1.0 Existing Conditions Inventory and Assessment

The Ulster and Delaware Railroad Corridor was built in the late 1800's and early 1900's and provided rail transportation from Kingston to Oneonta, NY. New York City residents frequented the route to access the many luxurious hotels and resorts in the Catskill Mountains. The route was also used for freight hauling operations to transport raw materials such as lumber, stone, and even water into the Hudson Valley and to points south such as New York City. The last commercial trains traveled the corridor in the 1970's and only small tourism railroads have been in operation in limited segments along the corridor since. There are many segments of the railroad corridor that have fallen into disrepair since the last commercial trains traveled the corridor.

1.1 Data Collection Methodology

B&L personnel visited the railroad corridor on October 14, 2020 to assess and document the existing conditions found throughout the corridor. B&L staff used a handheld Trimble GPS data collection instrument to record existing conditions and to log geospatial location information along the corridor. This GPS information was used to produce preliminary mapping of the existing conditions and a preliminary cost estimate. B&L collected the following data along the corridor:

- Feasible trail width
- Width, composition, and suitability of the existing ballast as a base course
- Track, tie and tree removal requirements
- Existing stormwater flow patterns
  - Swale sizes, locations and conditions
  - Washouts
  - Stream crossings
  - Existing culvert assessment
- Access locations for:
  - Construction / staging
  - Trailheads
  - Emergency services
  - Secondary or "local" access points
- Scenic overlook locations
- Historical interpretation opportunities
- Pedestrian and Bicyclist safety concerns and potential fencing locations
- Connections to existing trail network
- Existing tree and vegetation removal needs
- Visible underground and overhead utilities

B&L also performed a separate site visit to determine the existing environmental characteristics of the corridor. This assessment is further discussed in Section 3.0. These data and measurements were used to assemble a preliminary construction estimate for the conversion of the existing railroad corridor into a multi-use trail system. The tree removal quantity was estimated by obtaining the density of trees that would need to be removed over a 50 ft. length of the corridor and extrapolating that over the stretch of the corridor with a similar density of trees.

Data such as the vertical clearance, clear width, ballast width, and the embankment width correlate with the image below. These measurements and collected data were used in the development of the preliminary cost estimate and is further discussed in Section 4.0.

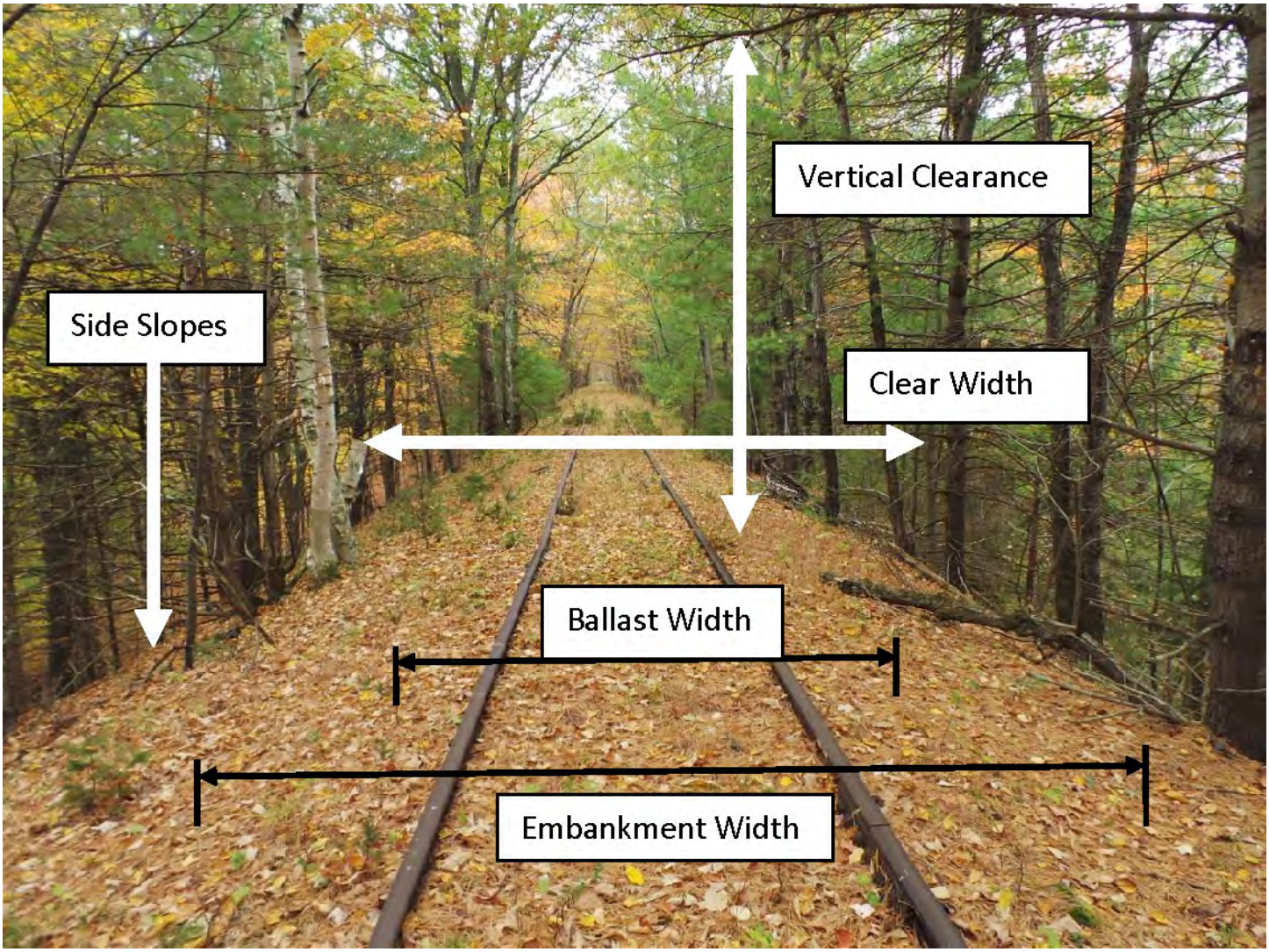


Figure 1-1: Corridor Dimensions & Measurements

1.2 Recommended Design Standards

Typical trail design standards of this nature should utilize the American Association of State Highway and Transportation Officials ("AASHTO") Guide for the Development of Bicycle Facilities 2012. Design standards from this guide were used to determine feasibility, impacts, constraints, and to assign estimated construction costs for the development of this multi-use trail.

Typical sections for the development of the trail including trail width, shoulder width, clear width, cross slope, maximum grade, etc. should be established using the guidelines and methodology outlined in the AASHTO Guide for the Development of Bicycle Facilities 2012 and the 2010 ADA Standards for Accessible Design. ADA standards applicable to the trail deign include maintaining no greater than a 1.5% cross slope of the trail and a 4.5% running slope, and providing a trail surface that is firm and stable. The table below displays the design standards used in development for this feasibility study and for use during the design of the trail:

Recommended Trail Design Standards

Element	Standard
Minimum Design Speed	18 MPH
Multi-use Trail Width:	10 feet (Min.)* 10-14 feet (Rec.)
Multi-use Trail Shoulder Width (without railings) Slope of 1V:6H Slope of 1V:3H	2 feet (Min.) 3-5 feet (Rec.) 5.0 feet
Distance between edge of trail and top of slope without barrier	5 feet
Maximum Grade (ADA Compliance)	4.5%
Minimum Horizontal Curve Radius	120 feet
Design Cross Slope (ADA Standard):	1.5% (Max.)
Stopping Sight Distance	300 feet
Lateral Clearance (from edge of trail)	1.0 feet (to fence) 2.0 feet (to obstruction)
Vertical Clearance	8.0 feet (Min.) 10.0 feet (Rec.)
Bridge Structure Capacity (Emergency veh.)	H-20
Pedestrian Safety Rail Height	42 inches (Min.)

*Design standard established is a 10 ft. width; however, short segments with an 8 ft. width may be adequate in areas of limited physical width or other obstructions.

The predominant section through the corridor is as shown below with a drainage swale on the right side (assuming travel from Highmount to Big Indian) of the trail, a 10 foot crushed stone trail width, and a down slope on the left side of the trail with pedestrian safety railing.

Figure 1-2: Predominant Trail Corridor Section

According to the AASHTO guidelines, pedestrian safety railing a minimum of 42" in height should be included adjacent to the trail when a clear area of 5 feet at a maximum slope of 1:6 cannot be achieved and one of the following conditions are present:

- **Slope is equal to or steeper than 1:3 for a vertical drop greater than 6 feet**
- **Slope is equal to or steeper than 1:2 for a vertical drop greater than 4 feet**
- **Slope is equal to or steeper than 1:1 for a vertical drop greater than 1 feet**
- **Slope is equal to or steeper than 1:3 adjacent to a parallel body of water or other substantial obstacle.**

Engineering judgment should also be considered when determining the locations of the pedestrian safety railing and the need to balancing the cost to install and maintain the railing, and the safety of the trail users if they were to veer off the trail in areas where there are steep slopes. The addition of safety railing should be evaluated by analyzing the available top of embankment width for construction of the trail and the recommended trail shoulders to establish the clear zone. Analysis should first be performed by reviewing surface contours obtained by a topographical survey. Safety railing should be located in areas that meet the criteria mentioned above. The need to install the railing should then

Figure 1-3: Example of Safety Railing

be confirmed by conducting a site visit and review of the locations and analyzing each location on a case by case basis based on the need identified by the guidelines and using engineering judgment.

Structural design standards and loading for the rehabilitated bridges and culverts should follow New York State Department of Transpiration ("NYSDOT") and AASHTO standards for bridge design and rehabilitation. The recommended loading for the new or rehabilitated structures on this project is H-20. This loading standard refers to a two-axle, 40,000 pound (20 ton) vehicle with 32,000 pounds loaded on the rear axle and 8,000 pounds on the front axle. Structures designed to carry H-20 loading can support the weight of most maintenance and emergency services vehicles. However, depending on the phasing of the project, and the available access points, it may become necessary for loaded construction vehicles to cross the bridges to build sections of the trail. A loaded tri-axle dump truck could easily exceed 35 tons as a fully loaded tri-axle truck typically has a 20 ton load combined with an unloaded weight of 15 tons for the truck. The potential costs of rehabilitating the structures to meet the additional loading requirements may outweigh the benefits provided by allowing construction vehicles to use the bridges and can be further discussed during design when needs and construction sequencing become more apparent. For the purposes of this study, field reviews of the bridges were completed to evaluate their ability to carry pedestrian and bicyclist loading (90 pounds per square foot). A more detailed analysis of the bridges will need to be completed during design to quantitatively determine the structural capacity of each structure and to determine their viability for various construction vehicles.

1.3 Existing Railroad Corridor Evaluation

The existing railroad corridor consists of railroad infrastructure such as steel rails, steel rail hardware, wooden railroad ties, and ballast stone. Additional railroad infrastructure throughout the corridor includes four standing bridges, drainage culverts, and swales. A detailed assessment of this additional infrastructure is included in the proceeding sections of this report.

The existing railroad corridor is a narrow single-track corridor built into the side of Belleayre Mountain. From the perspective of the railroad corridor, the south side is a slope that rises to the top of the mountain, and the north side slopes down to the Birch Creek valley. The railroad corridor descends from an elevation of 1890 ft. in Highmount to 1215 ft. in Big Indian, with an average grade of 2.6%, which is considered steep for a railroad grade. In some locations, the side slopes adjacent to the corridor are very steep on the north side of the corridor constructed at 1.5H:1V (66%) slope and exceeds over 100 ft. in elevation from the railroad corridor to the flat area at the bottom of the slope.

The existing railroad corridor was found to be in poor condition due to a lack of maintenance activities since the trains stopped running in the 1970's. The existing railroad track infrastructure was found to be in poor condition. The steel rails and steel hardware has separated from the wooden railroad ties in many areas due to the deterioration of the wood ties. Heavy vegetation growth including grasses, weeds, and even mature trees were found to be growing within and immediately adjacent to the tracks.

Figure 1-4: Ballast Test Pit performed By B&L Staff

Figure 1-5: Mile marker K41

The composition of the ballast was also lacking the high percentage of 1" diameter or larger stone typically found in railroad ballast. The existing stone is also rounded without the sharp angles typically found in crushed granite and limestone. A heavy presence of organic material was also observed to depths greater than 1 ft. with no noticeable transition to a layer of stone free from organics (see Figure 1-4). The depth and composition of the ballast was recorded at three locations throughout the corridor and found to be consistently poor at all three locations. The ballast throughout the corridor should be assumed not suitable for use as a trail base.

The historic bluestone mile markers, K37 to K41, were all found within the railroad corridor. Markers K40 and K41 are tipped over or leaning on its side and will need to be reset. Other railroad infrastructure includes a "W" post (most likely a whistle post), concrete and stone foundations, and metal sign remains are located within the corridor and do not inhibit the construction of a trail. Please see the existing condition mapping and documentation in appendix A for the specific locations of the existing railroad infrastructure.

1.4 Utilities

The corridor was observed for visible utilities within or crossing the corridor. In general, overhead electrical and telephone utilities were observed where a roadway intersects with the railroad corridor, such as Lasher Road and Station Road/Mill Street. Overhead utilities were also observed near the Belleayre snowmaking reservoir and the double horseshoe curve. Underground utilities consist of stone drainage culverts and steel pipes (discussed in section 1.3).

Another noted underground utility is the 16" diameter waterline buried 4-6 ft. in depth and directly adjacent to the railroad tracks from the Belleayre Beach DUA to the Belleayre snowmaking reservoir in Highmount. This waterline is used by the Belleayre Ski Mountain to pump water from Pine Hill Lake for use in the snowmaking process in the winter. There are several concrete manholes/wells located throughout this segment that provide access to this waterline. This waterline and related infrastructure is not expected to have any impacts to hinder the construction of a trail through this corridor. Record plans should be obtained from ORDA (if available) and used to determine if any conflicts exist.

No other underground utilities were observed, however, coordination with Dig Safe shall be progressed by the Contractor during construction.

1.5 Drainage Assessment

The drainage assessment of the corridor was broken out into five separate categories; large culverts, small culverts, swales, washouts, and uncontrolled stream crossings. Bridge structures were also included in this study and a full in-depth assessment of the bridges is included in section 2.0. In general, the large culverts were rectangular stacked stone with mortar, the small culverts were round smooth or corrugated steel, and the swales were adjacent to the tracks and not well defined. The observed stream characteristics of the corridor also varied with perennial streams and intermittent streams. Some culverts also appeared to be installed in dry areas where the drainage characteristics have changed and the culvert may no longer needed. A detailed summary of the culverts is in included in Appendix D.

1.5.1. Large Culverts

The large culverts were constructed of laid up stone with mortar joints to form a rectangular opening. The roof of the culverts are made of large stone slabs that could span the entire width of the structure, up to 5 ft. in width. The condition of the large culverts varied throughout the corridor but were generally in good condition and will require only minor repairs.

One large culvert located near the Belleayre Mountain snowmaking reservoir and the double horseshoe curve should be replaced. This culvert is a side-by-side (double barrel) system constructed of stacked stone and mortar culverts with both originally measuring 5' x 5' at the outlet. The southern culvert is collapsed halfway through the culvert and repair attempts were made at one point to address the collapsing roof of the culvert by inserting steel railroad rails into the culvert. A large sinkhole has formed within the railroad tracks directly above this collapsed portion of the culvert. Daylight is not visible through the culvert, however, water does flow through the large voids in-between the stone within the culvert. The northern culvert has been repaired by insertion of a steel 24" diameter pipe approximately 75% of the way through the culvert. The original 5'x5' opening of the culvert was walled off with stone and mortar to direct flow into the pipe. The invert of this pipe is above the adjacent southern culvert pipe see Figure 1-3.

The steel sections of pipe have become separated resulting in a wavering flow line from end to end, rather than a straight line. This culvert carries the entire railroad tracks and embankment over the outlet of a snowmaking reservoir for Belleayre Mountain, which has twin 48" steel pipes that control the water elevation of the reservoir and outlet into the culverts under the railroad corridor. Rehabilitation of this culvert is not feasible due to the poor existing condition of the culvert. Therefore, replacement of the failed culverts is the recommended alternative. Options for replacement include a large concrete box culvert or three sided structure with a natural stream bed. The Town of Shandaken indicated that the Belleayre Mountain staff occasionally perform large volume water realeases of the reservoir which could further erosion of the embankment if the existing condition of the cuvlerts is not improved to allow water to flow freely below.

The majority of the remaining large stone culverts were found to be in good condition and would require only minor repairs to convert the railroad corridor to a trail. A detailed assessment of the existing conditions and potential repairs is included in Appendix D.

Figure 1-6: Collapsed southern culvert with repair attempts and flowing water visible (left) and inlet of double barrel culverts flowing under railroad (right).

1.5.2. Small Culverts

The observed small culverts found throughout the railroad corridor were comprised of 12 to 24 inch diameter round plate steel, corrugated steel, or vitrified clay pipe. Each of the vitrified clay pipes should be replaced as most are cracked and have reached the end of their useful life. Many of the steel based pipes are corroded and should also be replaced, additionally many pipes are not long enough to span the expected width of the trail. However, the majority of the culvert pipes are close to the surface and will not be challenging or costly to replace. Replacement of the pipes with a larger diameter and more durable material such as High Density Polyethylene ("HDPE") at least 15 inches in diameter will ensure a long lasting and functional drainage system for the new trail.

1.5.3. Swales

Drainage swales were present throughout the majority of the railroad corridor but were poorly defined. The majority of the southwestern side of the corridor should have a properly functioning swale to convey potential runoff from the mountainside into the culvert pipes and away from the trail. Trees were present within the swales as well as significant debris accumulation. Most swales were dry and did not exhibit signs of flowing water during our field observations. However, active streams were observed within the swales in some locations such as at the double horseshoe curve parallel to the tracks near the Belleayre snowmaking reservoir at milepost K40.36. The stream has caused erosion and sediment transport of the ballast under the ends of the railroad ties. Disturbance to this stream should be limited and the trail potentially shifted or narrowed to avoid this water course. This stream is referenced as delineated stream 3 and is further discussed in section 3.0 along with the other streams that are jurisdictional by USACE or NYSDEC.

Figure 1-7: Active stream at the double horseshoe curve (left) and dry swales with no apparent flows (right).

Swale improvements should include the removal of all debris within the swale including sediment and woody materials. However, this work will need to be carefully vetted with the New York City Department of Environmental Protection ("DEP") staff in preparation of the Stormwater Pollution Prevention Plan ("SWPPP.") Work that alters an existing drainage feature may be subject to DEP regulation as this project is located within the New York City Watershed. Removal of woody debris within all swales should be performed and should be allowable under DEP Regulations. Ideally, all swales within the corridor would be shaped to provide positive drainage flow toward a culvert. This project has nearly 24,000 ft. of swales that should be cleaned or rehabilitated during the construction of the trail. Locations of existing swales and active streams are included in Appendix A.

1.5.4. Washouts

Several washouts were found throughout the corridor and ranged in size from a few feet to nearly 40 feet in width. Repair of the washouts to establish a trail is dependent on the specific washout. If no flow is observed and the washout appears to have stemmed from an isolated storm event, the washout can simply be filled in with earth imported from an off-site location and compacted. The source of the flow that caused the washout will need to be investigated and either mitigated at the source or accommodated in the repair. In areas where the washout occurs in an active drainage channel, or within a clear seasonal drainage channel, a drainage pipe or culvert should be installed to convey any potential drainage flows that may re-enter the corridor in the future.

Figure 1-8: Washout just East of Winding Mountain Road (left) and large washout at milepost K38 (right).

The above two photos depict the larger washouts found within the corridor. The photo on the left was taken just east of the Winding Mountain Road crossing where it appears that a one-time drainage flow entered the railroad corridor and washed out the ballast below the tracks for about 30 ft. before the flow turned down the side slope. A watershed analysis should be performed during the preliminary design phase to assess the likelihood that drainage flows could re-enter the washed out locations. If the washout is determined to be a one-time event, then washout could be repaired by adding fill to re-establish the desired grade. The photo on the right was taken at Milepost K38 and appears to be an intermittent stream that may only flow during large storm events. There is a defined stream channel both upstream and downstream of the crossing and the existing Pipe and a pipe upstream below a road are evidence that this is, or was at one time, part of an active stream channel. This washout likely occurred over several heavy storm events. Depending on the results of the watershed analysis, a large culvert pipe or a small concrete box culvert should be installed at this washout and a short portion of the stream should be realigned to carry the stream under the new trail.

There are other minor washouts found within the corridor that can simply be repaired by filling in the washout and armoring against repeat erosive flow or installing a culvert pipe within the flow channel to carry future flows. These washouts are noted in the existing conditions mapping in Appendix A.

1.5.5. Uncontrolled drainage crossings

In addition to the washouts and controlled drainage crossings found throughout the corridor, there are also several active uncontrolled drainage crossings of the existing railroad tracks. This is where an active stream was observed to be flowing across the corridor either over the railroad tracks, or through the railroad ties. These drainage crossings are subject to USACE and NYSDEC review through the submission of a Joint Application for Permit submission to the agencies.

A complete discussion of the potentially jurisdictional streams is located in Section 3. Culverts or pipes installed to control the stream may need to be 1.25 times the bank full width of the stream, which could lead to a large culvert crossing. In some locations, it may be advisable to install a low short span bridge over the flow rather than a concrete culvert.

Figure 1-9: Uncontrolled stream crossing west of milepost K39.

Figure 1-9 shows an uncontrolled stream crossing approximately 20 ft. in length (measured along the tracks) where a mountain side stream flows between the railroad ties. The stream also collects along the right side of the tracks and flows parallel to the tracks for approximately 100 ft. before entering a culvert pipe below the tracks and outletting down the left side slope. In this location, excavating within the right side drainage swale or installing a culvert pipe where the stream enters the railroad corridor would properly convey the stormwater flows if. Alternatives to reduce impacts within the banks of the stream, if necessary to reduce stream impacts, could be completely spanning the stream and allowing it to maintain its full width below the new trail by installing a concrete culvert or short span low bridge.

Figure 1-10: Uncontrolled stream just west of Lasher Road.

Just west of the Lasher Road overpass, the B&L team observed water flowing between the ties and parallel to the tracks within the rock cut. This water flow appears to be intermittent and was determined not to be a wetland or stream during our site visits. The saturated materials should be removed and replaced with a layer of geotextile fabric and large interlocking stone (1.5" to 3" in diameter) that will provide a solid foundation to accommodate construction and future maintenance or emergency vehicles. The drainage flows should be directed into re-established swales that run parallel to the tracks and away from the railroad corridor. The photo below shows the water in-between the railroad ties.

If drainage infrastructure is not well maintained for extended periods of time, damage to the existing corridor may occur and wetlands may form in the depressions or swales. The wet and saturated soils can cause instability in the rail bed and degrade the infrastructure. During B&L's field investigations, one wetland (delineated Wetland A) was found within the footprint of the railroad tracks that if disturbed in its entirety, would exceed the USACE threshold for allowable wetland disturbance and would require mitigation such as the creation and monitoring of new wetlands within the corridor. This wetland is located about 1,000 ft. east of Galli Curci Road in Highmount and extends within the drainage swales and between the railroad tracks from 600-700 ft. east. Alternatives to reduce impacts to the wetland and avoid mitigation include shifting or re-routing portions of the trail within the railroad corridor, completing an on-road section of the trail along the Ulster and Delaware Turnpike, or constructing a short boardwalk to bridge the wetland and allow vegetation to grow underneath. Construction through Wetland A is feasible and the characteristics of this wetland are further discussed in Chapter 3.

1.6 Access Locations

Logical locations for trailheads, local community access and construction access are based on the site assessment performed by B&L and from recommendations received from Ulster County staff and the Technical Advisory Committee ("TAC").

1.6.1. Trailhead Locations

There are three logical trailhead locations for the trail with two of the three locations offering easy access to the potential users and straightforward construction on land currently owned by Ulster County. From West to East, the locations recommended for trailhead are at the intersection of Galli Curci Road (CR 49A) and Route 28 in Highmount (adjacent to the Belleayre sign), at the Belleayre Beach Day Use Area in Pine Hill operated by ORDA, and at the Big Indian Town Park in Big Indian. The trailhead at the Belleayre Beach DUA is contingent on an agreement between the County and ORDA due to the configuration and operation of the facility. In the development of this feasibility study, coordination with ORDA has begun, and is expected that a mutual agreement that will compliment both facilities will be reached. See section 1.6.2 for additional discussion on this facility and ORDA's operations.

Each trailhead should consist of a no-cost parking area for approximately 20-30 vehicles for people wishing to use the trail. However, this number of spaces is ultimately dependent on available land at each location. Overflow or alternate locations within the vicinity of the trailhead could also be identified and utilized if capacity is exceeded at each trailhead on a particular day. Asphalt pavement is the preferred parking lot surface as it offers the most stable and least maintenance alternative for parking area surface treatment and is easiest to plow in the winter. Asphalt also allows pavement stripes to be installed to delineate parking stalls to help encourage efficient unattended parking. Without typical parking stall delineation, users tend to park further away from adjacent vehicles which reduces the effective number of parking stalls within each parking lot. However, the trade-off is that asphalt is an impervious surface which will require stormwater management and likely green infrastructure facilities to be constructed to mitigate the stormwater runoff.

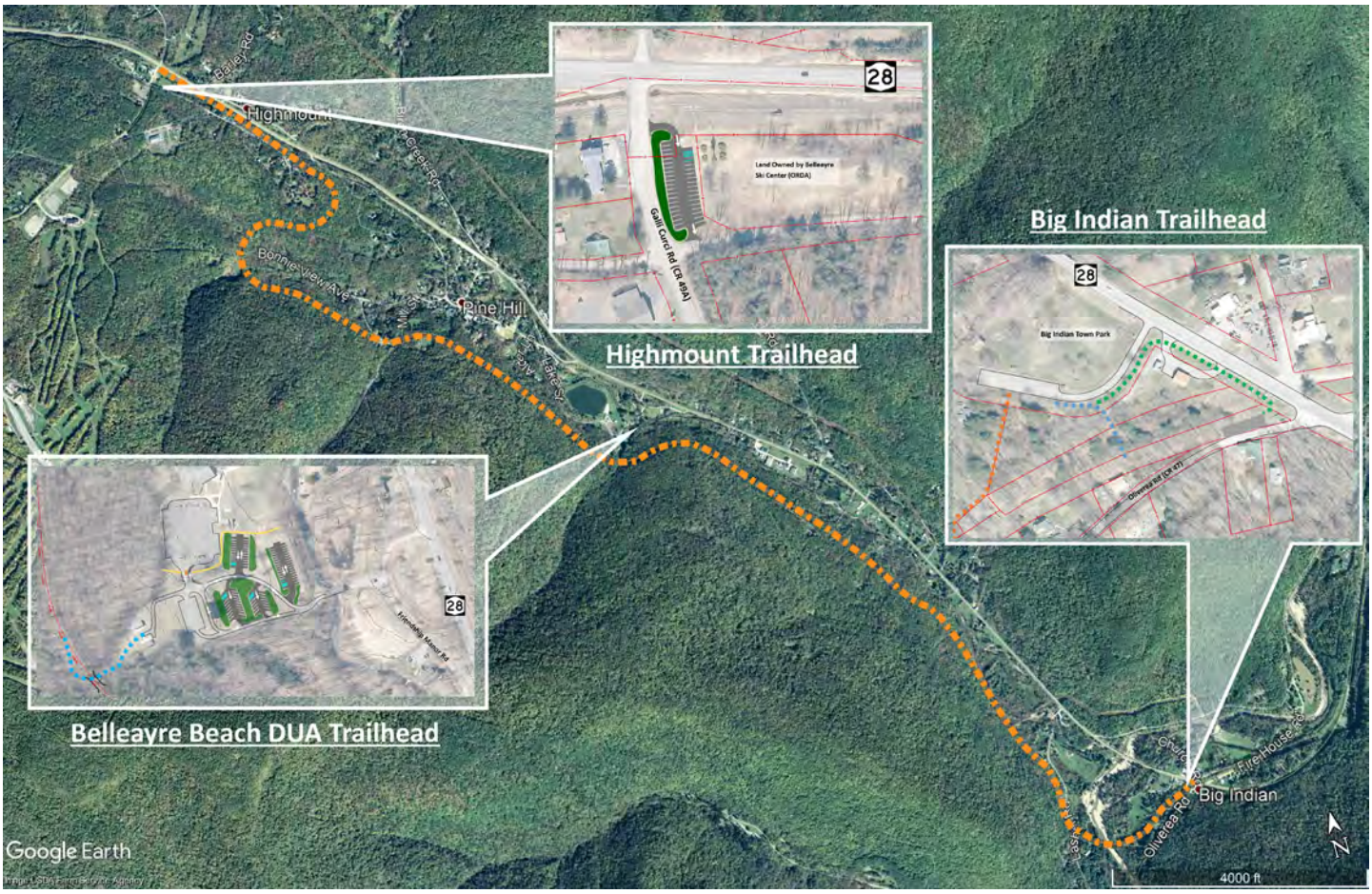


Figure 1-11: Trailhead Location Map with conceptual drawings.

The trailheads also give the County the opportunity to install informational kiosks and signage where a trail map, information and rules and regulations can be installed in a central location for users to see. Drawings of each of the trailheads depicting conceptual alternatives and layouts at each trailhead area are included in Appendix A and the cost associated with each trailhead is discussed in section 4.2.

1.6.2. Local Community Access Locations

Secondary or local access connections to the trail could be areas where a footpath leads to the mainline trail or where small (2-5) car parking areas are established with minimal informational signage to alert users of the rules and regulations. These locations would likely be utilized frequently by local users whereas the Route 28 access trailheads will likely consist of out of town users whom are visiting the trail for the first time.

The most desirable location for a secondary access point is within the hamlet of Pine Hill where local residents could walk, bike or drive to the trail. The most logical location for access to the trail is from Station Road/Woodchuck Hollow Road and is immediately west of the Woodchuck Hollow Bridge. A flat area located within the County Right of Way for the railroad could provide parking for 3-5 cars with improvements such as a crushed stone surface for vehicles to park on, fencing

Figure 1-12: Pine Hill local access location

to delineate the trail from the parking area and barriers and barricades (such as wooden posts or large boulders) to deter vehicles from entering the trail.

Alternative locations to provide secondary access within Pine Hill are not easily feasible due to the steep slope adjacent to the railroad and private properties that boarder the County's property. Constructing a path or stairway on the steep slope could be cost prohibitive and also may direct users close or onto private property, which is generally undesirable. Private paths could be established if requested by individuals or organizations and signed appropriately to discourage the public from using these paths.

Access to Ulster and Delaware Turnpike near the western terminus in Highmount should be provided where the County ROW is immediately adjacent to the roadway ROW. A narrow 8 ft. path could be provided from the trail to the roadway and will allow the neighboring residents a location to access the trail without trespassing on private property. No formal parking spaces are recommended in this location as the users at this location will most likely consist of residents from the small neighborhood.

Depending on the Lasher Road crossing selected (see section 2.3), a local access path could also be provided here for local residents to access the trail without trespass.

1.6.3. Trail Network Connections

The NYSDEC and ORDA operate an expansive network of hiking, mountain biking, and cross country ski trails on the Belleayre Mountainside and within the surrounding Shandaken Wild Forest. This network is expanding rapidly with both organizations identifying this railroad corridor as an important link in their network of trails. ORDA is expanding their XC Ski trail network within the vicinity of the double horseshoe curve and already has a trail that runs to the railroad corridor by their snowmaking pond near the double horseshoe curve. This trail could connect to this XC Ski trail and expand the number of trails both for use by ORDA and for users of this trail, creating loops for various trail users.

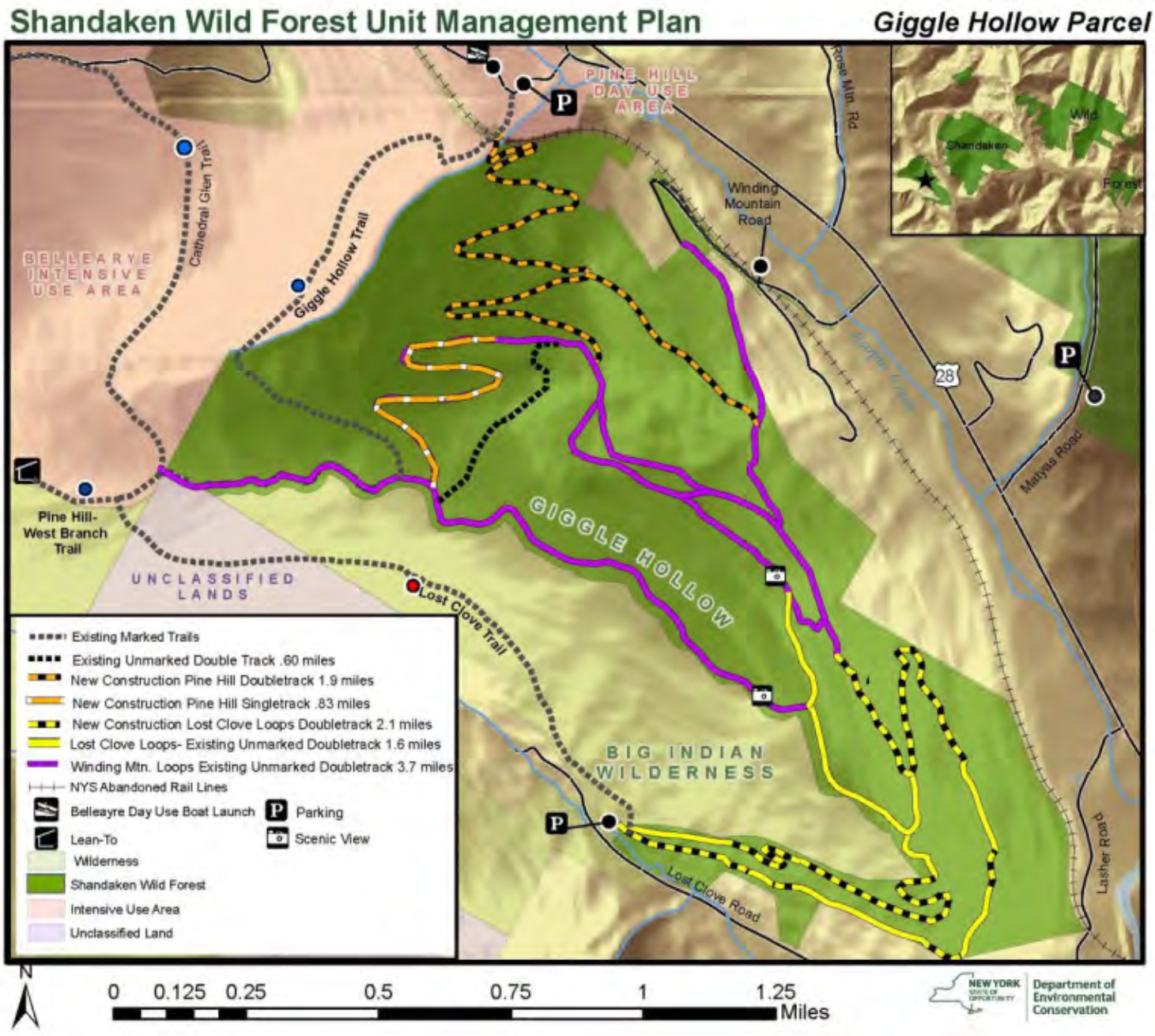
Currently, there are three existing trails that connect to the railroad corridor. The Cathedral Glenn trail connects to the railroad corridor at the double horseshoe curve, and the Giggle Hollow trail connects at the Giggle Hollow Bridge. A third trail is operated by ORDA and connects to the railroad corridor on the double horseshoe curve by the snowmaking reservoir. This trail is primarily used as a cross country ski trail and as an access road for vehicles to get to the reservoir. Conversion of the corridor to a multi-use trail west of the Giggle Hollow Bridge provides an opportunity to make the Cathedral Glenn trail a complete loop starting at the Belleayre Day Use Area ("DUA"). In addition, conversion of the trail to a multi-use path from the Giggle Hollow Bridge east to Lasher Road would create several opportunities for future connections to trails that have been identified by NYSDEC as part of their Shandaken Wild Forest Draft Unit Management Plan ("UMP").

The NYSDEC purchased the land bordered by Belleayre Mountain to the West, Lasher Road to the East, Lost Clove Road to the South, and the railroad corridor to the North in December 2011. This 610 acre parcel of land is known as the "Big Indian" parcel and was classified as "Wild Forest" and added into the Shandaken Wild Forest Draft Unit Management Plan ("Draft UMP") in 2020. The Draft UMP identifies 10.1 miles of trails throughout the Big Indian Parcel that consists of repurposing former logging roads and 4.1 miles of new trail construction into a trail network suitable for hiking, mountain biking, and cross country skiing. The new trails were first identified in the Shandaken-Belleayre Mountain Bike and Cross Country Ski Trail System Concept Plan developed by Sinuosity and Tahawus Trails, LLC. As shown on the map below, the railroad corridor would provide an ideal multi-use trail connection between the parking area at the Belleayre Beach DUA to the new Winding Mountain Loop trail and to the Lasher Road. The railroad corridor could also provide additional opportunities for trail connections included in the Tahawus report, but not included in the Draft UMP.

Source: https://www.belleayre.com/todo/hiking/

Figure 1-13: Belleayre Hiking and XC Ski Trails

The Olympic Regional Development Authority ("ORDA") also a key stakeholder in the development of a trail on this section of the U&D Railroad corridor, particularly at the Belleayre Beach DUA and the western half of the corridor. ORDA operates the Belleayre Ski Center in Highmount at the western terminus of the corridor including Cross Country ("XC") Ski trails adjacent to the railroad corridor. There is currently one XC ski trail that connects to the railroad corridor with additional trails planned in the future. ORDA also maintains a network of mountain bike trails and plans to expand on their network as part of their updated Unit Management Plan for the area. One of the new trails, according to the Shandaken-Belleayre Mountain Bike and Cross Country Ski Trail System Concept Plan developed by Sinuosity and Tahawus Trails, LLC., proposes to utilize a short segment of the railroad corridor for its new route on Belleayre Mountain. This study identifies the railroad corridor as a "highly valuable potential component of a trail system" due to its many connection opportunities from Big Indian to Highmount.



Source: NYSDEC 2020 Shandaken Wild Forest Draft Unit Management Plan

Figure 1-14: NYSDEC Proposed Trails in the Shandaken Wild Forest.

1.6.4. Construction Access

Access for construction vehicles is critical for the construction of the trail. Identifying access locations for the future contractor during the planning and preliminary design phases could help the contractor to identify their access locations during the bidding process and reduce some of the unknowns, which could decrease bid prices. Since this is a narrow single track corridor, contractors will only be able to have one vehicle in a section of the corridor at a time. Providing the contractor with passing zones where one vehicle can pass another or several access points would help the contractor to increase production during the grading and stone placement activities. This study identifies potential locations where a contractor could access the corridor and potential constraints that a contractor will have to consider along the route, progressing along the trail corridor from west to east. All access routes and locations provided within this study shall be reviewed in greater detail during the design phase of the project, just prior to the construction phase, as conditions of the bridges and roadways can change rapidly.

The intersection of Galli Curci Road (CR 49A) and Route 28 is a logical area for a contractor to access the railroad corridor and stage equipment and materials at the western terminus of the corridor. This will provide access to the double horseshoe curve and access for large vehicles or heavy loads at the western end of the project. Access directly to the southern double horseshoe curve could be provided by two alternate routes if needed to do the repairs to the large stone culvert. Bonnie View Avenue from Pine Hill via is an option, however, there is a bridge on Bonnie View Avenue that is load posted to 14 tons according to the NYSDOT Posted Bridges viewer. As most loaded dump trucks exceed 30 tons, this route may not be useable to a contractor unless temporary or permanent bracing or other improvements are performed to this bridge. The Ulster County DPW has scheduled bridge replacements on Bonnie View Road in 2021 and 2022. This work should be coordinated during the preliminary design phase of the project and the appropriate information should be included as part of the construction access plan. Another constraint on this route is a second stream crossing that has a steel culvert pipe with an unknown load capacity. The structural capacity of the culvert pipe should be assessed during the design process. Alternatives to improve this pipe could include an increase in fill above the pipe, a concrete pad or steel plates to better distribute loads, or even a temporary bridge structure. Access from the west may be accommodated through the Belleayre Ski area where steep slopes will be challenging and may limit the equipment that can utilize this area. Using tracked equipment could allow this area to be utilized. Coordination with ORDA would be required during final design should other less constrained areas of access not be available.

The next logical construction access point is from Station Road at the Woodchuck Hollow Bridge. This location will require vehicles to travel through the local roads within the hamlet of Pine Hill, which are narrow and will require a transportation plan with detailed routes to be developed depending on the equipment proposed to be used. Access to the corridor is from the Station Road side of the bridge as the low overpass of the railroad bridge on the Mill Street side, and the very sharp turns will restrict larger

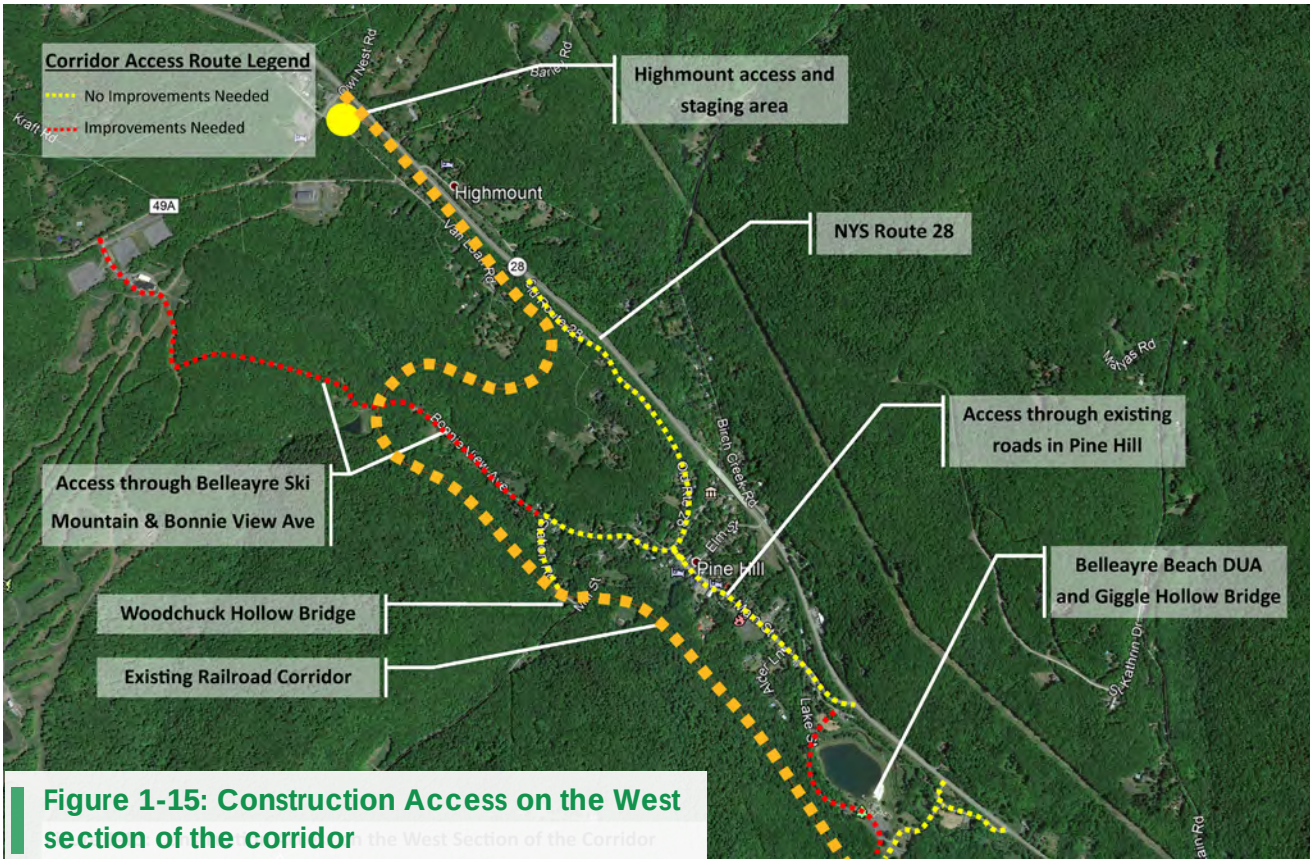


Figure 1-15: Construction Access on the West section of the corridor

vehicles from using this route. There are no posted bridges along this route according to the NYSDOT Posted Bridges Viewer.

Between the Woodchuck Hollow Bridge and the Giggle Hollow Bridge, Lake Avenue from Pine Hill could be an option for an construction access route. However, this is a gravel road to Birch Creek with no means to cross the creek. A temporary bridge, a permanent bridge, large culvert pipes and fill, or a concrete box culvert could be utilized to cross the creek. ORDA indicated that two large pipe culverts used to be installed to cross the creek and were damaged during Hurricane Irene and Tropical Storm Lee and later removed. ORDA also indicated that construction of a permanent crossing in this location may be beneficial for their operations as a second option for their maintenance crews to access the DUA facilities without the restrictions of the covered entrance bridge and sharing that bridge with the public. The steep slopes between Lake Avenue and the railroad corridor limit the connection options between Lake Ave and the D&U railroad corridor.

Another feasible access location for construction vehicles is at the entrance to the Belleayre Beach DUA. A one lane steel girder covered bridge spanning the Birch Creek was constructed in 1992 and was constructed to New York State Department of Transportation standards at that time. The wooden cathedral-like cover or roof will need to be modified to allow larger construction vehicles to access the DUA and then the corridor. This location will also provide access to the Giggle Hollow Bridge and locations west of this site. Accessing the east side of the corridor will require construction vehicles to either cross the Giggle Hollow stream either via a temporary structure or by utilizing the railroad bridge. Modifications to the railroad bridge will be required for this to occur prior to use. An access road will also need to be cut into the slope adjacent to the railroad in order for vehicles to access the railroad corridor to the west. This access road could be permanent and provide an access for the trail users.

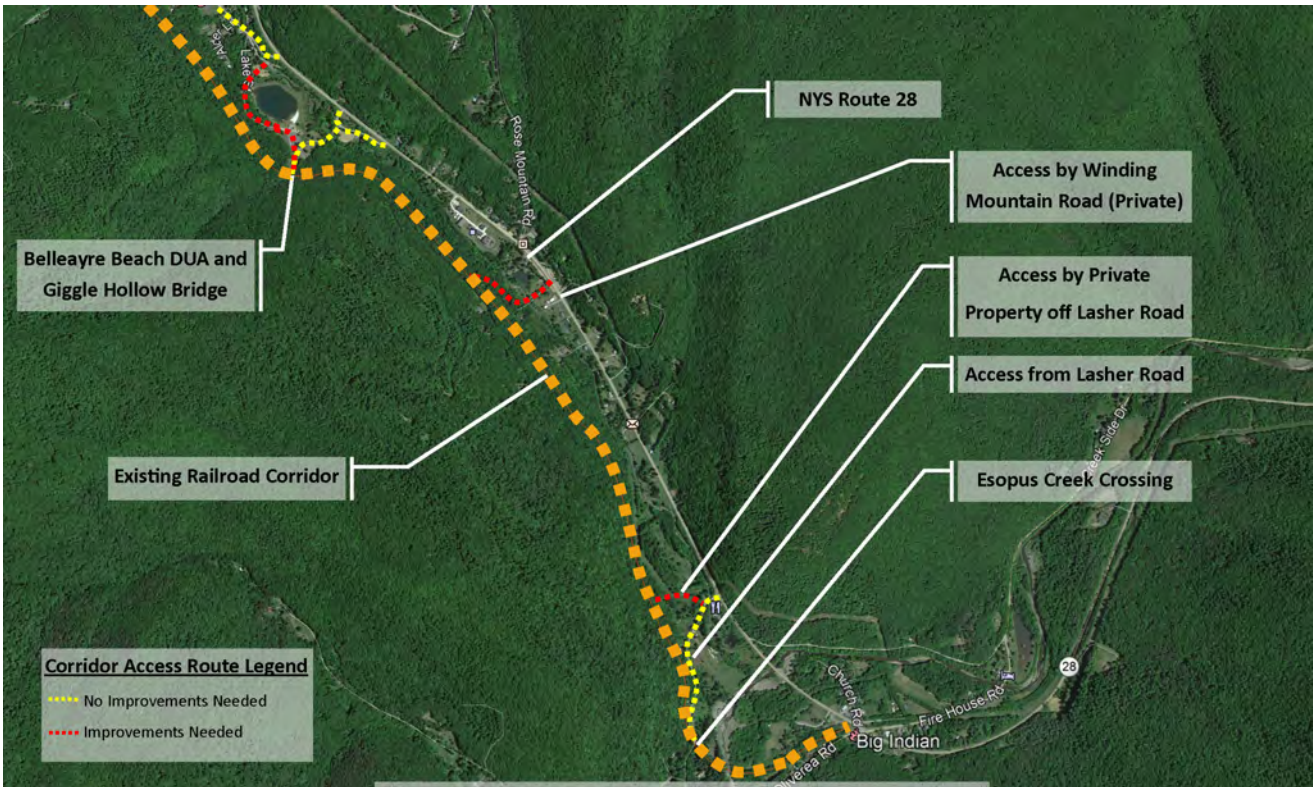


Figure 1-16: Construction Access on the East section of the corridor

The 2-mile stretch between the Giggle Hollow Bridge and Lasher Road provides limited opportunities for construction vehicles to access the railroad corridor. There are no major structures that need to be rehabilitated between these two points and the access at Lasher Road provides convenient access for a contractor to work. Winding Mountain Road may be viewed as a convenient access point, however, the road is privately owned and would require a temporary bridge structure to cross Birch Creek if used for construction vehicles. Additionally, NYSDEC may have an access easement through this roadway to access their parcel of land and may be able to grant access to this roadway through their agreement with the owner of the roadway. Use of the DEC access easement and construction of a temporary bridge should be pursued during the design phase of the project.

Another potential access location through this stretch is through a vacant property owned by Crossroads Ventures, LLC., according to the Ulster County Parcel viewer. This property provides direct access from Lasher Road to the Railroad corridor and if an agreement between Crossroads Ventures LLC and the County can be reached, could provide as a potential trailhead location until the Esopus Creek Bridge is constructed in a later phase. Preliminary discussions with the property owner indicate that use of this property is feasible and could be pursued further during design. If an agreement for a trailhead is not secured, then the contractor for the trail may wish to pursue this as a construction access route and staging area for work on the western section of the corridor.

Access to the Esopus Creek Bridge can easily be provided from the west via Lasher Road and from the East by utilizing the existing Railroad corridor from Route 28 and Oliverea Road (CR 27.) No other access locations would be necessary for construction from the
Esopus Creek to Route 28.

The longest stretches of the corridor with only one potential construction access point is two miles from the Giggle Hollow Bridge to Lasher Road. The contractor will need to carefully manage their crews and operations in a linear manner from the one access point forward. Providing the contractor the option to install passing zones every quarter to half mile along the corridor and additional access points could be beneficial to improve the contractor's efficiency while working on the project. The Woodchuck Hollow Bridge to the Giggle Hollow Bridge is a one mile section with access provided at both ends of the segment. Secondary access points to the trail are limited by the steep slopes adjacent to the corridor and the private properties that boarder the corridor to the north.

B&L recommends that the above mentioned routes are considered to be included in the design plans to alert a future contractor of their potential for use. Typically, the contractor is responsible for choosing and furnishing their own access routes with approval by the project owner. Variations to this include restrictions by permitting agencies or if the County desires a potential access route to be formalized for use after construction of the trail. This could be for uses by emergency vehicles, maintenance vehicles, or for other uses.

1.6.5. Emergency Vehicle Access

Emergency vehicles could access the trail from one of the major trailheads constructed along this corridor at Highmount, Belleayre Beach DUA, and in Big Indian. Emergency Vehicles can also access the trail from Station Road/Woodchuck Hollow Road in pine Hill. These access points will allow for a distance from entry/exit points no greater than two miles along the trail. The recommended trail section and bridge improvements allow for vehicles to drive along the trail to reach their destination.

1.7 Vegetation Management

1.7.1. Existing Vegetation Assessment

Vegetation conditions and potential needs along the corridor can be separated into two segments. The west segment from the Giggle Hollow Bridge to Highmount is generally clear of vegetation that would need to be removed for a trail to be constructed. Select trees may be removed depending on connection points and work to culverts determined during the design phase, but no major clearing is required. Vegetation between, and immediately adjacent to the tracks, is sparse and is limited to grasses, weeds, and small shrub growth.

Figure 1-17: Heavy tree growth adjacent to tracks.

The eastern segment from the Giggle Hollow Bridge to Route 28 in Big Indian exhibits heavy tree and vegetation growth. Trees ranging from 3 to 8 inches diameter at breast height (dbh) have grown within and adjacent to the railroad tracks and within the construction footprint of the trail. Smaller brush growth is also present along this segment. This segment also exhibits numerous large tree blowdowns that will need to be cleared prior to track and tie removal and to construct the trail.

The recommended clearing width will vary depending on the final trail width chosen for the trail. Generally, a minimum of 2-3 foot width free of trees and other obstructions is desired adjacent to the trail edge for errant bicyclists. If a 10 foot trail is to be used for the trail, then a minimum 14 foot width should be cleared centered on the tracks. Overhead clearance should be a minimum of 10-12 feet in height from the final trail surface elevation, although greater heights may be needed by construction vehicles to traverse the corridor.

The field assessment conducted by B&L occurred in the fall of 2020, after the leaves had dropped from the trees. We recommend that a full assessment of the ash trees within the corridor be performed while the leaves are on the trees making species identification easy. Ash trees are being ravaged by the Emerald Ash Bore throughout the County and State. Standing ash trees along the corridor will become infested and could pose a hazard to construction crews and the general public if they are not cut down before they die and start to crumble. We recommend that all ash trees that pose a threat to fall on the trail be cut down.

1.7.1. Scenic Vista Opportunities

Despite traversing through the scenic Catskill Mountains, the corridor offers few locations for scenic views of the area. The corridor traverses through a valley and along a mountain side to the south hiding any views of the top. The north side is heavily wooded, and scenic views are again blocked by the flat plateau of the mountains to the north. Views of the Birch Creek Valley to the south and west from the double horseshoe curve are blocked by heavy tree growth. However, there is an opportunity to clear a scenic vista of the Birch Creek Valley to the north of the corridor just west of the double horseshoe curve. Views from atop the Giggle Hollow Bridge to the north could also be opened up by selective tree clearing. This would also improve views of the bridge from the Belleayre Beach DUA potentially making this a highly sought after photo opportunity. The Esopus Creek also offers picturesque photo opportunities of the Catskill Mountain wilderness if the bridge is constructed.

1.8 Project Stakeholders

1.8.1. New York State Department of Environmental Conservation

As discussed in section 1.4.3, the NYSDEC is an important stakeholder for this project. The land to South of the project is owned by the NYSDEC and has been identified in their Draft UMP for further development. Coordination between the County and NYSDEC is ongoing and is recommended throughout the planning and design process of the trail.

1.8.2. Olympic Regional Development Authority

In addition to the Belleayre Ski Center in Highmount, ORDA also owns and operates the Belleayre Beach DUA at Pine Hill. This seasonal recreational facility is a pay by use facility open from mid-June to Labor Day annually. Outside of this timeframe, the facility is gated at a one-way covered bridge crossing the Birch Creek. The bridge is the only access point to the facility from Route 28. Pedestrians are permitted to cross the bridge outside of the open season, however, they need to park their vehicles on the side of Friendship Manor Road which does not offer more than 4 or 5 vehicles to park at a time. As mentioned in section 1.3, this facility is a desirable location to provide access to the potential trail both during and after construction. Coordination with ORDA to provide full time access and parking facilities is an important element of the project and has begun as part of this feasibility study. This pay-by-use facility typically has 18,000 to 24,000 visitors seasonally from mid-June through Labor Day.

1.8.3. Delaware and Ulster Railroad

The Delaware and Ulster Railroad ("D&U RR") is a not for profit organization that operates a scenic railroad ride based out of Arkville, NY. The D&U RR has the rights to operate on 19 miles of track from Highmount to Roxbury, NY, but currently only operates on the western 13 miles of track. The D&U RR has plans to renovate the eastern 6 miles of track west of Highmount NY in the summer of 2021 and restore tourism train service to Highmount in the fall of 2021. The D&U RR plans to use the side-by-side tracks and switches in Highmount to reverse the direction of their tourist trains. Ulster County has issued a permit for the D&U RR to operate their trains for 929 ft. east of the Delaware-Ulster County line. The eastern terminus of the permit has become known as the compromise joint and is the eastern most point that the railroad is allowed to use.

If the trail is constructed, the tracks in Highmount would need remain intact and operational for the D&U RR. Coordination with the D&U RR will be necessary during the design process to ensure compatibility for both operations to function simultaneously. Potential improvements needed for the railroad to operate in Highmount include a new and potentially larger (30-40 ft.) loading platform, railroad track improvements, and a small parking facility. The D&U RR indicated that this area would not be used as a station or to load or discharge train users.

1.8.4. Town of Shandaken

The segment of the U&D corridor assessed by this study falls entirely within the Town of Shandaken. Nestled in the heart of the Catskill Mountains, the town of 3,000 residents is comprised by nearly 75% NYSDEC forestlands making this a prime location to establish a new multi-use trail. A quick visit to the Town's website highlights their emphasis on outdoor recreation and hiking. In addition, the Comprehensive Recreation Master Plan for Town of Shandaken – 2013 recommends that the establishment of the "U&D rail corridor as a multiuse trail as a priority trail project for the community" and "establishing non-motorized trails is a cost-effective wat to foster recreation supply in Shandaken." Early discussions with the Town have indicated their full support for the development of this 5 mile stretch of the U&D corridor.

1.9 Historical Interpretation Opportunities:

There are many historical elements that could be chosen to showcase on interpretative panels throughout the corridor, beginning with the significance of the railroad on the development of the local communities such as at Highmount, Pine Hill, and in Big Indian. Existing physical elements such as the foundation adjacent to the railroad tracks at Pine Hill (figure 1-18) is just one example of an opportunity to highlight. Other examples include the Grand Hotel (figure 1-19) at Highmount, industry in Pine Hill such as the Tanneries, lodging at Inns and Hotels, the Crystal Spring Water Company, and the engineering feats of the corridor such as the grade and the significance of the segment commonly referred to as the "double horseshoe curve." A historical assessment will be further developed to highlight additional opportunities.

Figure 1-18: Highmount Grand Hotel

Figure 1-19: Foundation remains