slope type	1:1

Parameter	Description	Type	Default
A2	Top outside wall thickness near the lid	Numeric, Positive	0.45 ft 0.15 m
B2	Outside wall thickness of the ditch structure	Numeric, Positive	0.6 ft 0.2 m
C2	Lid depth on the outside	Numeric, Positive	0.45 ft 0.15 m
E	Depth of the hinge point where the start of outside bench/backslope links is located	Numeric, Positive	0 ft 0 m
Outside Bench Width	Width of the (optional) outside bench. Enter ZERO for no bench	Outside Bench Width	3.5ft 1.1m
Outside Bench Grade	Cross grade of the (optional) outside bench. It is measured away from the ditch structure edge, and a positive slope indicates rising bench from the ditch	Outside Bench Grade	4%
F2	Outside backslope link (optional) width. Enter ZERO value for no backslope link	Numeric, Positive	0.3
G2	Slope of the (optional) outside backslope link. It is measured away from the ditch structure, and a positive slope indicates rising link from the start point	Numeric, Slope type	1 : 1

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in

a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Behavior

The subassembly builds the shape for a ditch structure, as shown in the above illustration. To omit the daylight and bench links, enter a zero value for the appropriate width parameters.

### Layout Mode Operation

In layout mode, this subassembly draws as it is defined using the input parameters, starting from the attachment point.

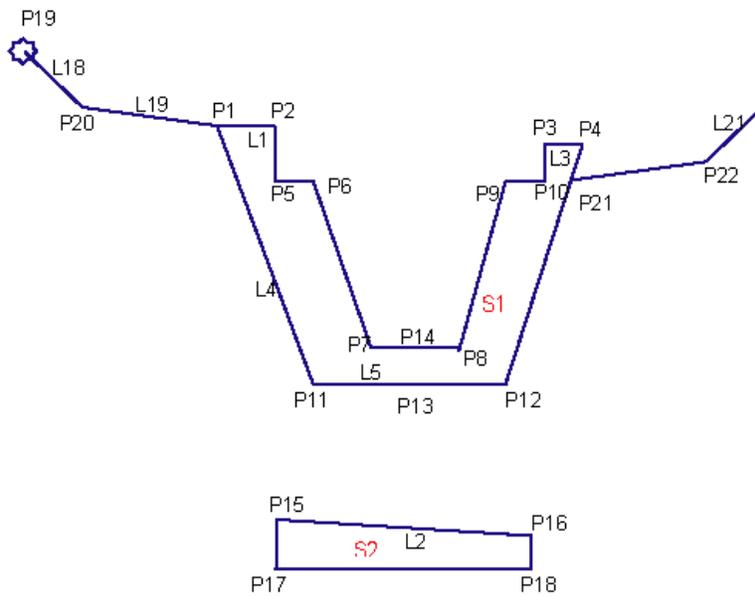
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P1	Ditch_In	
P1, P4	Ditch_Back	
P2, P3	Ditch_Lid_Face	
P15, P16	Lid_Top	L2 is defined by these two points
P21	Ditch_Back_Fill	
P23	Ditch_Out	
L18, L19, L20, L21	Top, Datum	
L1, L2, L3	Top	
L4, L5, L6	Datum	

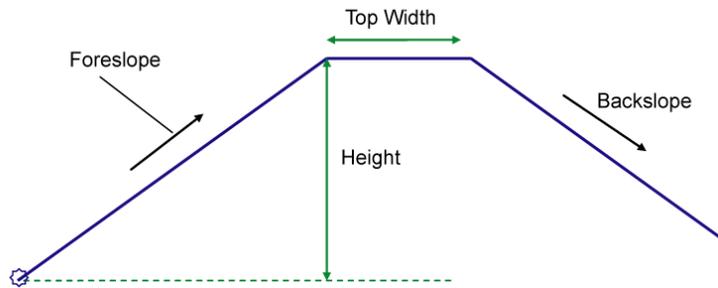
Point/Link	Codes	Description
S1	Ditch	Ditch structure shape area
S2	Lid	Lid structure area

### Coding Diagram



## SimpleNoiseBarrier

This subassembly inserts a noise barrier with the option to specify a topsoil material.



### Attachment

The attachment point is at the inside edge of the barrier, which is typically at the outside edge-of-traveled way or shoulder or another road element.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Top Width	Width of the top barrier top.	Numeric, Positive	1.0m 3.0 ft
Foreslope	Default slope of the barrier foreslope link.	Numeric	1:1.5
Backslope	Default slope of the barrier back slope link.	Numeric	1:1.5
Height	Specifies height of the barrier measure from the attachment point elevation.	Numeric, Positive	3.00m 9.00ft
Topsoil Thickness	Specifies depth of material lining along daylight link. If a value of	Numeric, positive	0.0

Parameter	Description	Type	Default
	zero is entered, then no lining material is added.		
Topsoil Shape Code	Specifies shape code for the topsoil material	String	Topsoil

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Target Surface	Can be used to tie in the back of the barrier into an existing surface at the user defined slope. The following object types can be used as targets for specifying this surfaces: surfaces.	Optional

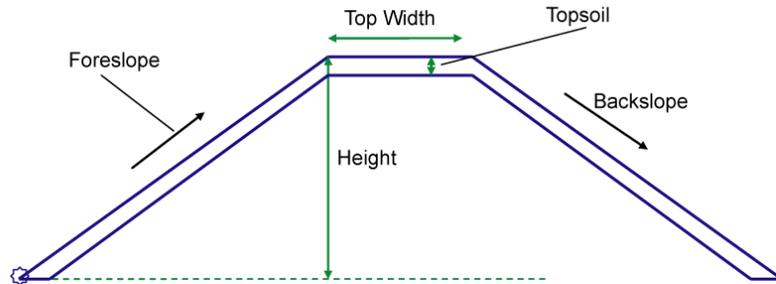
### Output Parameters

Parameter	Description	Type
Barrier Top Elevation	Elevation of the mid point of the barrier top link	Numeric
Barrier Top Offset	Offset of the mid point of the barrier top link	Numeric
Topsoil Thickness	Thickness of topsoil material	Numeric
Backslope	Slope of the noise barrier backslope link	Numeric
Barrier End Offset	Offset of the end point of the noise barrier.	Numeric
Barrier End Elevation	Elevation of the end point of the noise barrier	Numeric

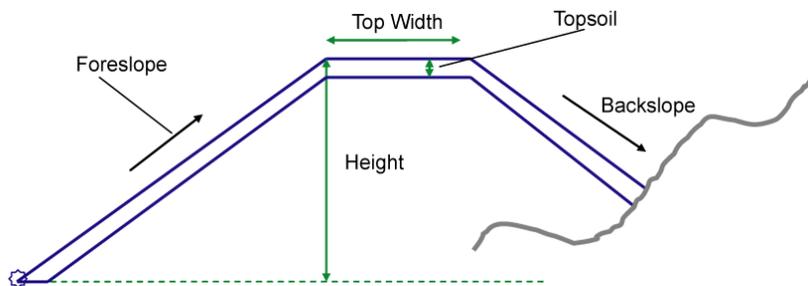
### Behavior

This noise barrier is introduced from the attachment point with the foreslope and backslope as specified by the user. If the Top width is set to zero value, then a triangular shaped noise barrier results. Further if a topsoil layer is

selected for this subassembly – then a lined material layer is introduced as illustrated below. (Note: a horizontal link at the attachment point is introduced such that the thickness of the material is equal to the specified value).



If the backslope is tied into a surface, then that side height is adjusted to daylight into the surface as shown below.



If the backslope is not tied into any surface, then the height of that side is set with specified height. Further, if the surface at that point is higher than the top of the barrier then again backslope link is drawn downwards with specified slope and height parameters.

### Layout Mode Operation

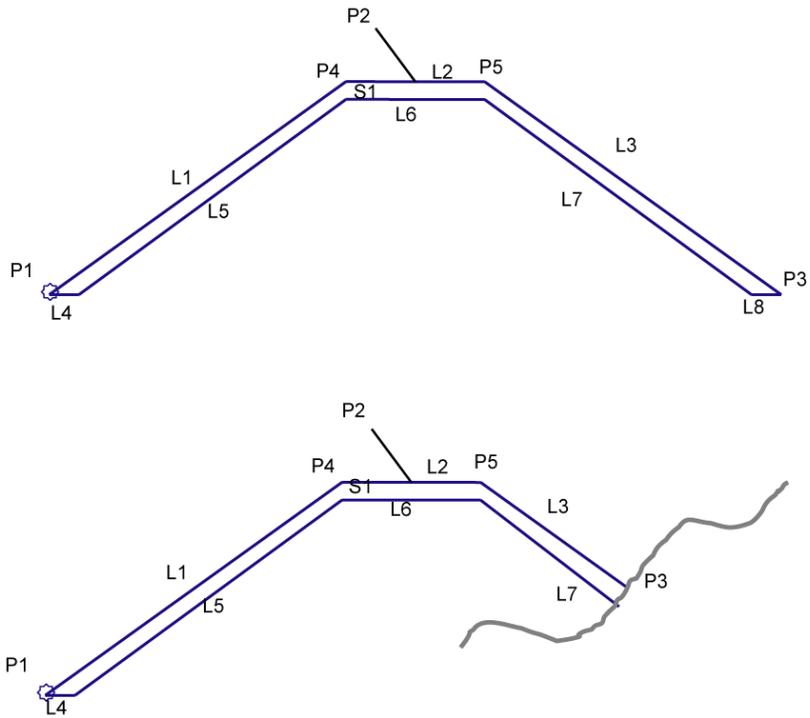
In layout mode, this subassembly draws the links showing the default parameters, including height for back slope.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Type	Codes	Description
P2	RW_Top	Top point of the barrier
P3	RW_Outside	Subbase daylight point
P3	Daylight	Only if Target Surface is set
P4	Bench_In	Inside edge of the barrier top (only if Top Width is non-zero value)
P5	Bench_Out	Outside edge of the barrier top (only if Top Width is non-zero value)
L1, L2,L3	Top	Finish grade of the shoulder
L1, L2,L3	Datum	Only if the topsoil is thickness is set to zero
L4 to L7	Datum	Only if the topsoil thickness is set to Positive value
L8	Datum	Only if Target Surface is not set
S1	User Defined Code	User defined code for topsoil (default - Topsoil)

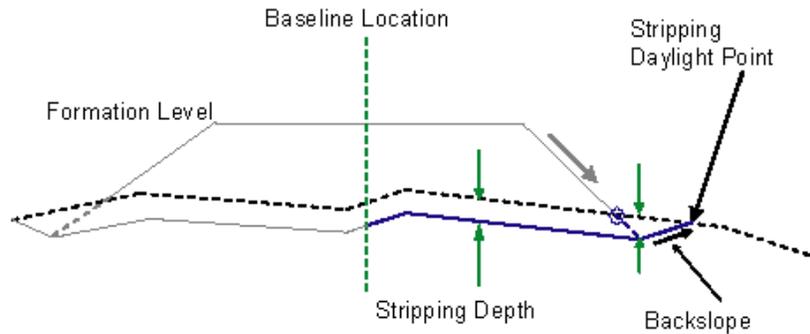
### Coding Diagram



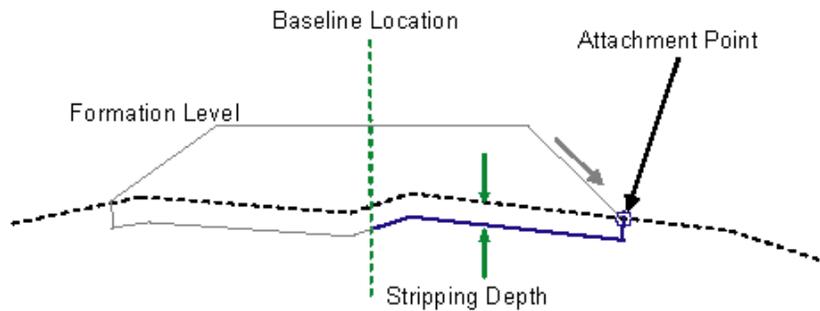
## Stripping Pavement

This subassembly is used to specify the existing top layer stripping to a specified depth.

Case 1: Stripping With Foreslope



Case 2: Stripping To Daylight Extents



Optionally, this subassembly can extend the stripping back to the existing ground with a specified backslope.

**Attachment**

The attachment point is at the daylight point on the finish grade.

**Input Parameters**

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Stripping Depth	Specifies depth of the topsoil to remove.	Numeric	0.05m 0.167ft

Parameter	Description	Type	Default
Extend to Existing Ground	Specifies to extend the stripping back to existing ground	Boolean	Yes
Foreslope	Default foreslope of the stripping extension from original daylight point to beginning of back slope.	Numeric	-2 (:1)
Backslope	Backslope to grade from bottom of stripping back into the existing ground	Numeric, positive	2 (:1)

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Existing Surface	Name of the existing surface to grade back from bottom of stripping. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

### Output Parameters

None.

### Behavior

This subassembly inserts parallel links defining the bottom of the stripping layer below a specified surface. If the option to extend stripping to the existing ground with a backslope is set to No, then stripping starts at the attachment point directly on the specified surface, with a vertical link with depth value specified in the input parameters. From the bottom of this vertical link, a series of links parallel to the specified surface are introduced inwards, until the baseline location of the assembly. If the option to extend stripping to the existing ground is set to Yes, then at the attachment point, a link is introduced with the specified foreslope, until the elevation difference between the bottom of this new link and the specified existing ground is equal to the “stripping

depth”. From this point, a series of links parallel to the specified surface are introduced inwards, until the baseline location of the assembly. Additionally, another link outwardly is added to daylight to existing ground.

### Layout Mode Operation

In layout mode, this subassembly inserts a horizontal line below the attachment point, towards the baseline location. This link is inserted from the attachment point at a depth equal to the “stripping depth”.

If the option to extend the stripping link to a surface is selected, then a foreslope link with a specified slope value to the stripping depth is inserted first, and then the horizontal link is added, as explained previously. Also, a backslope link is added outward, from the outside bottom of the stripping link with a specified foreslope, and to the elevation equal to the subassembly attachment point.

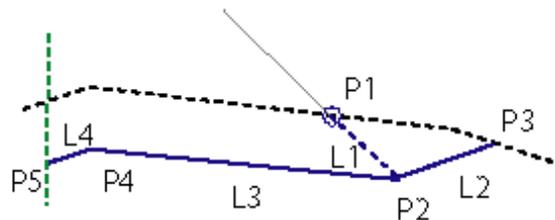
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

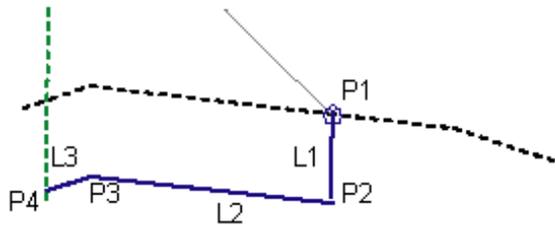
Point/Link	Codes	Description
P3	Daylight_Strip (Only for Case 1)	Daylight point of stripping backslope link
L1	Foreslope_Stripping (Only for case 1)	Stripping foreslope link defining backfill
L2, L3, L4... Ln	Stripping	Stripping links

### Coding Diagram

Case 1: Stripping Extended Back To Surface

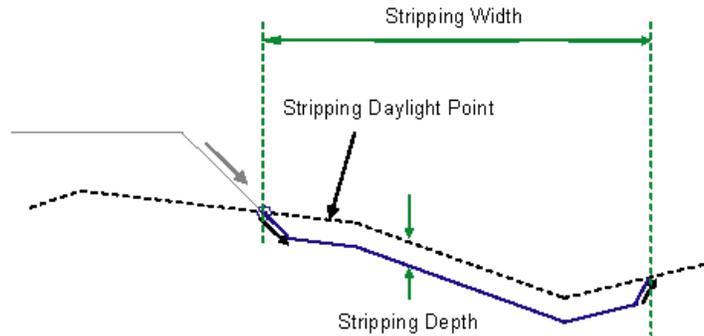


## Case 2: Stripping To The Extents Of Daylight



## StrippingTopSoil

This subassembly is used to specify stripping of top soil to a specified depth.



### Attachment

The attachment point is at the inside of the stripping link.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right/Right	Right
Stripping Depth	Specifies depth of the topsoil to remove.	Numeric	0.05m

Parameter	Description	Type	Default
			0.167ft
Stripping Width	Specifies width of the topsoil stripping region.	Numeric	5m 16.67ft
Foreslope	Default foreslope of the stripping extension from original daylight point to beginning of back slope.	Numeric	-2 (:1)
Backslope	Backslope to grade from bottom of stripping back into the existing ground	Numeric, positive	2 (:1)

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Stripping Width	May be used to override the fixed Stripping Width and tie to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional
Existing Surface	Name of the existing surface to grade back from bottom of stripping. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

### Output Parameters

None.

### Behavior

This subassembly inserts parallel links defining the bottom of the stripping layer below a specified surface. The stripping starts at the insertion point just below the specified surface. A foreslope link is placed from the insertion point to the side specified in the input parameters. This link is drawn until the elevation difference between its lowest point and the existing ground is equal to the "stripping depth".

Similarly, a backslope link is drawn from the topsoil surface at an offset specified by the “stripping width” from the insertion point. Again the depth of this link is such that the elevation difference at the bottom of the link, with respect to the topsoil surface, is equal to the stripping depth.

Now a series of links parallel to the specified topsoil surface are introduced connecting above two new links to define the stripping layer.

To insert vertical links at the insertion point, and or at the other end of the stripping, specify foreslope and or backslope values to zero.

### Layout Mode Operation

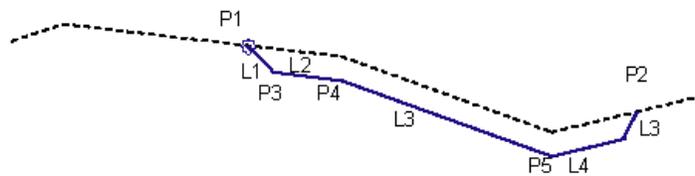
In layout mode, foreslope and backslope links are added using the input parameters. Connecting the bottom of these two links, a horizontal line is added to represent the stripping layer.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

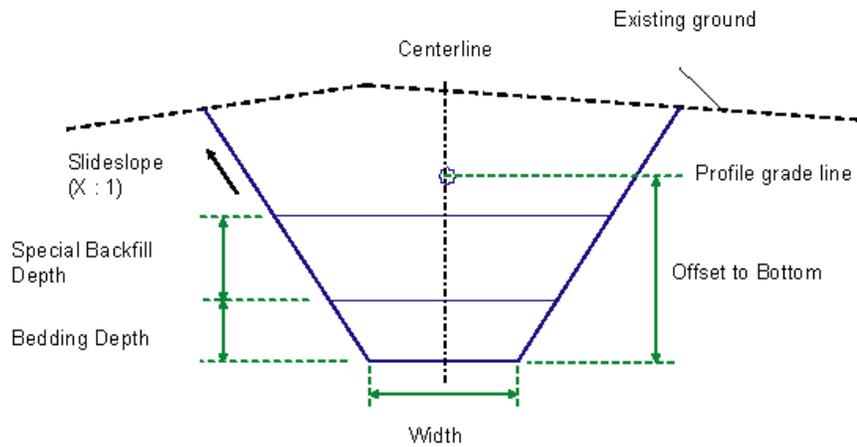
Point/Link	Codes	Description
P2	Daylight_Strip	Daylight point of stripping backslope link
All Links	Stripping	Stripping links

### Coding Diagram



## TrenchPipe1

This subassembly creates a flat-bottom trench with equal sideslopes and up to three layers of backfill material.



### Attachment

The attachment point is at the Offset To Bottom distance above the midpoint of the base of the trench.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Width	Width of the bottom of the trench	Numeric, positive	2.0 m 6.0 ft
Sideslope	X : 1 slope of the trench sideslopes	Numeric, positive	3 : 1
Bedding Depth	Depth of the bedding layer	Numeric, positive	0.0
Special Backfill Depth	Depth of the special backfill layer	Numeric, positive	0.0
Offset to Bottom	The vertical offset down from the profile grade line elevation to the bottom of the trench. For example, if the profile runs along the top of a circular pipe, the vertical offset is the pipe diameter plus the dis-	Numeric	0.0

Parameter	Description	Type	Default
	tance from the bottom of the pipe to the bottom of the trench.		

### Behavior

The elevation of the bottom of the trench is calculated as the profile grade line elevation minus the Offset To Bottom value. The horizontal trench bottom link is placed symmetrically about the attachment point offset at that elevation, and the sideslopes are extended upward to the Existing Surface. The horizontal Bedding link is placed at the given depth above the trench bottom. The horizontal Special Backfill link is placed at the given depth above the Bedding link.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

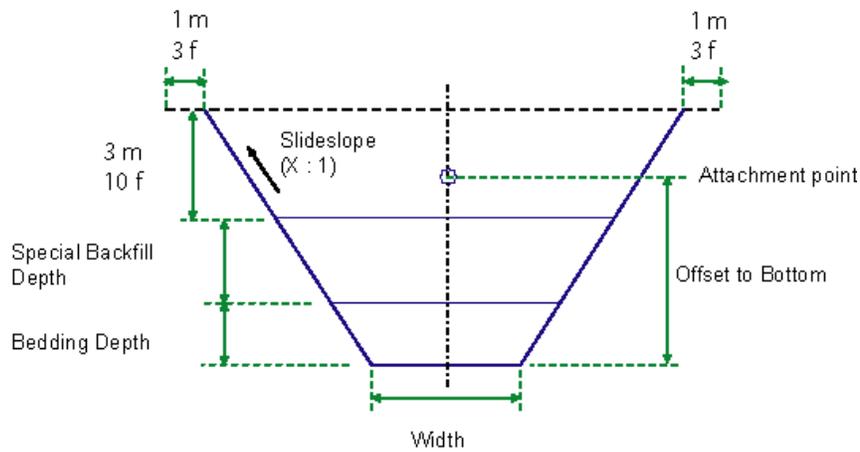
Parameter	Description	Status
Existing Surface	Surface model defining the existing roadway surface. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

### Output Parameters

None.

### Layout Mode Operation

In layout mode, the trench and existing surface are drawn as shown below.

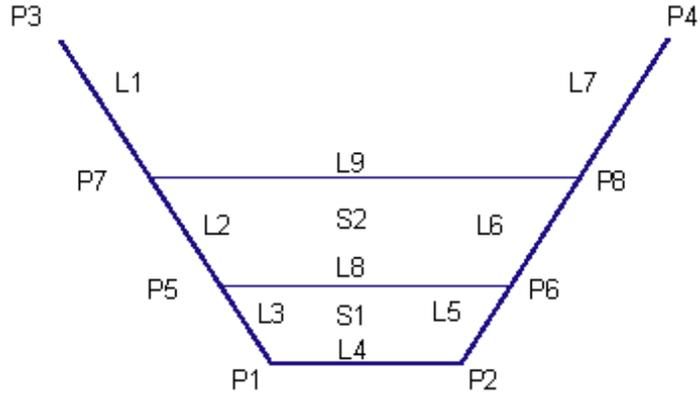


### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

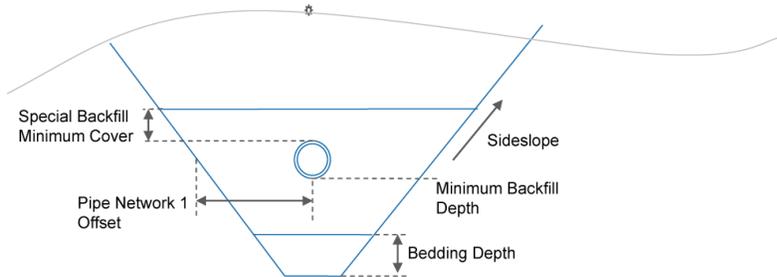
Point / Link	Code	Description
P1, P2	Trench_Bottom	
P3, P4	Trench_Daylight	
P5, P6	Trench_Bedding	
P7, P8	Trench_Backfill	
L1 – L7	Trench Datum	
L8	Trench_Bottom	
L9	Trench_Daylight	
S1	Trench_Bedding	
S2	Trench_Backfill	

### Coding Diagram



## TrenchPipe2

This subassembly creates a flat-bottom trench with equal sideslopes, and up to three layers of backfill material. The width of the trench is determined by a user- specified width and minimum pipe cover.



### Attachment

The attachment point is located along the target surface in the middle of the trench.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Sideslope	X : 1 slope of the trench sideslopes	Numeric, positive	3 : 1
Bedding Depth	Depth of the bedding layer	Numeric, positive	0.0
Special Backfill Minimum Cover	Minimum amount of special backfill cover placed over the highest outer pipe diameter.	Numeric, positive	0.0
Special Backfill Minimum Depth	Minimum depth for special backfill below lowest pipe. The pipe is measured from the pipe's outer diameter.	Numeric, positive	0.0
Width	Width of the bottom of the trench	Numeric, positive	2.0 m 6.0 ft
Pipe Network 1 Offset	Offset from the centerline of the pipe to the trench sideslope	Numeric, positive	0.0
Pipe Network 2 Offset	Offset from the centerline of the pipe to the trench sideslope	Numeric, positive	0.0

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Existing Ground surface to connect sideslopes to. The following object types can be used as targets for specifying this surface: surfaces.	Required

Parameter	Description	Status
Pipe Network 1	Used to specify Pipe Network 1. The following object types can be used as targets for specifying this pipe network: pipe networks.	Required
Pipe Network 2	Used to Specify Pipe Network 2. The following object types can be used as targets for specifying this pipe network: pipe networks.	Optional

### Output Parameters

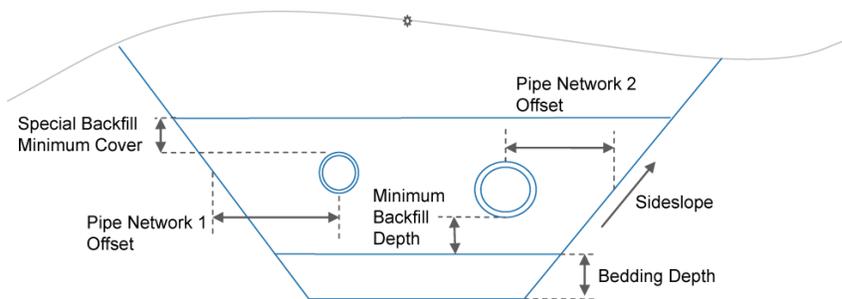
None.

### Behavior

In both cases, the subassembly will determine the bottom of the trench depth and the trench width based on the location of a pipe (or pipes) in a specified pipe network. The Special Backfill Minimum Cover is determined by measuring the distance from the centerline of the highest pipe found at the sampled section. The Special Backfill Minimum Depth is determined by measuring the distance from the bottom outer diameter of the lowest pipe found at the sampled station.

#### Case 1: Single Pipe Network Selected

If only Pipe Network 1 is selected, the subassembly will search 3 feet (1m) from the controlling baseline to the left and right to find the pipe center line at the sampled station. Apply the Pipe Network 1 offset value to both sides to determine the trench width, or the minimum width, whichever is larger. The bottom of the trench is determined by the outer pipe diameter, plus the Special Backfill Minimum Depth, plus the Bedding Depth.



#### Case2: Two Pipe Networks Selected

When two pipe networks are selected, Pipe Network 1 will be assumed to be on the left side of the baseline. Pipe network 2 will be assumed to be on the right side of the alignment. The material depth of the Special Backfill Minimum Depth is determined by the higher of the two pipe outer diameters, plus the Special Backfill Minimum Cover depth. The bottom of the trench depth is determined by the lower of the two pipe outer diameters, plus the Special Backfill Minimum Depth, plus the Bedding Depth.

### Layout Mode Operation

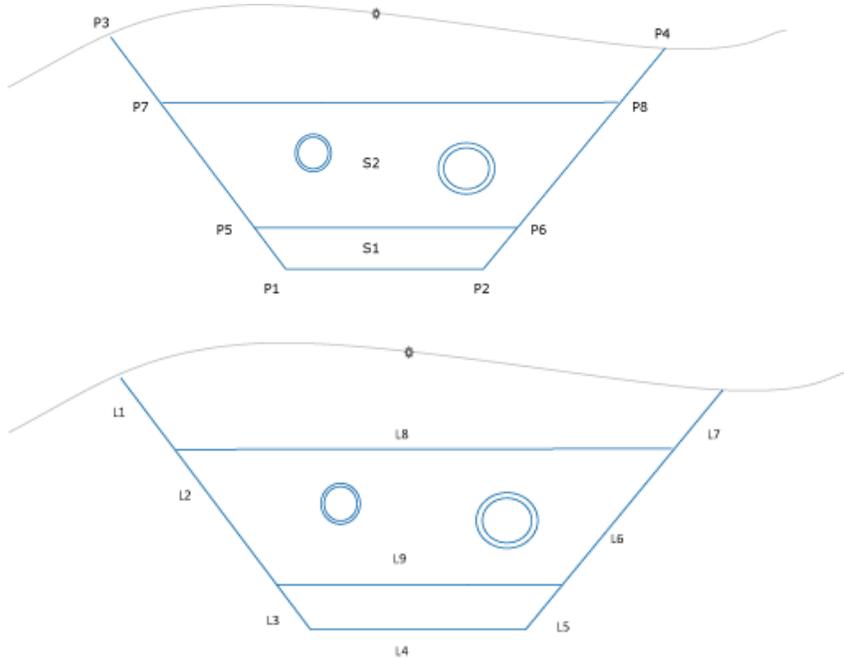
In layout mode, this subassembly draws a trench as shown in the previous illustrations.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

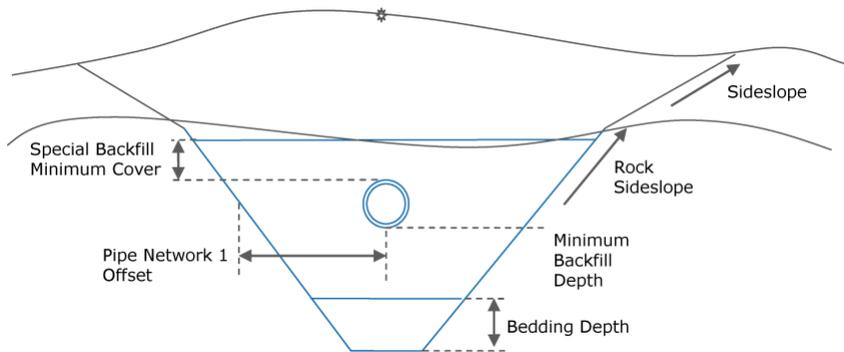
Point/Link	Codes	Description
P1, P2	Trench_Bottom	
P3, P4	Trench_Daylight	
P5, P6	Trench_Bedding	
P7, P8	Trench_Backfill	
L1 - L7	Trench Datum	
L8	Trench_Backfill	
L9	Trench_Bedding	
S1	Trench_Bedding	
S2	Trench_Backfill	

### Coding Diagram



## TrenchPipe3

This subassembly creates a flat-bottom trench with equal sideslopes and allows for two surface types and will use the slope specified for the surface it is below. Up to three layers of backfill material are available. The width of the trench is determined by a user-specified width and minimum pipe cover.



## Attachment

The attachment point is located along the target surface in the middle of the trench.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Sideslope	X : 1 slope of the trench sideslopes	Numeric, positive	3 : 1
Bedding Depth	Depth of the bedding layer	Numeric, positive	0.0
Special Backfill Minimum Cover	Minimum amount of special backfill cover placed over the highest pipe. The pipe is measured from the pipe’s top outer diameter.	Numeric, positive	0.0
Special Backfill Minimum Depth	Minimum depth for special backfill below the lowest pipe. The pipe is measured from the pipe’s bottom outer diameter.	Numeric, positive	0.0
Width	Width of the bottom of the trench	Numeric, positive	2.0 m 6.0 ft
Pipe Network 1 Offset	Offset from the centerline of the pipe to the trench sideslope	Numeric, positive	0.0
Pipe Network 2 Offset	Offset from the centerline of the pipe to the trench sideslope	Numeric, positive	0.0
Sideslope Rock	X : 1 slope of the trench rock sideslopes	Numeric, positive	1 : 1

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Existing Surface	Existing Ground surface to connect sideslopes to. The following object types can be used as targets for specifying this surface: surfaces.	Required
Rock Surface	Rock surface to connect sideslopes to. The following object types can be used as targets for specifying this surface: surfaces.	Optional
Pipe Network 1	Used to specify Pipe Network 1. The following object types can be used as targets for specifying this pipe network: pipe networks.	Required
Pipe Network 2	Used to specify Pipe Network 2. The following object types can be used as targets for specifying this pipe network: pipe networks.	Optional

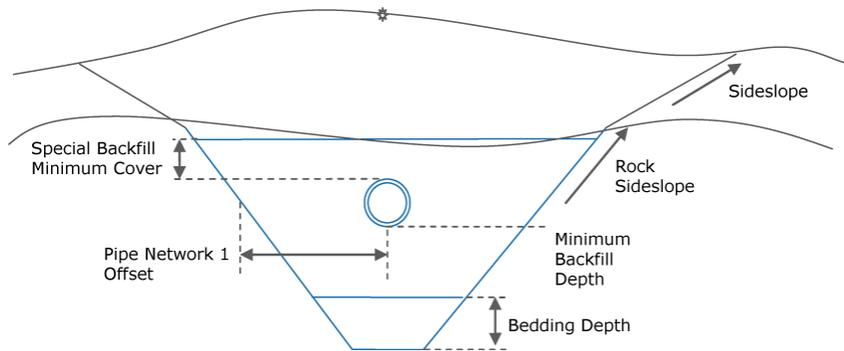
### Output Parameters

None.

### Behavior

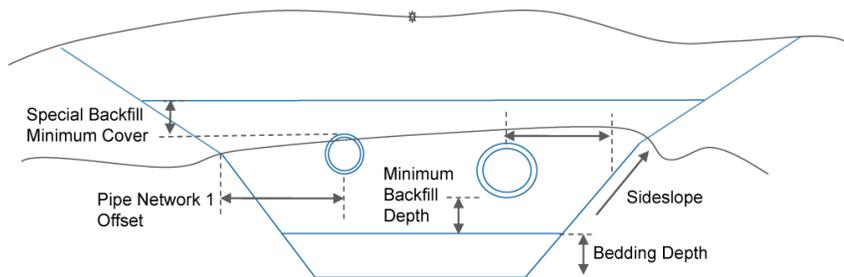
In both cases the subassembly will determine the bottom of trench depth and trench width based on the location of a pipe or pipes in specified networks. The Special Backfill Minimum Cover is determined by from the top outer diameter of the highest pipe found at the sampled section. The Special Backfill Minimum Depth is determined by the lower outer diameter of the lowest pipe found at the sampled station. Whichever surface the sideslope is below, the appropriate slope is used (rock or regular).

Case 1: Single Pipe Network Selected



If only Pipe Network 1 is selected, the subassembly will search 3 feet (1 meter) from the controlling baseline to the left and right to find the pipe centerline at the sampled station. Apply the Pipe Network 1 offset value to both sides to determine the pipe width, or the minimum width, whichever is smaller. The bottom of the trench is determined by the pipe bottom outer diameter, plus the Special Backfill Minimum Depth, plus the Bedding Depth.

#### Case2: Two Pipe Networks Selected



When two pipe networks are selected, Pipe Network 1 will be assumed to be on the left side of the baseline, Pipe Network 2 will be assumed to be on the right side of the alignment. The material depth of the Special Backfill Minimum Depth will be determined by the higher of the two pipe top outer diameters, plus the Special Backfill Minimum Cover value. The bottom of the trench depth will be determined by the lower of the two pipe bottom outer diameters, plus the Special Backfill Minimum Depth, plus the Bedding Depth.

#### Layout Mode Operation

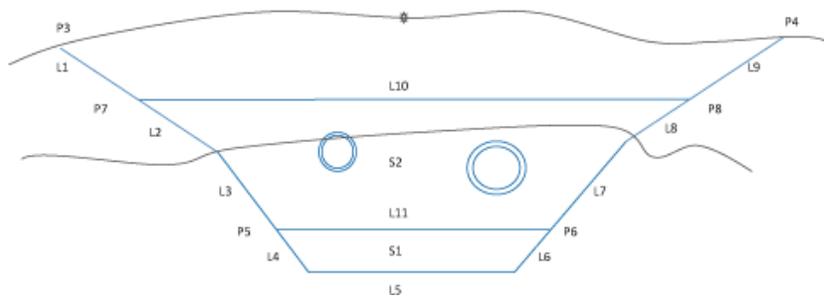
In layout mode, this subassembly draws a trench as shown in the previous illustrations.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

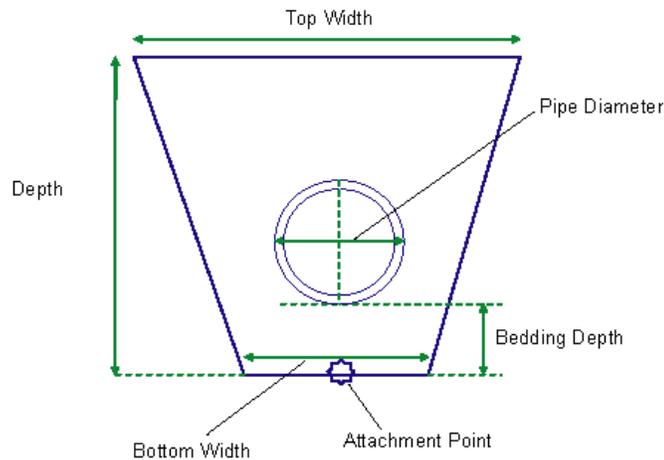
Point/Link	Codes	Description
P1, P2	Trench_Bottom	
P3, P4	Trench_Daylight	
P5, P6	Trench_Bedding	
P7, P8	Trench_Backfill	
L1 - L9	Trench Datum	
L5	Trench_Bottom	
L1,L9	Trench_Daylight	
L10	Trench_Backfill	
L11	Trench_Bedding	
S1	Trench_Bedding	
S2	Trench_Backfill	Trench backfill minus area of pipes

### Coding Diagram



# TrenchWithPipe

This subassembly creates a stone-filled drain structure with a circular pipe inside.



## Attachment

The attachment point for this subassembly can be at the bottom center, the top center, or the top corner of the drain structure.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1), unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left / Right	Right
Attachment Point	Specifies location of subassembly attachment point.	String; (a) Top center; (b) Bottom center, (c) Top corner	Top corner
Bottom Width	Bottom Width of the trench	Numeric, Positive	1.0 ft 0.3 m

Parameter	Description	Type	Default
Top Width	Top width of the trench	Numeric, Positive	1.5 ft 0.5 m
Depth	Total depth of the trench	Numeric, Positive	2.0 ft 0.6 m
Bedding Depth	Depth of the pipe bedding over trench bottom	Numeric, Positive	0.6 ft 0.2 m
Pipe Diameter	Drain pipe diameter	Numeric, Positive	0.6 ft 0.2 ft
Pipe Thickness	Thickness of the pipe material (optional)	Numeric, Positive	0.0 ft 0.0 m

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Depth	Depth of the trench can be optionally be overridden from a profile elevation. If the attachment point is on the top of the trench, then this profile is assigned for the trench bottom and vice-versa. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

### Output Parameters

#### Behavior

The subassembly builds the shape for a simple drain structure as shown in the above illustration.

#### Layout Mode Operation

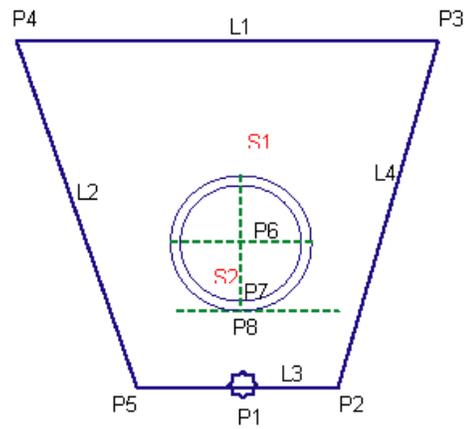
In layout mode, this subassembly draws as it is defined using the input parameters, starting from the attachment point.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point/Link	Codes	Description
P1	Drain_Bottom	
P2	Drain_Bottom_Outside	
P3	Drain_Top_Outside	
P4	Drain_Top_Inside	
P5	Drain_Bottom_Inside	
P6	Drain_Center	
P7	Flow_Line	Use existing point code, if any, among curb and gutters.
L1	Top, Drain_Top	
L2, L3, L4	Datum, Drain_Bottom	
S1	Trench_Backfill	
S2	Drain_Area	

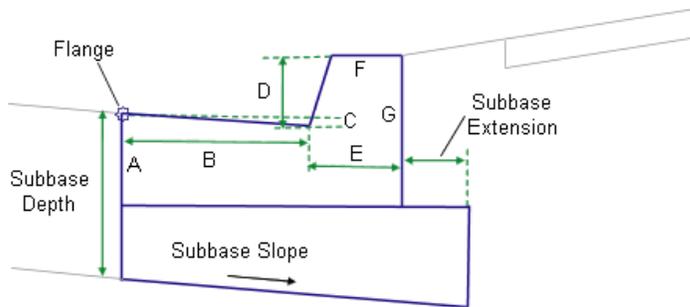
### Coding Diagram



## UrbanCurbGutterGeneral

This subassembly inserts links for a standard shape concrete curb-and-gutter with subbase.

User-defined input parameters control the dimensions of the shape.



### Attachment

The attachment point is at the flange point of the gutter or the back of the curb.

### Input Parameters

Note: Subbase dimensions are in meters or feet. Curb-and-gutter dimensions must be given in millimeters or inches.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Insertion Point	Specifies insertion point of the curb and gutter as either Gutter Edge or Back of Curb	Boolean	Gutter Edge
Gutter Slope Method	Specifies method of gutter slope input as: Use outside lane superelevation slope; Fixed slope; Use depth of flow line from flange point.	Boolean	Outside lane superelevation slope
Gutter Slope	Specifies fixed gutter slope	Numeric	- 2%
Subbase Depth	Depth to subbase at the flange point. Use zero if there is no subbase.	Numeric, positive	0.450 m 1.5 ft
Subbase Extension	Distance the subbase is extended beyond the back-of-curb. Use zero to terminate the subbase at the back-of-curb.	Numeric, positive	0.3 m 1.0 ft
Use SE	Selects whether to use the Outside Lane superelevation slope for the subbase layer, or to set a numeric % slope value	Selection list	Use superelevation
Subbase %Slope	% slope of the subbase layer. Not used if Use SE is set to True.	Numeric	-2 (%)
Dimension A (mm/in)	Depth of the gutter at the flange point	Numeric, positive, non-zero	175 mm 7 in
Dimension B (mm/in)	Width from the flange point to the gutter flowline		400 mm 16 in
Dimension C (mm/in)	Depth from the flange point to the gutter flowline	Numeric, positive, non-zero	25 mm 1 in

Parameter	Description	Type	Default
Dimension D (mm/in)	Height of curb from the gutter flowline to the top-of-curb	Numeric, positive, non-zero	150 mm 6 in
Dimension E (mm/in)	Width from the gutter flowline to the back-of-curb	Numeric, positive, non-zero	200 mm 8 in
Dimension F (mm/in)	Width of the top-of-curb	Numeric, positive, non-zero	150 mm 6 in
Dimension G (mm/in)	Height of the back-of-curb	Numeric, positive, non-zero	325 mm 13 in

### Behavior

The curb and gutter links are inserted based on the Input Parameter dimensions Dimension A – Dimension F. All dimensions must be positive, non-zero values. If a non-zero subbase depth is given, the subbase layer is inserted to the back of curb, and continues for the Subbase Extension width. The subbase layer closes to the bottom-back-of-curb, as shown in the diagram.

The subassembly builds the shape for a simple curb and gutter, with the attachment point either at (a) inside edge of the gutter (or lip), or (b) the back of the curb. The face of the curb is given a small, constant width to make it non-vertical.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Layout Mode Operation

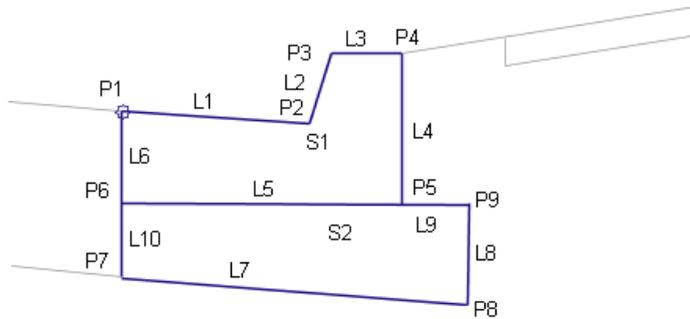
In layout mode, this subassembly displays the curb-and-gutter component based on the input parameters given. If the Use SE parameter is set to true, the subbase layer is inserted at a slope of -2%.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point / Link	Code	Description
P1	Flange	Flange point of the gutter
P2	Flowline_Gutter	Gutter flowline point
P3	TopCurb	Top-of-curb
P4	BackCurb	Back-of-curb
L1 – L3	Top, Curb	Finish grade on the curb and gutter
L7	Subbase Datum	
S1	Curb	Curb-and-gutter concrete area
S2	Subbase	

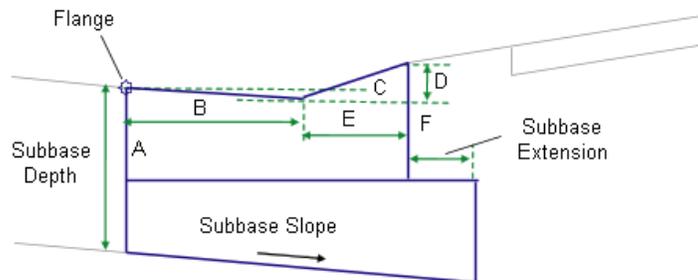
### Coding Diagram



## UrbanCurbGutterValley1

This subassembly inserts links for a flat-bottomed valley curb and gutter with subbase.

User-defined input parameters control the dimensions of the shape.



### Attachment

The attachment point is at the flange point of the gutter or the back of the curb.

### Input Parameters

Note: Subbase dimensions are in meters or feet. Curb-and-gutter dimensions must be given in millimeters or inches.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Insertion Point	Specifies insertion point of the curb and gutter as either Gutter Edge or Back of Curb	Boolean	Gutter Edge
Gutter Slope Method	Specifies method of gutter slope input as: Use outside lane superelevation slope; Fixed slope; Use depth of flow line from flange point.	Boolean	Outside lane superelevation slope
Gutter Slope	Specifies fixed gutter slope	Numeric	- 2%
Subbase Depth	Depth to subbase at the flange point. Use zero if there is no subbase.	Numeric, positive	0.450 m 1.5 ft
Subbase Extension	Distance the subbase is extended beyond the back-of-curb. Use zero to terminate the subbase at the back-of-curb	Numeric, positive	0.3 m 1 ft
Use SE	Select for subbase to use outside lane superelevation, or to specify a numeric % slope	Boolean	Use outside lane super-elevation
Subbase %Slope	% slope of the subbase layer. Not used if Use SE is set to True.	Numeric	-2 (%)
Dimension A	Depth of the gutter at the flange point	Numeric, positive, non-zero	175 mm 7 in
Dimension B	Width from the gutter flange point to the gutter flowline	Numeric, positive, non-zero	375 mm 15 in
Dimension C	Depth from the gutter flange point to the gutter flowline	Numeric, positive, non-zero	25 mm 1 in

Parameter	Description	Type	Default
Dimension D	Height from the gutter flowline to the top-of-curb	Numeric, positive, non-zero	75 mm 3 in
Dimension E	Width from the gutter flowline to the top-of-curb	Numeric, positive, non-zero	250 mm 9 in
Dimension F	Height of the back-of-curb	Numeric, positive, non-zero	250 mm 9 in

### Behavior

The curb and gutter links are inserted based on the Input Parameter dimensions Dimension A – Dimension F. All dimensions must be positive, non-zero values. If a non-zero subbase depth is given, the subbase layer is inserted to the back of curb, and continues for the Subbase Extension width. The subbase layer closes to the bottom-back-of-curb, as shown in the diagram.

The subassembly builds the shape for a simple curb and gutter, with the attachment point either at (a) inside edge of the gutter (or lip), or (b) the back of the curb. The face of the curb is given a small, constant width to make it non-vertical.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Layout Mode Operation

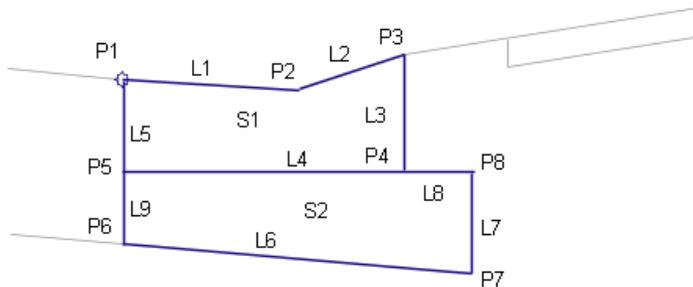
In layout mode, this subassembly displays the curb-and-gutter component based on the input parameters given. If the Use SE parameter is set to true, the subbase layer is inserted at a slope of -2%.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point / Link	Code	Description
P1	Flange	Flange point of the gutter
P2	Flowline_Gutter	Gutter flowline point
P3	TopCurb BackCurb	Top-of-curb
L1, L2	Top, Curb	Finish grade on the curb and gutter
L6	Subbase Datum	
S1	Curb	Curb-and-gutter concrete area
S2	Subbase	

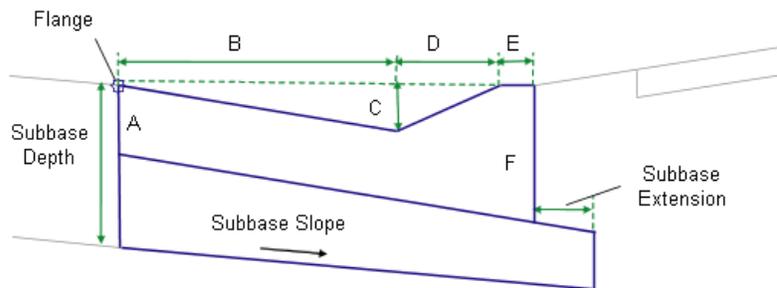
### Coding Diagram



## UrbanCurbGutterValley2

This subassembly inserts links for a slope-bottomed valley curb and gutter with subbase.

User-defined input parameters control the dimensions of the shape.



### Attachment

The attachment point is at the flange point of the gutter or the back of the curb.

### Input Parameters

Note: Subbase dimensions are in meters or feet. Curb-and-gutter dimensions must be given in millimeters or inches.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Insertion Point	Specifies insertion point of the curb and gutter as either Gutter Edge or Back of Curb	Boolean	Gutter Edge
Gutter Slope Method	Specifies method of gutter slope input as: Use outside lane superelevation slope; Fixed slope; Use depth of flow line from flange point.	Boolean	Outside lane super-elevation slope
Gutter Slope	Specifies fixed gutter slope	Numeric	- 2%
Subbase Depth	Depth to subbase at the flange point. Use zero if there is no subbase.	Numeric, positive	0.450 m 1.5 ft
Subbase Extension	Distance the subbase is extended beyond the back-of-curb. Use zero to terminate the subbase at the back-of-curb.	Numeric, positive	0.3 m 1 ft

Parameter	Description	Type	Default
Use SE	Select for subbase to use outside lane superelevation, or to specify a numeric % slope	Boolean	Use outside lane superelevation
Subbase %Slope	% slope of the subbase layer. Not used if Use SE is set to True.	Numeric	-2 (%)
Dimension A	Depth of the gutter at the flange point	Numeric, positive, non-zero	150 mm 6 in
Dimension B	Width from the gutter flange point to the gutter flowline	Numeric, positive, non-zero	610 mm 24 in
Dimension C	Depth from the gutter flange point to the gutter flowline, and from the gutter flowline to the top-of-curb	Numeric, positive, non-zero	100 mm 4 in
Dimension D	Width from the gutter flowline to the top-of-curb	Numeric, positive, non-zero	225 mm 9 in
Dimension E	Width from the top-of-curb to back-of-curb	Numeric, positive, non-zero	75 mm 3 in
Dimension F	Height of the back-of-curb	Numeric, positive, non-zero	300 mm 12 in

### Behavior

The curb and gutter links are inserted based on the Input Parameter dimensions Dimension A – Dimension F. All dimensions must be positive, non-zero values. If a non-zero subbase depth is given, the subbase layer is inserted to the back of curb, and continues for the Subbase Extension width. The subbase layer closes to the bottom-back-of-curb, as shown in the diagram.

The subassembly builds the shape for a simple curb and gutter, with the attachment point either at (a) inside edge of the gutter (or lip), or (b) the back

of the curb. The face of the curb is given a small, constant width to make it non-vertical.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Output Parameters

None.

### Layout Mode Operation

In layout mode, this subassembly displays the curb-and-gutter component based on the input parameters given. If the Use SE parameter is set to true, the subbase layer is inserted at a slope of -2%.

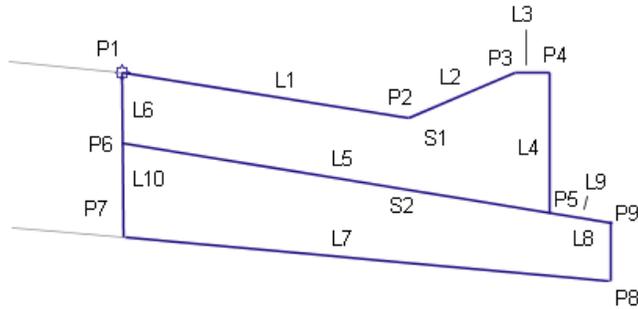
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point / Link	Code	Description
P1	Flange	Flange point of the gutter
P2	Flowline_Gutter	Gutter flowline point
P3	TopCurb	Top-of-curb
P4	BackCurb	Back-of-curb
L1 – L3	Top, Curb	Finish grade on the curb and gutter
L7	Subbase Datum	
S1	Curb	Curb-and-gutter concrete area

Point / Link	Code	Description
S2	Subbase	

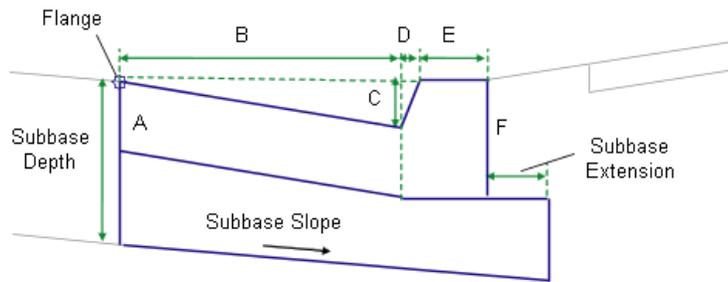
### Coding Diagram



## UrbanCurbGutterValley3

This subassembly inserts links for a slope-bottomed valley curb and gutter with subbase.

The bottom surface of the curve flattens to a horizontal link at the gutter flowline. User-defined input parameters control the dimensions of the shape.



### Attachment

The attachment point is at the flange point of the gutter or the back of the curb.

### Input Parameters

Note: Subbase dimensions are in meters or feet. Curb-and-gutter dimensions must be given in millimeters or inches.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Insertion Point	Specifies insertion point of the curb and gutter as either Gutter Edge or Back of Curb	Boolean	Gutter Edge
Gutter Slope Method	Specifies method of gutter slope input as: Use outside lane superelevation slope; Fixed slope; Use depth of flow line from flange point.	Boolean	Outside lane superelevation slope
Gutter Slope	Specifies fixed gutter slope	Numeric	- 2%
Subbase Depth	Depth to subbase at the flange point. Use zero if there is no subbase.	Numeric, positive	1.0 m 1.5 ft
Subbase Extension	Distance the subbase is extended beyond the back-of-curb. Use zero to terminate the subbase at the back-of-curb.	Numeric, positive	0.3 m 1 ft
Use SE	Selects whether to use the Outside Lane superelevation slope for the subbase layer, or to set a numeric % slope value	Selection list	Use Outside Lane Superelevation
Subbase Slope	Cross slope of the subbase layer. Not used if Use SE is set to True.	Numeric	- 2 (%)
Dimension A	Depth of the gutter at the flange point	Numeric, positive, non-zero	150 mm 6 in
Dimension B	Width from the gutter flange point to the gutter flowline	Numeric, positive, non-zero	600 mm 24 in

Parameter	Description	Type	Default
Dimension C	Depth from the gutter flange point to the gutter flowline, and from the gutter flowline to the top-of-curb	Numeric, positive, non-zero	50 mm 2 in
Dimension D	Width from the gutter flowline to the top-of-curb	Numeric, positive, non-zero	40 mm 1.5 in
Dimension E	Width from the top-of-curb to back-of-curb	Numeric, positive, non-zero	150 mm 6 in
Dimension F	Height of the back-of-curb	Numeric, positive, non-zero	300 mm 12 in

### Behavior

The curb and gutter links are inserted based on the Input Parameter values for Dimension A – Dimension F. All dimensions must be positive, non-zero values. If a non-zero subbase depth is given, the subbase layer is inserted to the back of curb, and continues for the Subbase Extension width. The subbase layer closes to the bottom-back-of-curb, as shown in the diagram.

The subassembly builds the shape for a simple curb and gutter, with the attachment point either at (a) inside edge of the gutter (or lip), or (b) the back of the curb. The face of the curb is given a small, constant width to make it non-vertical.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Target Parameters: None.

### Layout Mode Operation

In layout mode, this subassembly displays the curb-and-gutter component based on the input parameters given. If a numeric value is given for the Subbase

%Slope, the subbase layer is inserted at the given slope value. Otherwise the default value of -2% is used.

### Output Parameters

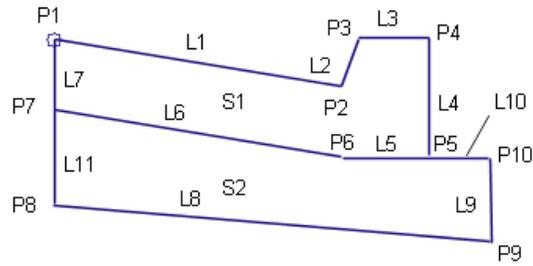
None.

### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point / Link	Code	Description
P1	Flange	Flange point of the gutter
P2	Flowline_Gutter	Gutter flowline point
P3	TopCurb	Top-of-curb
P4	BackCurb	Back-of-curb
L1 – L3	Top, Curb	Finish grade on the curb and gutter
L8	Subbase Datum	
S1	Curb	Curb-and-gutter concrete area
S2	Subbase	

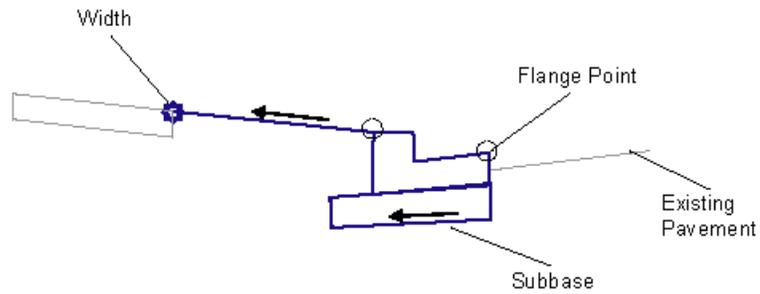
### Coding Diagram

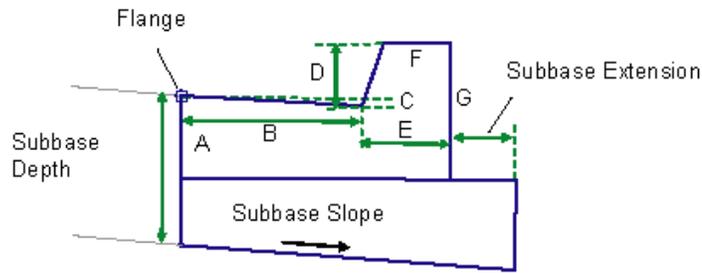


## UrbanReplaceCurbGutter1

This subassembly is used to replace an existing curb and gutter, with the sod strip tying to the existing inside edge of sidewalk. The vertical placement of curb and gutter is determined by allowable milling and/or overlay at the flange points and by allowable ranges of slopes for sod strip.

To apply this subassembly, flange point information (alignment or offset value) is essential.





Curb and Gutter Definition

### Attachment

The attachment point is outside/highside point of the sod strip edge of the sidewalk. Though notionally this attachment point is to mark the highside of the sodstrip, actual location of sod strip high point could vary from this as the user attaches an appropriate marked point or alignment and profile. Therefore, this attachment point is more of layout time assistance rather than design point control.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run over rise form (for example, 4 : 1) unless indicated as a percent slope with a "%" sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Flange Point Offset from CL	Point defining the offset of the face of the flange of the gutter. This offset is as measured from the baseline point.	Numeric	3.6 m 10 ft
Sidewalk Point	This inside sidewalk point will be used as the high point of sod strip. (OPTIONAL)	String	None
Max Milling	Maximum allowable depth of the flange point below the edge of existing pavement.	Numeric, positive	0.05 m 2.5 in
Desirable Lift	Desirable difference in elevation from the edge of existing pavement to the flange point. A positive	Numeric, positive	0.08m 3.5 in

Parameter	Description	Type	Default
	value is for the flange point being above the existing pavement.		
Min Sod Slope	Minimum allowable slope from the back of curb to the sidewalk point.		0.02
Max Sod Slope	Maximum allowable slope from the back of curb to the sidewalk point.		0.06
Mark Inside Point	Mark Flange Point - name of a marked point to be stored at the flange point - for later rehab subassemblies.	String	None
The following are the same parameters as Curb-AndGutterGeneral subassembly.			
Subbase Depth	Depth to subbase at the flange point. Use zero if there is no subbase.	Numeric, positive	0.450 m 1.5 ft
Subbase Extension	Distance the subbase is extended beyond the back-of-curb. Use zero to terminate the subbase at the back-of-curb.	Numeric, positive	0.3 m 1 ft
Use SE	Selects whether to use the Outside Lane super-elevation slope for the subbase layer, or to set a numeric % slope value	Selection list	Use super-elevation
Subbase %Slope	% slope of the subbase layer. Not used if Use SE is set to True.	Numeric	-2 (%)
Dimension A (mm/in)	Depth of the gutter at the flange point.	Numeric, positive, non-zero	175 mm 6 in
Dimension B (mm/in)	Width from the flange point to the gutter flowline.		400 mm 16 in
Dimension C (mm/in)	Depth from the flange point to the gutter flowline.	Numeric, positive, non-zero	25 mm 1 in

Parameter	Description	Type	Default
Dimension D (mm/in)	Height of curb from the gutter flowline to the top-of-curb.	Numeric, positive, non-zero	150 mm 6 in
Dimension E (mm/in)	Width from the gutter flowline to the back-of-curb.	Numeric, positive, non-zero	200 mm 8 in
Dimension F (mm/in)	Width of the top-of-curb.	Numeric, positive, non-zero	150 mm 6 in
Dimension G (mm/in)	Height of the back-of-curb.	Numeric, positive, non-zero	325 mm 13 in

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see Setting Targets in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Inside Edge of Sidewalk	This will set the offset value for the highside point for sod strip. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional
Flange Point	This will establish the offset value of flange point to start the subassembly. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional
Inside Edge of Sidewalk Profile	This will set the offset value for the highside point for sod strip. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
EGTopSurf	Name of the existing surface, used to determine the edge of pavement elevation at the flange point, and	Required

Parameter	Description	Status
	is also used to determine the elevation of the Sidewalk Point if given as an offset or alignment; but profiles not set. The following object types can be used as targets for specifying this surfaces: surfaces.	

If marked points are provided, target parameters are unnecessary and will be ignored even if set. If marked points are not set and offsets or alignments are used to locate points, it is expected to set profiles through target parameters. If they are not, this subassembly takes its elevation from the surface set in the target parameter listed above.

#### Output Parameters

Parameter	Description	Type	Default
Sod Strip Slope	Cross slope of designed sod strip	Numeric	
Gutter Slope	Gutter slope in the new curb and gutter sub-assembly	Numeric, positive	

#### Behavior

This subassembly is used to place a new curb and gutter parametrically, and can optionally tie (with a sod strip) into either the inside edge of the existing sidewalk, or to a new sidewalk created with another subassembly. The horizontal placement of the curb and gutter is determined from the previously known flange point location. Highside of the sod strip can be located either by a fixed offset or any other marked point, such as the inside edge of sidewalk. Alternatively, this point can come from target parameters of an alignment and profile. Newly designed flange point, optionally marked so that it can be used as input later for replacement lane subassemblies.

Key steps in completing this conditional subassembly are as follows:

- 1 Get existing pavement elevation at the flange point offset.
- 2 Set flange point elevation based on the minimum lift value.
- 3 Next insert curb and gutter points from P to P4 using the input parameters (similar to CurbAndGutterGeneral).
- 4 If the inside sidewalk marked point is assigned, establish that point as P10. If marked point is not associated, look for target parameters for

'inside edge of sidewalk" alignment. If yes, then get profile elevation from the surface target parameter.

- 5 If none of the above data is available for the highside of the sod strip, use the offset as dictated by attachment point to establish point P10.
- 6 Find the slope between P4 and P10.
- 7 Check whether that slope is within the parameters of Min/Max sod strip slopes.
- 8 If it is lower than minimum, set the slope to minimum allowable and computed points P4 to P1 backwards. Similarly, if the slope is more than maximum allowable sod strip slopes, set it to maximum allowable and calculate P4 to P1.
- 9 Check whether the elevation difference between P1 and P11 is within tolerable limits of max milling. If P is below P11 and difference is more than max milling, then abort, resulting in an error displayed in the event viewer.

All other curb and gutter links are inserted, based on the Input Parameter dimensions Dimension A - Dimension F. All dimensions must be positive, non-zero values. If a non-zero subbase depth is given, the subbase layer is inserted to the back of curb, and continues for the Subbase Extension width. The subbase layer closes to the bottom-back-of-curb as shown in the diagram.

### Layout Mode Operation

In layout mode , this subassembly is set based on the attachment point and the default flange point offset from baseline. The width of the sod strip is computed by subtracting the curb and gutter total width from "flange point to attachment point" distance. The minimum allowable sod strip slope is used to calculate the back of curb point from which the rest of the curb and gutter is drawn, using the input parameters given.

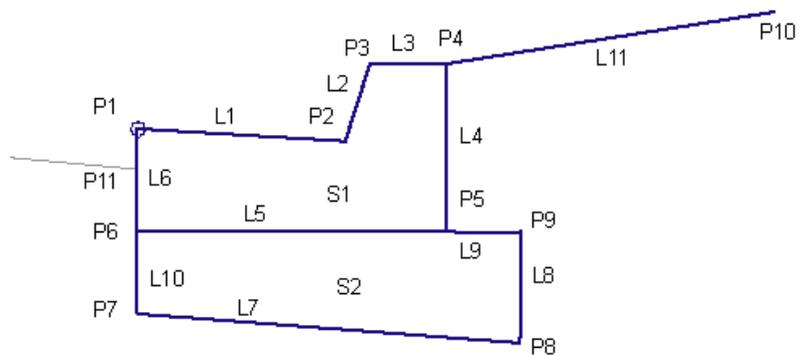
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point / Link	Code	Description
P1	Flange	Flange point of the gutter

Point / Link	Code	Description
P2	Flowline_Gutter	Gutter flowline point
P3	TopCurb	Top-of-curb
P4	BackCurb	Back-of-curb
L1-L6	Curb	All curb links
L1-L3	Top	Finish grade on the curb and gutter
L7	Subbase Datum	
L4, L8, L9	Datum	
L11	Top, Datum, Sod	
S1	Curb	Curb-and-gutter concrete area
S2	Subbase	

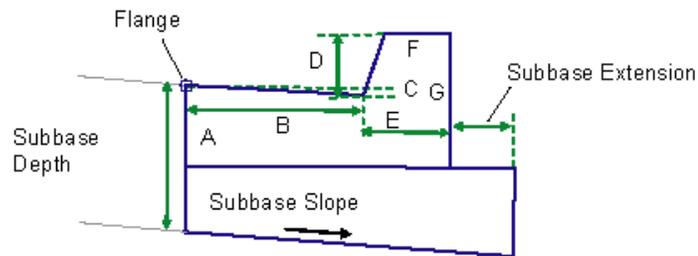
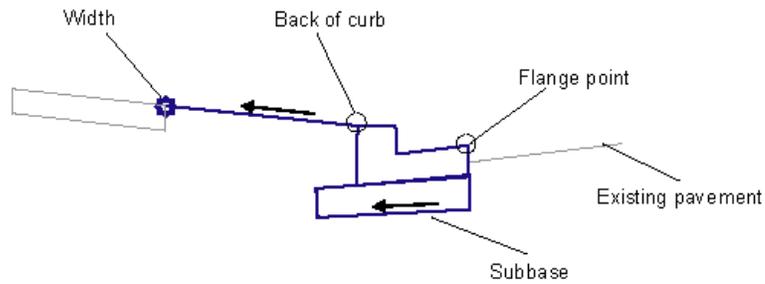
**Coding Diagram**



## UrbanReplaceCurbGutter2

This subassembly is used to replace an existing curb and gutter, with the sod strip tying to the existing inside edge of sidewalk. The vertical placement of the curb and gutter is controlled by a design profile of the back of curb.

To apply this subassembly, flange point information (alignment or offset value) is essential.



Curb and Gutter Definition

### Attachment

The attachment point is outside/highside point of the sod strip edge of the sidewalk. Though notionally this attachment point is to mark the highside of the sodstrip, actual location of sod strip high point could vary from this as the user attaches an appropriate marked point or alignment and profile. Therefore, this attachment point is more of layout time assistance rather than design point control.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run over rise form (for example, 4 : 1) unless indicated as a percent slope with a "%" sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right

Parameter	Description	Type	Default
Flange Point Offset from CL	Point defining the offset of the face of the flange of the gutter. This offset is as measured from the baseline of the assembly (or corridor in corridor state).	Numeric	3.6 m 10 ft
Sidewalk Point	This inside sidewalk point will be used as the high point of sod strip. (OPTIONAL)	String	None
Mark Inside Point	Mark Flange Point - name of a marked point to be stored at the flange point - for later rehab subassemblies.	String	None
The following are the same parameters as Curb-AndGutterGeneral subassembly.			
Subbase Depth	Depth to subbase at the flange point. Use zero if there is no subbase.	Numeric, positive	0.450 m 1.5 ft
Subbase Extension	Distance the subbase is extended beyond the back-of-curb. Use zero to terminate the subbase at the back-of-curb.	Numeric, positive	0.3 m 1 ft
Subbase %Slope	% slope of the subbase layer. Not used if Use SE is set to True.	Numeric	-2 (%)
Dimension A (mm/in)	Depth of the gutter at the flange point.	Numeric, positive, non-zero	175 mm 7 in
Dimension B (mm/in)	Width from the flange point to the gutter flowline.		400 mm 16 in
Dimension C (mm/in)	Depth from the flange point to the gutter flowline.	Numeric, positive, non-zero	25 mm 1 in
Dimension D (mm/in)	Height of curb from the gutter flowline to the top-of-curb.	Numeric, positive, non-zero	150 mm 6 in

Parameter	Description	Type	Default
Dimension E (mm/in)	Width from the gutter flowline to the back-of-curb.	Numeric, positive, non-zero	200 mm 8 in
Dimension F (mm/in)	Width of the top-of-curb.	Numeric, positive, non-zero	150 mm 6 in
Dimension G (mm/in)	Height of the back-of-curb.	Numeric, positive, non-zero	325 mm 13 in

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see [Setting Targets in the AutoCAD Civil 3D User's Guide Help](#).

Parameter	Description	Status
Inside Edge of Sidewalk	This will set offset value for the highside point for sod strip. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional
Flange Point	This will establish offset of flange point to start the subassembly. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional
Back of Curb Profile	This helps position curb and gutter. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Required
Inside Edge of Sidewalk	This will set offset value for the highside point for sod strip. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional

Parameter	Description	Status
EGTopSurf	Name of the existing surface, used to determine the edge of pavement elevation at the flange point, and is also used to determine the elevation of the Sidewalk Point if given as an offset or alignment; but profiles not set. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

If marked points are provided, target parameters are unnecessary and will be ignored even if set. If marked points are not set, and offsets or alignments are used to locate points, it is expected to set profiles through target parameters. If they are not, this subassembly takes its elevation from the surface that is set in the target parameters described above.

If Back of Curb profile is not assigned in corridor definition, then the subassembly aborts with an error message in event viewer.

#### Output Parameters

Parameter	Description	Type	Default
Sod Strip Slope	Cross slope of designed sod strip	Numeric	
Gutter Slope	Gutter slope in the new curb and gutter sub-assembly	Numeric, positive	

#### Behavior

This subassembly is used to place a new curb and gutter parametrically, and can optionally tie (with a sod strip) into either the inside edge of the existing sidewalk, or to a new sidewalk created with another subassembly. The horizontal placement of the curb and gutter is determined from the previously know flange point location. Highside of the sod strip can be located either by a fixed offset or any other marked point, such as inside edge of sidewalk. Alternatively this point can come from the target parameter of an alignment and profile. Newly designed flange point, optionally marked so that it can be used as input later for replacement lane subassemblies.

Key steps in completing this conditional subassembly are as follows:

- 1 From flange point offset and the input parameters locate the offset of “back of curb”.

- 2 From the target parameter, get the "back of curb" elevation at that station and establish this point P4.
- 3 From this point establish all curb and gutter points and links using the input parameters (similar to UrbanCurbGutterGeneral1
- 4 If inside sidewalk marked point is assigned, establish that point as P10. If marked point is not associated, look for target parameters for 'inside edge of sidewalk" alignment. If yes then get profile elevation or from the surface target parameter.
- 5 If none of the above data is available for the highside of the sod strip, use the offset as dictated by attachment point to establish point P10.

All other curb and gutter links are inserted based on the Input Parameter dimensions Dimension A - Dimension F. All dimensions must be positive, non-zero values. If a non-zero subbase depth is given, the subbase layer is inserted to the back of curb, and continues for the Subbase Extension width. The subbase layer closes to the bottom-back-of-curb as shown in the diagram.

### Layout Mode Operation

In layout mode the subassembly is set based on the attachment point and the default flange point offset from baseline. Width of the sod strip is computed by subtracting the curb and gutter total width from "flange point to attachment point" distance. Use 2% slope to calculate the low side of sod strip (or back of curb point), from which the rest of curb and gutter is drawn using the input parameters given.

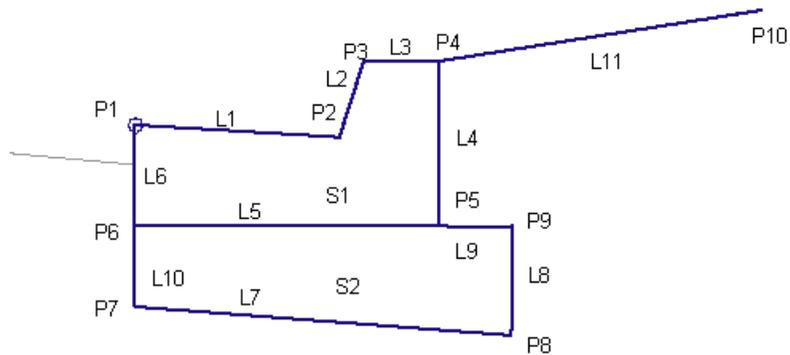
### Point, Link, and Shape Codes

The following table lists the point, link, and shape codes for this subassembly that have codes assigned to them. Point, link, or shape codes for this subassembly that do not have codes assigned are not included in this table.

Point / Link	Code	Description
P1	Flange	Flange point of the gutter
P2	Flowline_Gutter	Gutter flowline point
P3	TopCurb	Top-of-curb
P4	BackCurb	Back-of-curb
L1-L6	Curb	All curb links

Point / Link	Code	Description
L1-L3	Top	Finish grade on the curb and gutter
L7	Subbase Datum	
L4, L8, L9	Datum	
L11	Top, Datum, Sod	
S1	Curb	Curb-and-gutter concrete area
S2	Subbase	

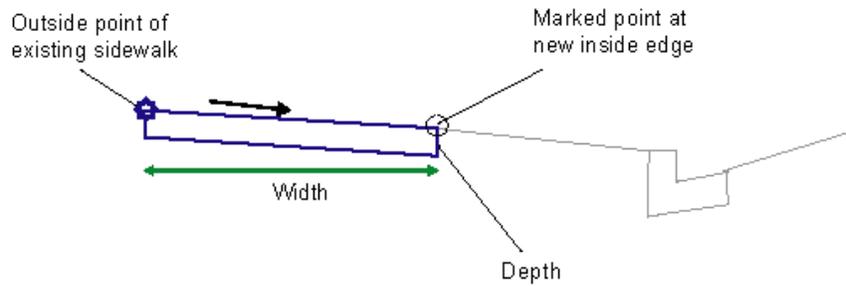
**Coding Diagram**



## UrbanReplaceSidewalk

This subassembly is used to replace an existing sidewalk, starting at the existing outside edge of sidewalk and inserting surfaces towards the curb.

To use this subassembly, you should have separate alignments defining the existing outside edge of sidewalk information. Elevations at this point could come from a surface or a profile. Furthermore, if the component defining this edge is also another rehab component, then they could be passed in as marked points, thus transferring offset and elevation information.



### Attachment

The attachment point is (near) the outside edge of the sidewalk. For better results, insert this on a controlling offset (with fixed offset) marker point during assembly construction.

### Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Outside Sidewalk Marked Point	To define outside edge of sidewalk and elevation to start the subassembly (OPTIONAL)	String	None
Width	Width of the sidewalk, measuring inwards from high edge of sidewalk point	Numeric	1.5m 5.0ft
% Slope	Cross slope of sidewalk in %, measuring inwards from high edge of sidewalk	Numeric	-2%
Depth	Depth or thickness of the sidewalk	Numeric, positive	
Mark Inside Point	Name of the marked point to be stored at the new low edge of sidewalk (OPTIONAL)	String	None

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets* in the AutoCAD Civil 3D User's Guide Help.

Parameter	Description	Status
Outside Edge of Sidewalk	This will set the outside edge of proposed sidewalk as start point. The following object types can be used as targets for specifying this offset: alignments, polylines, feature lines, or survey figures.	Optional
Left Gutter Profile	This will set the outside edge elevation value of proposed sidewalk. The following object types can be used as targets for specifying this elevation: profiles, 3D polylines, feature lines, or survey figures.	Optional
EGTopSurf	If profiles are not supplied for left/right edge of pavement elevations, then this surface elevation at that offset will be picked up as elevation value. The following object types can be used as targets for specifying this surfaces: surfaces.	Required

### Output Parameters

Parameter	Description	Type	Default
% Slope	Cross slope of sidewalk in %, measuring inwards from high edge of sidewalk	Numeric	-2%
Depth	Depth or thickness of the sidewalk	Numeric, positive	

### Behavior

By default outside edge of sidewalk is located at the attached marked point or at the associated alignment. Similarly elevation is set based on marker point associated, or profile or from the surface at that offset.

Once this start point is established, sidewalk structure links are inserted inwards from this point for given width, slope, and depth. If a name is given for Mark Inside Point, a marked point is stored at the new low edge of sidewalk.

### Layout Mode Operation

In layout mode, this subassembly starts at the attached point and draws a single shape with given dimensions, such as width, slope and depth.

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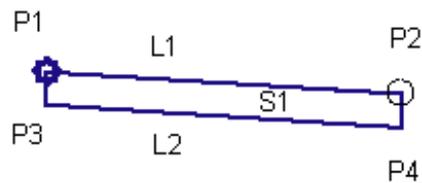
**NOTE** While constructing an assembly, it is recommended that this subassembly be added at a controlling offset, if there is no previously marked point. This controlling offset could be at a decent offset from the baseline marker, so that the layout mode looks like a typical section. However, it is recommended that the user doesn't have to map this controlling offset to any "alignment/profile" in the corridor state, as that would cause problems such as making the design not perpendicular to the baseline in some cases. Not associating this controlling offset will not have any effect on the corridor, as the start point is attached to an alignment/marked point through the subassembly macro for an exact location.

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### Point, Link, and Shape Codes

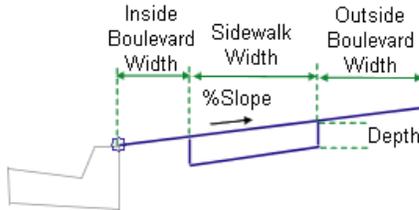
Point / Link	Code	Description
P1	Sidewalk_In	Inside edge of sidewalk on finish grade
P2	Sidewalk_Out	Outside edge of sidewalk on finish grade
L1	Top Sidewalk	
L2	Datum	
S1	Sidewalk	Sidewalk concrete area

### Coding Diagram



# UrbanSidewalk

This subassembly inserts links for a concrete sidewalk with inside and outside grass boulevards.



## Attachment

The attachment point is at the inside edge of the inside boulevard. The UrbanSidewalk subassembly is typically attached to a back-of-curb or edge of pavement.

## Input Parameters

Note: All dimensions are in meters or feet unless otherwise noted. All slopes are in run-over-rise form (for example, 4 : 1) unless indicated as a percent slope with a “%” sign.

Parameter	Description	Type	Default
Side	Specifies to insert the subassembly either on the right or the left side of the attachment point.	Left/Right	Right
Inside Boulevard Width	Width of the inside grass boulevard	Numeric, positive	0.0
Sidewalk Width	Width of the concrete sidewalk	Numeric, positive, non-zero	1.5 m 5.0 ft
Outside Boulevard Width	Width of the outside grass boulevard	Numeric, positive	0.0
%Slope	% slope of the sidewalk and grass strips. Positive slopes are upwards from the attachment point.	Numeric	2 (%)

Parameter	Description	Type	Default
Depth	Depth of concrete for the sidewalk	Numeric, positive	0.100 m 0.333 ft

### Behavior

The inside grass strip, sidewalk, and outside grass boulevard links are inserted outward from the attachment point at the given slope. The grass strips can be omitted by specifying a zero-width.

Optionally, various element widths can be attained by attaching to offset alignments. Also, the sidewalk cross slope can be derived by tying into an offset profile.

### Target Parameters

This section lists the parameters in this subassembly that can be mapped to one or more target objects, such as a surface, alignment, or profile object in a drawing. For more information, see *Setting Targets in the AutoCAD Civil 3D User's Guide Help*.

Parameter	Type of Assignment	Status
Inside Boulevard Width	May be used to override the fixed Inside Boulevard Width and tie the inside edge-of-sidewalk to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional
Sidewalk Width	May be used to override the fixed Width of Sidewalk and tie the outside edge-of-sidewalk to an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional
Outside Boulevard Width	May be used to override the fixed Outside Boulevard Width with an offset alignment. The following object types can be used as targets for specifying this offset: alignments, polylines, features lines, or survey figures.	Optional

### Output Parameters

None.

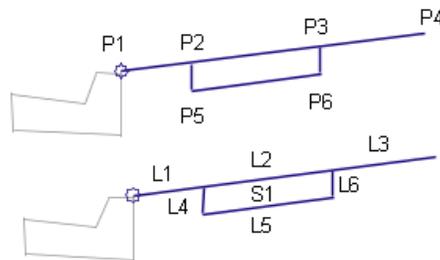
### Layout Mode Operation

In layout mode, this subassembly displays the boulevards and sidewalk based on the input parameter values given.

### Point, Link, and Shape Codes

Point / Link	Code	Description
P2	Sidewalk_In	Inside edge of sidewalk on finish grade
P3	Sidewalk_Out	Outside edge of sidewalk on finish grade
L1	Top Datum	
L2	Top Sidewalk	
L3	Top Datum	
L4 – L6	Sidewalk Datum	
S1	Sidewalk	Sidewalk concrete area

### Coding Diagram



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