

V. DETAILED STUDY OF RETAINED ALTERNATIVES

From the full range of concepts and preliminary alternatives (Chapter IV), DeIDOT selected five alternatives to be retained for Step Three of the alternatives evaluation process known as detailed study. The detailed study phase involved conceptual engineering design of each retained alternative, initial refinement of design elements to avoid or minimize impacts, and refined calculations of traffic and environmental performance. DeIDOT expects to select Alternative 5C Modified as the state's recommended preferred alternative.

The alternatives retained for detailed study are known as Alternatives 1, 4, 5C, 7C and 7D. Alternative 1 is the "No-Build" alternative against which all alternatives are compared. Alternatives 4, 5C, 7C and 7D are "Build" alternatives. In detailed study, each retained alternative was evaluated for its responsiveness to a broader and more refined set of project Purpose and Need criteria than was examined in Step One. The additional traffic and engineering analyses undertaken in detailed study enabled a finer measurement of performance for a larger set of criteria.

Similarly, detailed study also enabled a finer analysis of the engineering and environmental issues. The benefits and probable impacts of each retained alternative are presented in the following sections.

A. METHODOLOGY AND TOOLS USED FOR DETAILED STUDY

i. Detailed Traffic Analysis

The detailed traffic analysis for each retained alternative included the following elements:

- Future daily traffic volumes provided by DeIDOT's travel demand model were analyzed to determine the future traffic flow patterns within the study area.
- Future evening peak hour traffic volumes were calculated from the demand model based on daily volumes to analyze the worst case volumes for traffic performance.
- Roadway segment volumes from the demand model were converted to intersection turning movement volumes based on the review of study area traffic flow patterns.
- Potential future trips estimated to be generated by the Eden Hill Farm development and proposed Kesselring Farm (West) development (west of the railroad) were calculated using the Institute of Transportation Engineers' (ITE) Trip Generation Manual. These trips were assigned to the study area roadway network based on established traffic distribution patterns.
- Intersection capacity analysis and traffic simulation models were developed to analyze the performance of study area intersections.
- The performance of major intersections related to each alternative was analyzed and compared to the future No-Build alternative to determine the improvement achieved due to the connector roadway.
- Intersection improvements were identified at affected intersections where performance degrades to an unacceptable level of service (LOS E or LOS F).

ii. Detailed Civil Engineering Analysis

The detailed civil engineering analysis for each retained alternative included the following elements:

- Refined connector alignment including cross-section templates and appropriate intersection treatments.
- Refined footprints of required structures with approximate locations of bridge piers and wing walls.
- Conceptual alignment plans indicating travel lanes, bicycle lanes, sidewalks, median types and treatments, locations of structures, provision for parking wherever appropriate, and treatments for modified access to/from residential, agricultural, and commercial areas wherever applicable.
- Determination of new impervious surface added or new pavement (in acres) and also the use of existing pavement (in acres) for the connector road.
- Identification of potentially available land area for stormwater management facilities.
- Refined alignment in response to more detailed information regarding historic properties and proposed land use plans.

iii. Detailed Environmental Impact Analysis

The detailed environmental impact analysis included calculating natural and built environmental impacts based on the refined alternative alignments developed during the detailed civil engineering analysis. For each retained alternative, the following impacts were quantified:

- Floodplain impacts (in acres), in terms of required fill
- Wetlands impacts (in acres), in terms of required fill as well as shading and tree removal impacts
- Stream impacts (in linear feet)
- Impacts on preserved agricultural land (in acres)
- Listed and eligible historic property impacts (number of properties) - both direct and indirect impacts
- Existing property displacement impacts (number of properties, acres) - residential, commercial, industrial and other
- Partial impacts on existing properties (number of properties, acres) - residential, commercial, industrial and other

The determination of approximate roadway cross-section right-of-way requirements in detailed study made it possible to assess the potential to avoid or minimize impacts on historic properties as well as to determine unavoidable impacts. Coordination with the DE State Historic Preservation Office (DE SHPO) in April 2006 led to the definition of an area of potential effects (APE) and a determination as to the historic properties of concern within the study area: the National Register-listed Eden Hill Farm on North Street, the eligible Kesselring Farm located west of New Burton Road, the eligible H. Jenkins House located on the south side of Webbs Lane east of New Burton Road and the National Register-listed Brecknock farmhouse located south of Isaac Branch. Consultation with the DE SHPO in accordance with Section 106 of the National Register of Historic Places Act is on-going; determinations of project effect are pending selection of the preferred alternative and concurrence by the Federal Highway Administration (FHWA) on the preferred alternative.

Within the study area, historic properties and public parks are considered protected property under Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966. Section 4(f) refers to the original section in the U.S. Department of Transportation (DOT) Act of 1966 and applies to all agencies within the DOT. The Section 4(f) requirement, originally set forth in 49 USC 1653(f), includes consideration in transportation project development of the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge, or land of an historic site of national, state, or local significance (as determined by the federal, state, or local officials having jurisdiction over the park, recreation area, refuge, or site). Historic sites are afforded protection under Section 4(f) if listed or determined eligible for the National Register of Historic Places (NRHP). The law is codified in 49 USC 303 and 23 USC 138 and is implemented by the FHWA per 23 CFR 771.135. In accordance with 23 CFR 771.135(a)(1), the FHWA may not approve an action requiring the use of a Section 4(f) protected property, unless it is determined that:

- There is no feasible and prudent alternative to the use of land from the property; and
- The action includes all possible planning to minimize harm to the property resulting from such use.

Two (2) public parks and four (4) historic properties listed in or eligible for the National Register of Historic Places have been identified in the project study area. Those properties afforded protection under Section 4(f) are:

- Brecknock Park
- Schutte Park
- Brecknock (K00143), located within Brecknock Park
- Eden Hill Farm (K00125)
- H. Jenkins House (K03205)
- Kesselring Farm (K01030)

The above properties were important considerations in detailed studies.

The potential for the alternatives to have disproportionate effects on minority and/or low-income populations was considered during detailed study. As described in Chapter IV, minority population percentages are equal to or greater than that of the City of Dover along North Street, Webbs Lane, and several other locations. Low-income household percentages are equal to or greater than that of the City of Dover primarily west of New Burton Road and north of Wyoming Avenue. Documentation of project compliance with Executive Order 12898, Environmental Justice, will be presented in the NEPA document prepared for the preferred alternative.

B. DETAILED STUDY FINDINGS

This section presents and describes the performance of each retained alternative in the context of the detailed traffic, civil engineering and environmental impacts analyses.

i. **Alternative 1 (No-Build)**

Alternative 1 is the ‘No-Build’ approach. In Alternative 1, it was assumed that no transportation infrastructure improvements would be made within the study area (apart from the improvements that have already been committed by DeIDOT in its Transportation Improvement Program based on other studies within the West Dover area). Figure V-1 depicts Alternative 1.

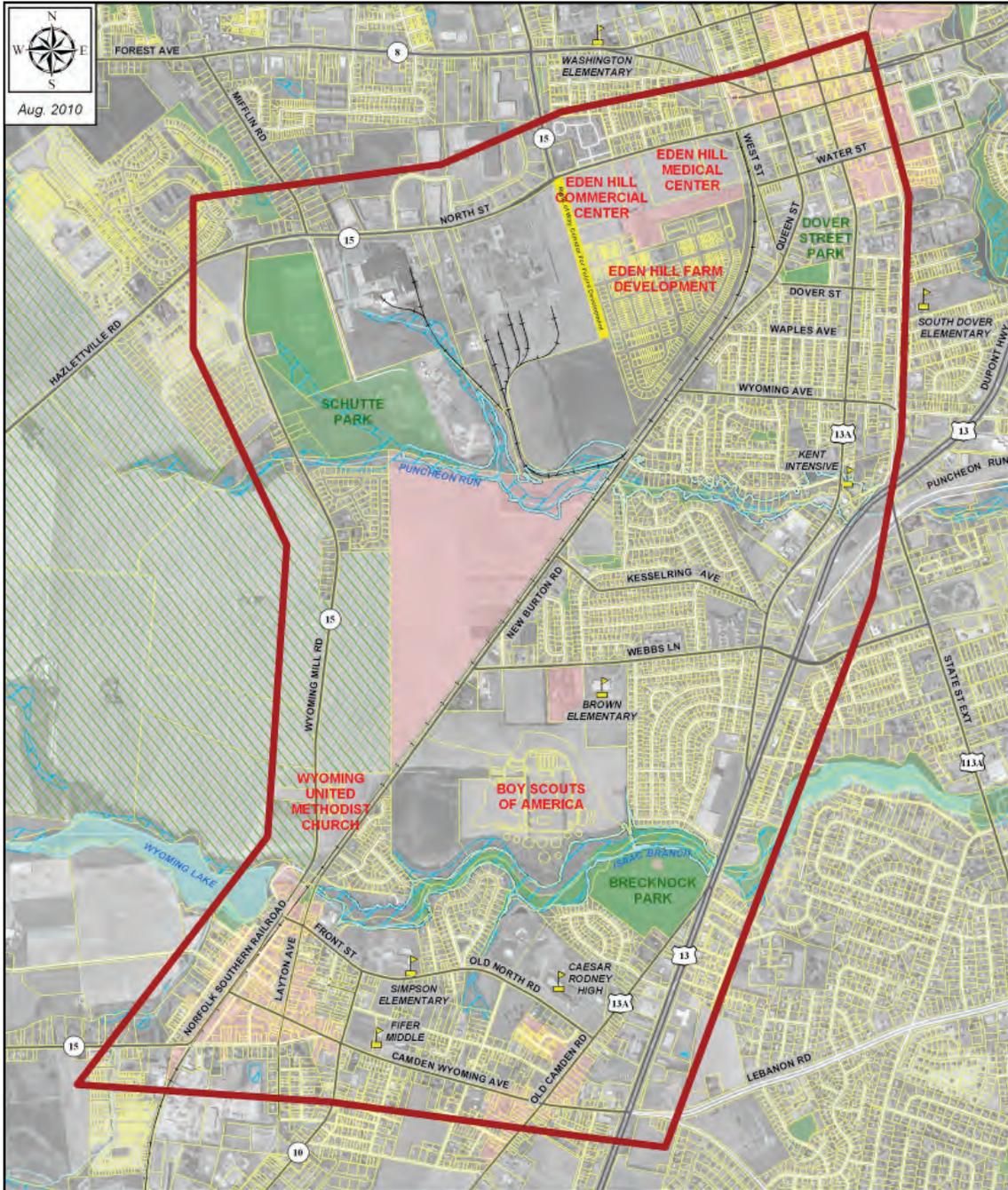


Figure V-1 – Alternative 1: No-Build

2030 Traffic Performance, Detailed Study: Intersection analysis showed that by 2030, almost all study area intersections would be near failing (E) or at a failing level of service (F) with excessively high delays. Of the total 25 study area intersections, twelve intersections will experience an average intersection delay of more than ten minutes per vehicle. In other words, during the evening peak hour, vehicles will wait at these intersections for over ten minutes before being able to pass through the intersection. At signalized intersections, vehicles will wait for more than six signal cycles to clear the intersection. At stop-controlled intersections, vehicles will wait in long traffic backups, sometimes more than a half mile. Eight intersections will experience an average intersection delay between two and ten minutes per vehicle. The average intersection delay per vehicle will be less than two minutes for only five intersections, of which only one intersection will operate at an acceptable level of service.

Environmental Performance, Detailed Study: Alternative 1 would result in no new displacements and/or partial impacts, required right-of-way acreage, impacts on streams, wetlands, floodplains, preserved agricultural lands, or historic properties.

Civil Engineering Factors, Detailed Study: None.

The No-Build Alternative has been used as a baseline for comparing the extent of benefits achieved by the other retained alternatives.

ii. Alternative 4

Alternative 4 would extend Saulsbury Road south from its current terminus at North Street, cross Puncheon Run and connect to US 13 using Webbs Lane. This alternative would also provide an auxiliary connection to Wyoming Mill Road from the connector. The alignment of Alternative 4 was refined during the detailed study phase to avoid direct impacts on the building complex of the eligible Kesselring Farm (West) located west of New Burton Road.

2030 Traffic Performance, Detailed Study: With required intersection improvements, Alternative 4 would improve the year 2030 performance of three major existing intersections along the connector alignment from an unacceptable level to an acceptable level. All newly formed intersections along the connector alignment would also have an acceptable level of service in 2030. Alternative 4 would also help improve the performance of nine other study area intersections with suggested intersection improvements, four of which would show performance improvement to an acceptable level from an unacceptable level with significant reductions in delay. Others would show reduction in average intersection delay per vehicle. Five of these nine intersections would not require any intersection improvements; the performance of these intersections would be improved just by the provision of the Alternative 4 connector alignment.

Environmental Performance, Detailed Study: Refinements to the alignment of Alternative 4 reduced the areas of potential environmental impact compared to the impacts reported in Chapter IV. Due to a proposed new crossing of Puncheon Run, Alternative 4 would have floodplain and wetlands impacts. There would be comparatively moderate floodplain impacts with respect to fill (0.35 acres). No fill would occur in wetlands. Shading and tree removal impacts in wetlands would be high (1.27 acres). This alternative has moderate impacts on preserved agricultural land (1.25 acres).

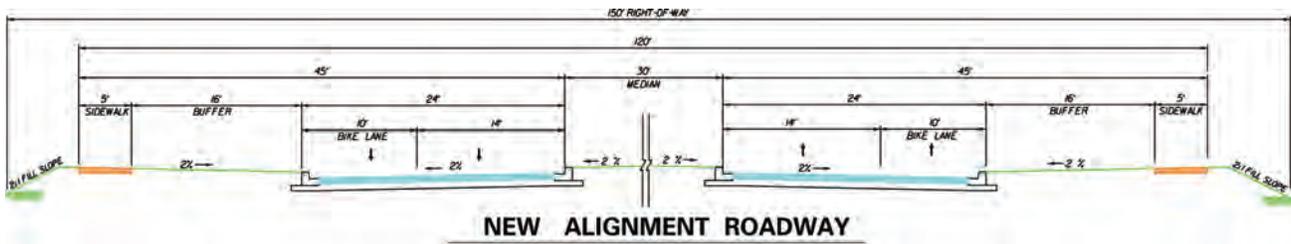
Alternative 4 would have direct impacts on one eligible historic property, the Kesselring Farm, west of New Burton Road. The elements that contribute to the historic property include the farm building complex and the surrounding farm land encompassed by the parcel boundary as defined by the DE SHPO. The alignment of Alternative 4 was refined during detailed study to avoid direct impacts on the

farm building complex; however, direct impacts on the surrounding farmland cannot be avoided. Alternative 4 would likely have an indirect impact on one eligible historic property, the H. Jenkins House, as a result of improvements along Webbs Lane, which would be further evaluated as part of Section 106 consultation with DE SHPO if Alternative 4 is selected as the preferred alternative.

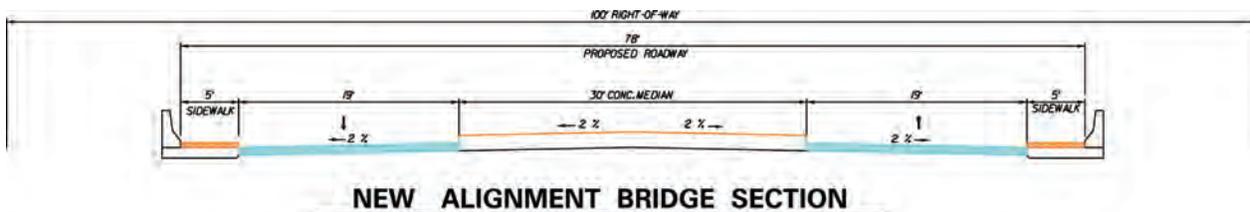
In terms of new right-of-way, Alternative 4 would require no residential or industrial displacements. Commercial displacements, however, would be high at five. Partial impacts (strip takes) would be moderate, affecting a total of 65 parcels: 49 residential properties, 13 commercial properties (fewer compared to the Step Two evaluation results), one industrial property and two state-owned properties.

Alternative 4 has the potential for disproportionate impacts on minority populations along Webbs Lane due to partial impacts for new right-of-way and additional traffic volume.

Civil Engineering Factors, Detailed Study: The new connector road alignment on the west side of the NS Railroad would have a typical section as shown below. As the intersection needs dictate, additional lanes may be developed.

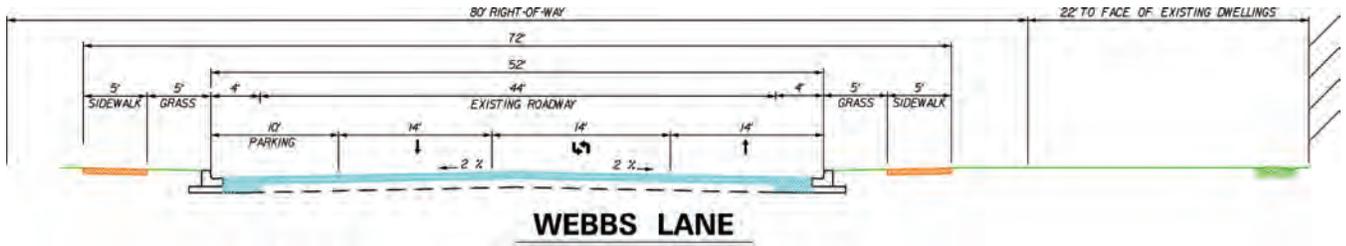


The cross-section proposed under Alternative 4 is shown above. Alternative 4 would extend Saulsbury Road along the western boundary of the Eden Hill Farm parcel (as shown in Figure V-2, Sheets 1 through 3) before swinging to the southwest to cross Puncheon Run and the railroad spur on a structure (as shown in Figure V-2, Sheets 4 through 6). The structure over Puncheon Run and the railroad spur would be a four-span structure (approximately 880 feet in length) with three bridge piers. The structure would maintain 23'-6" clearance over the railroad with the maximum clear height of 40' between any point on the ground and the bridge. The typical section on the bridge structure includes a raised concrete median island, five-foot sidewalks and on-road shared bicycle lane. It is shown below.



The alignment would then run parallel to and in close proximity to the railroad tracks on the west side (as shown in Figure V-2, Sheet 7) before it would loop around the Kesselring Farm (west) building complex (as shown in Figure V-2, Sheets 8 and 11) to cross the NS Railroad and New Burton Road on a curved girder bridge (as shown in Figure V-2, Sheet 11). This structure would be two spans, each approximately 100 feet long with one pier between the railroad and New Burton Road. The new connector road would then connect to Webbs Lane, touching down approximately 800 feet east of New Burton Road. The connection to New Burton Road would be provided via Garton Road with a partially elevated intersection approximately 450 feet east of New Burton Road. The north end of Garton Road would be realigned to achieve a perpendicular intersection with New Burton Road (as shown in Figure

V-2 Sheet 12) in place of the current oblique intersection. Webbs Lane would be improved up to the intersection with US 13. A typical section along Webbs Lane is shown below.



As previously mentioned, the residential properties along the south side of Webbs Lane would incur partial impacts (strip takes) along their frontage with an average of 22 feet remaining between the face of the existing dwelling and the proposed right-of-way line. Alternative 4 would result in loss of parking on the south side of Webbs Lane while parking on the north side would be maintained as shown in Figure V-2, Sheets 13 through 15. Intersections along Webbs Lane would be improved as per the operational needs identified under the detailed traffic analysis. In addition, Alternative 4 would have an auxiliary connection to Wyoming Mill Road from the new connector road as shown in Figure V-2, Sheets 9 and 10.

Alternative 4 includes 10.79 acres of new pavement and uses 5.28 acres of existing pavement. Stormwater management locations have been conceptually identified to adequately handle stormwater runoff associated with this alignment. The specific requirements for stormwater management, their exact locations, and the selection of Best Management Practices will be made in preliminary design.

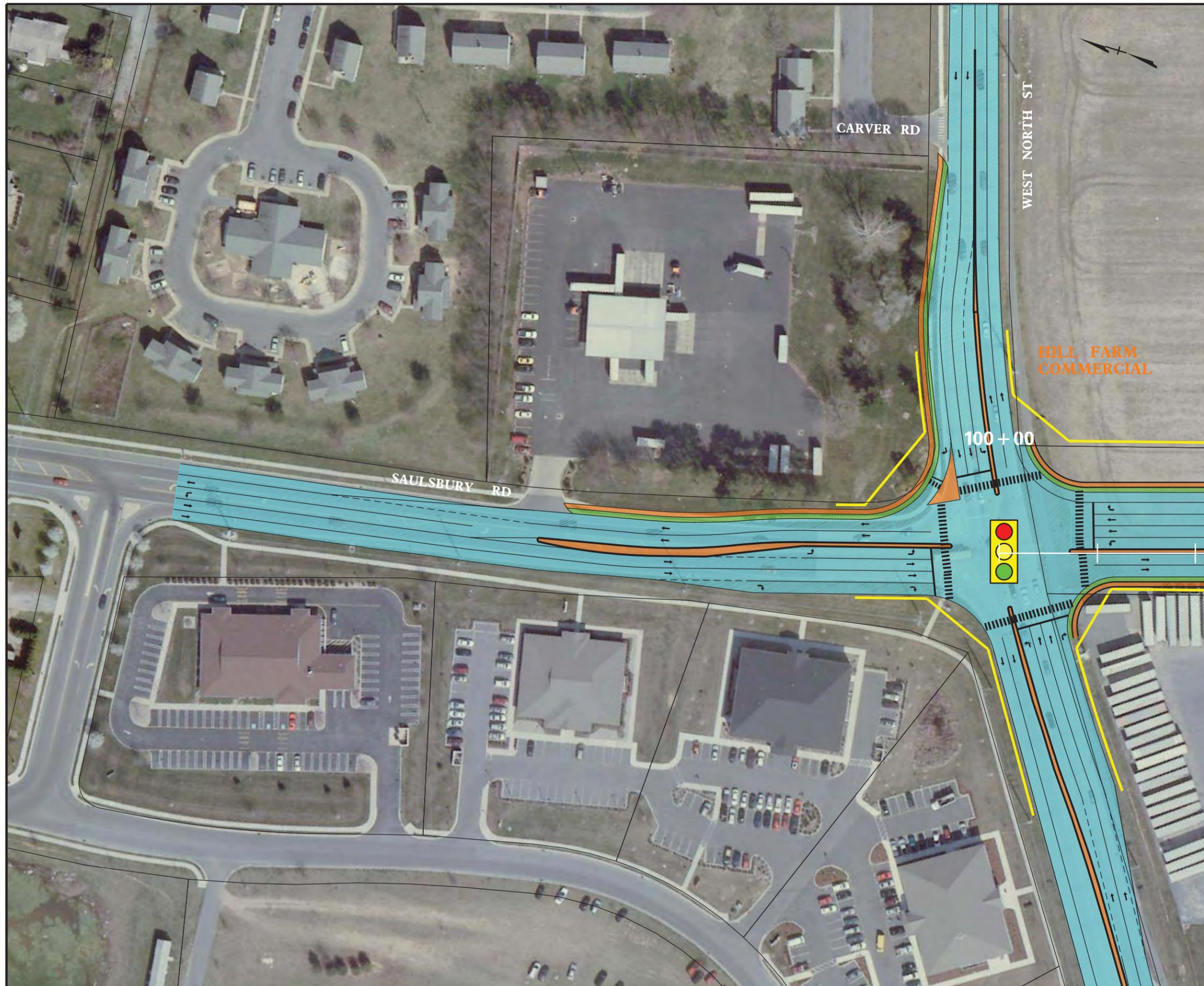
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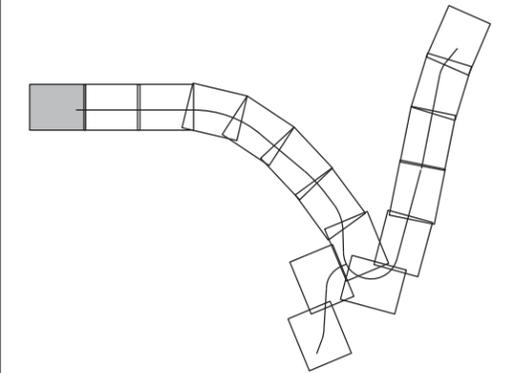
WEST DOVER CONNECTOR

**KEY MAP
ALTERNATIVE 4**





WEST DOVER CONNECTOR



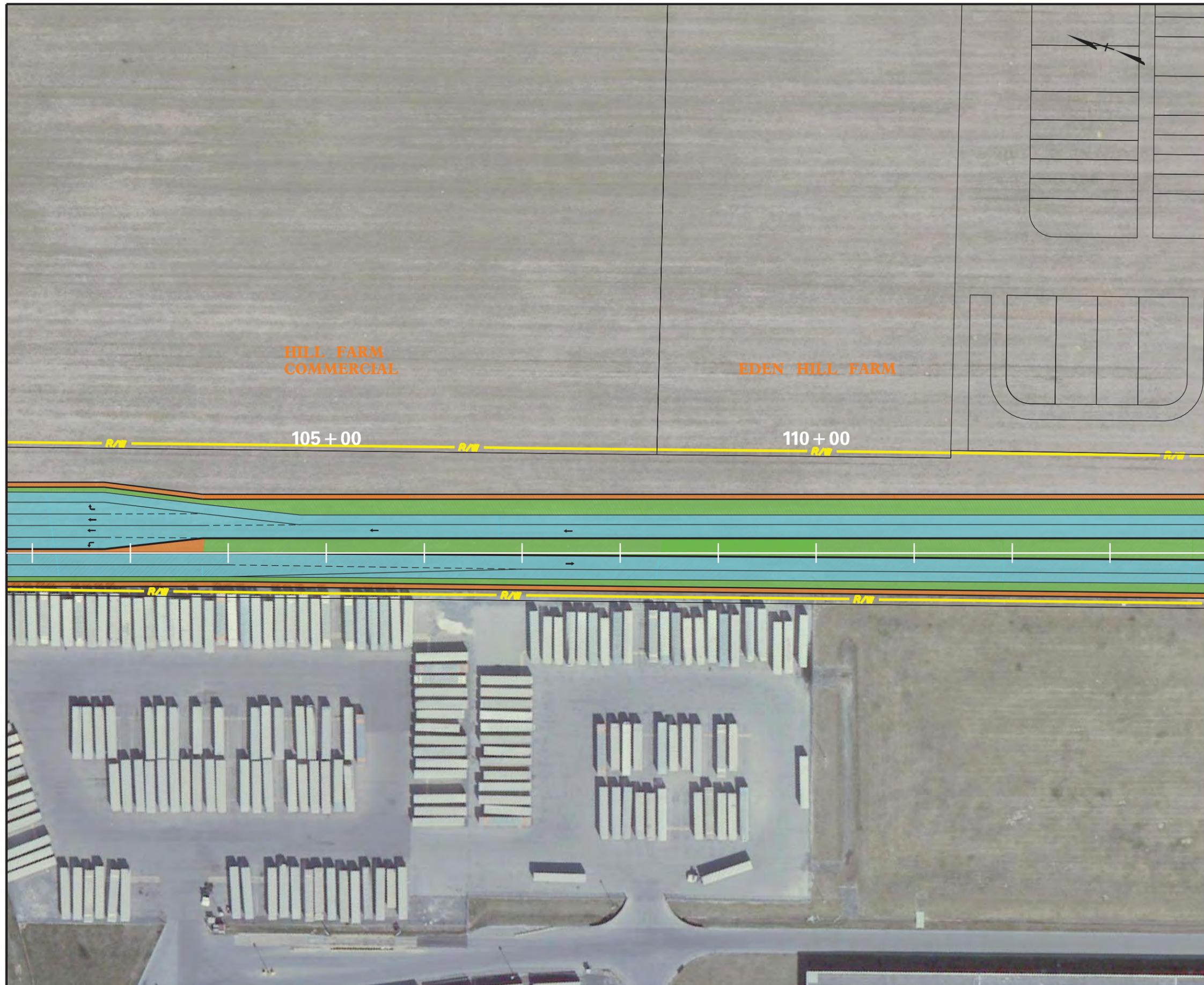
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-  SIDEWALK / MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

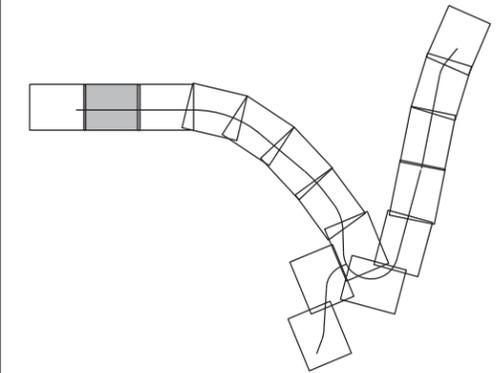
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LEGEND:

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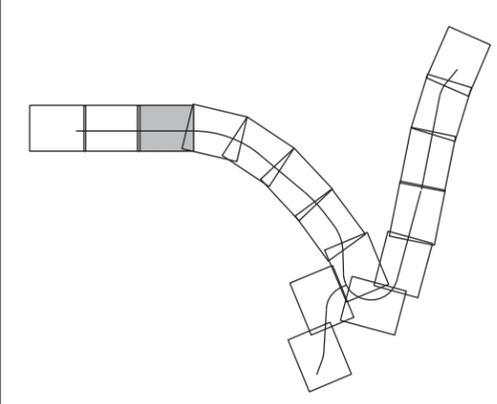
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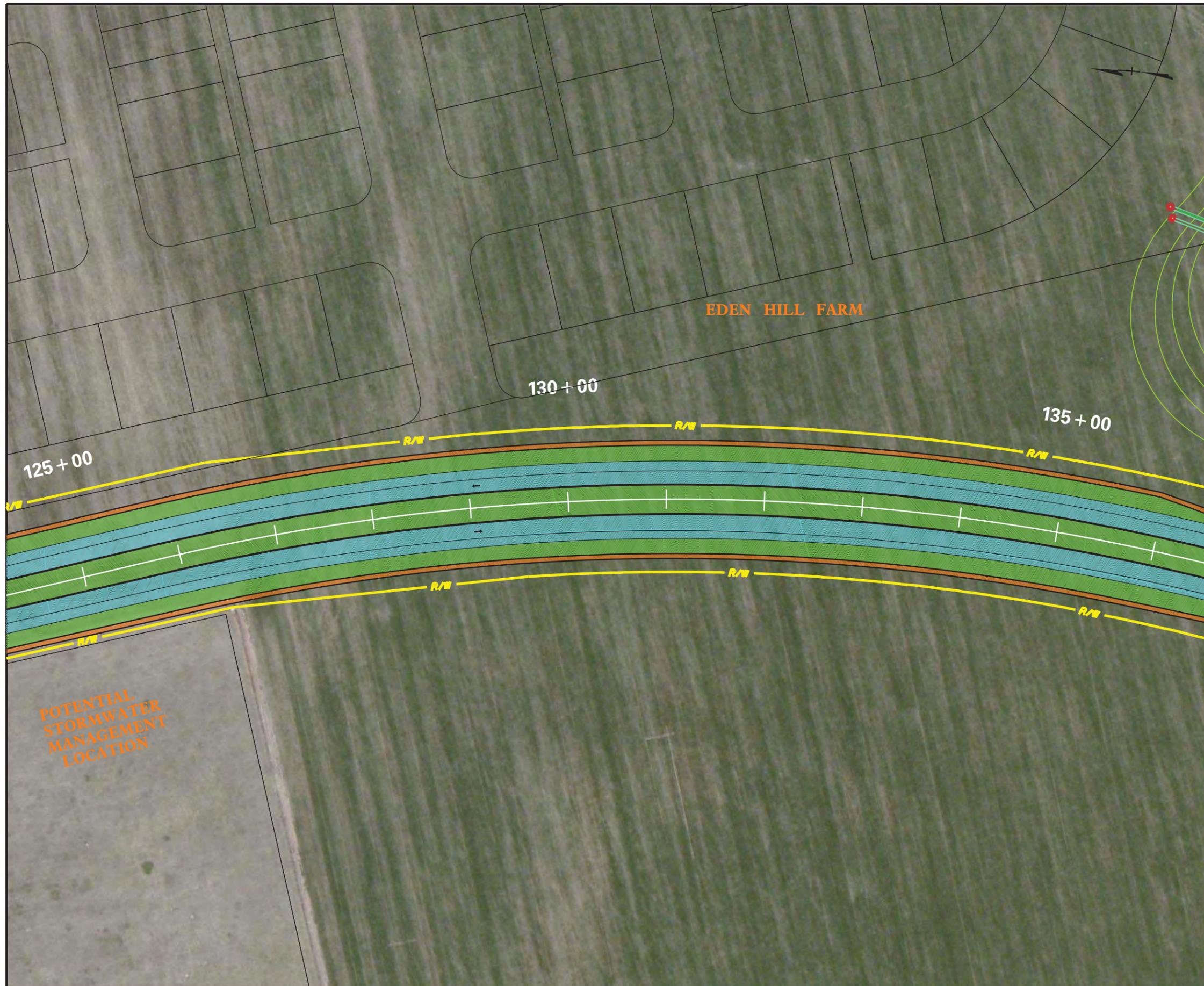
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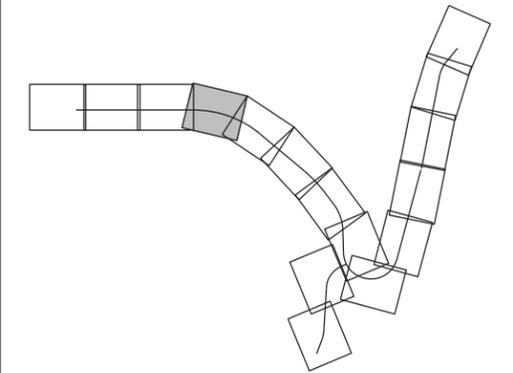
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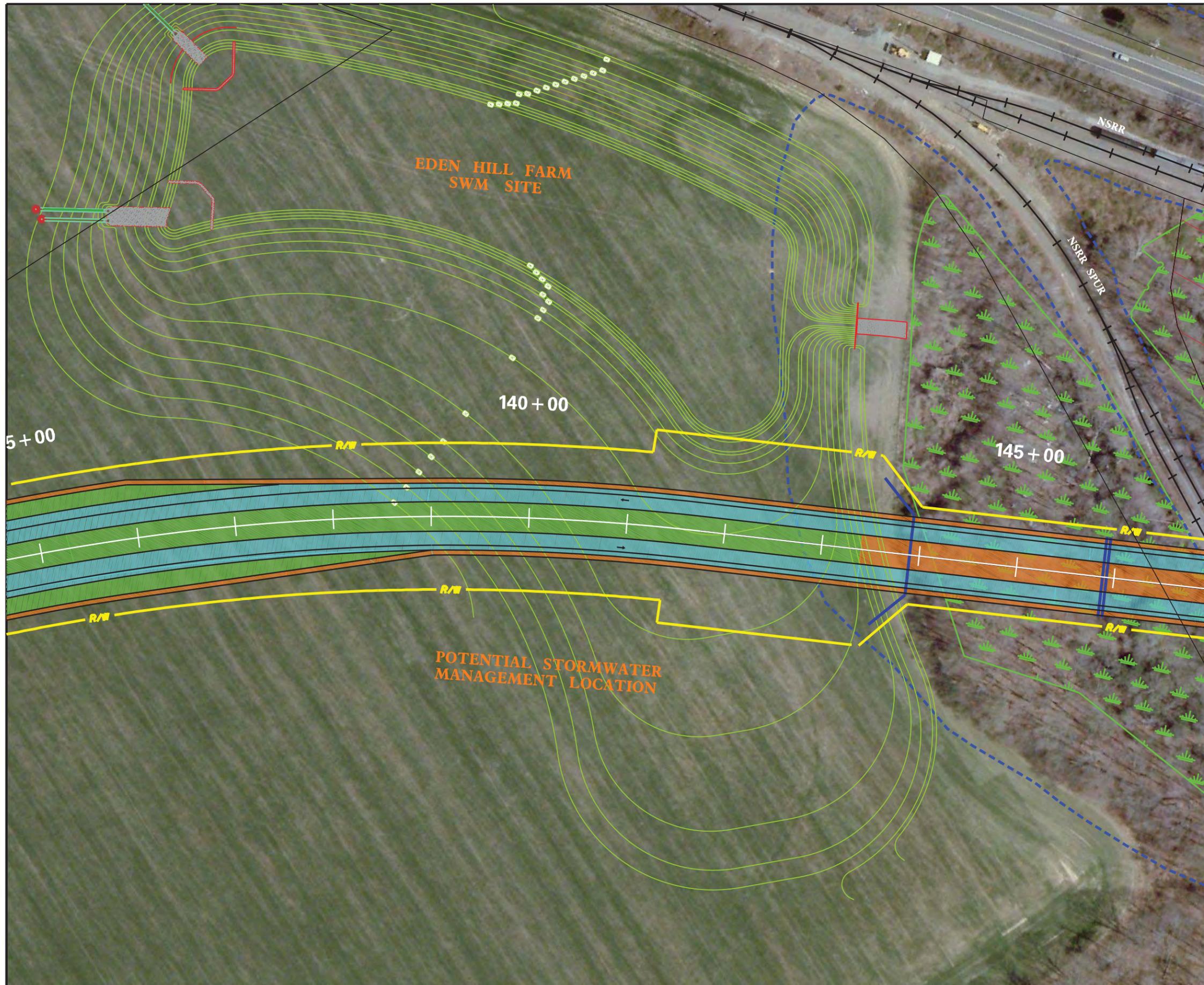
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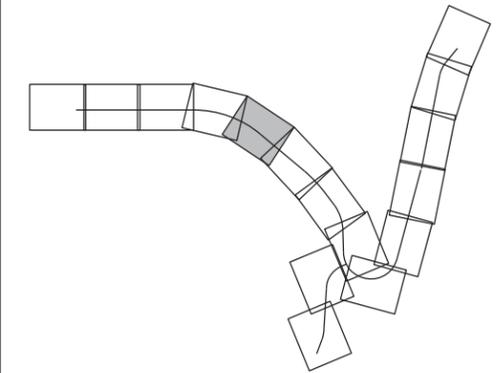
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WEST DOVER CONNECTOR



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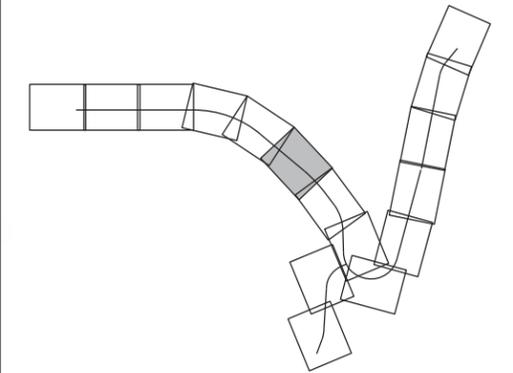
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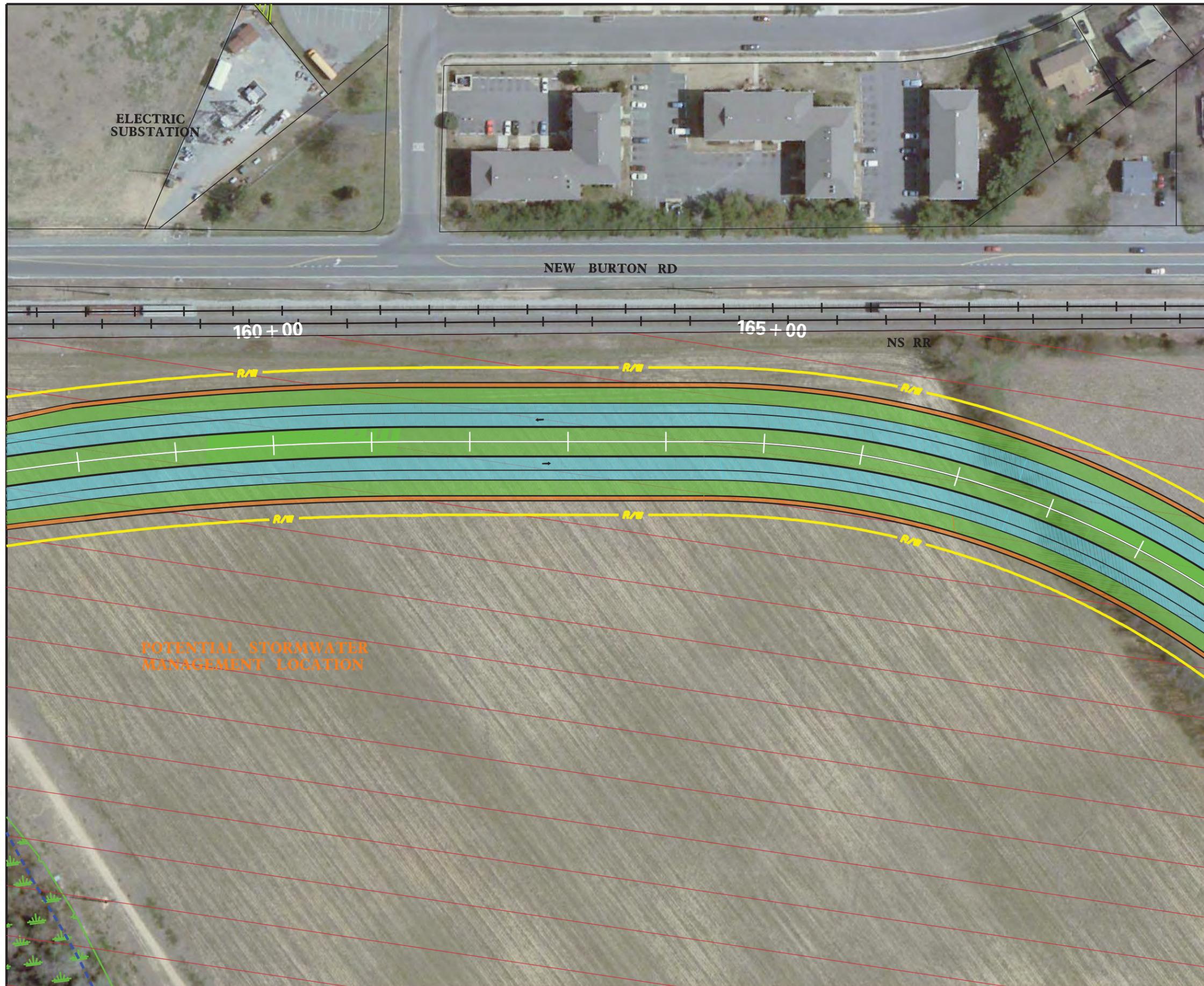
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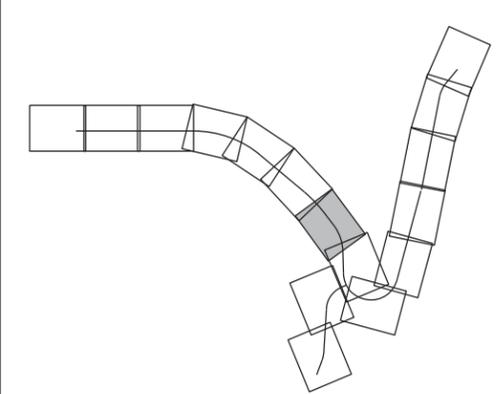
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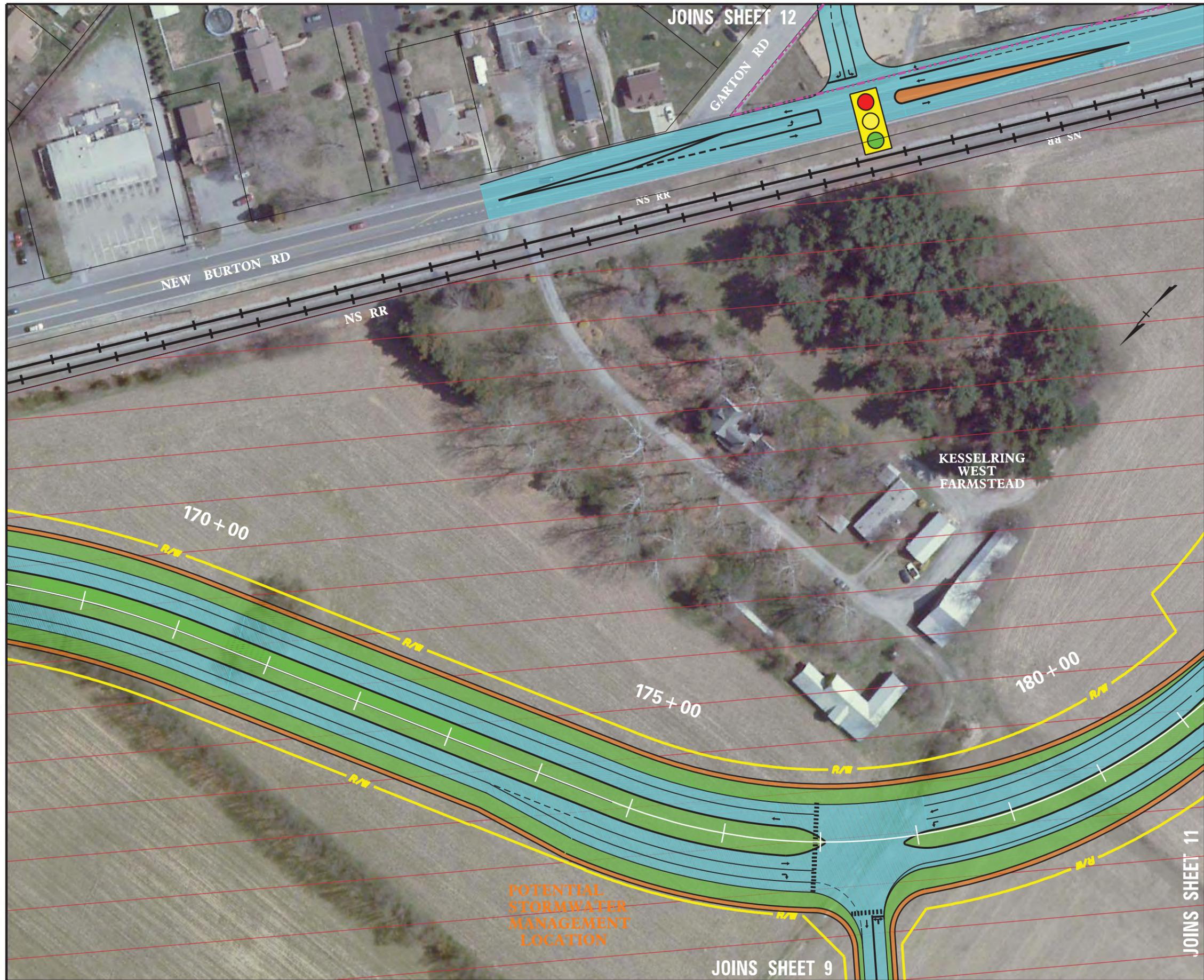
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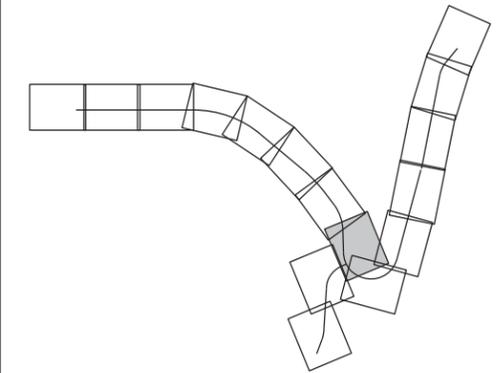
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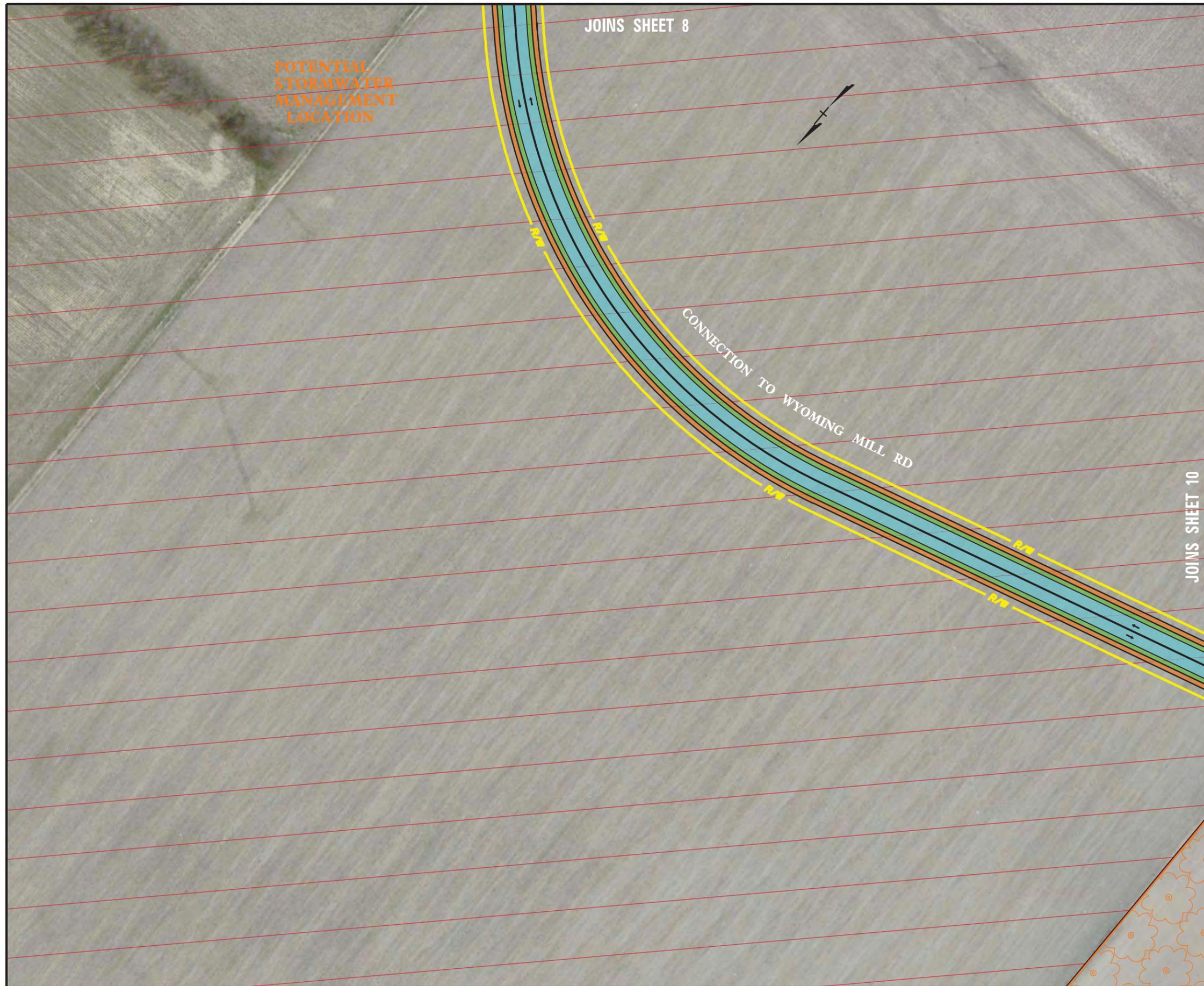
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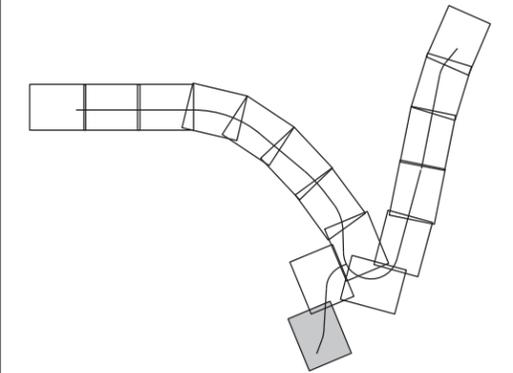
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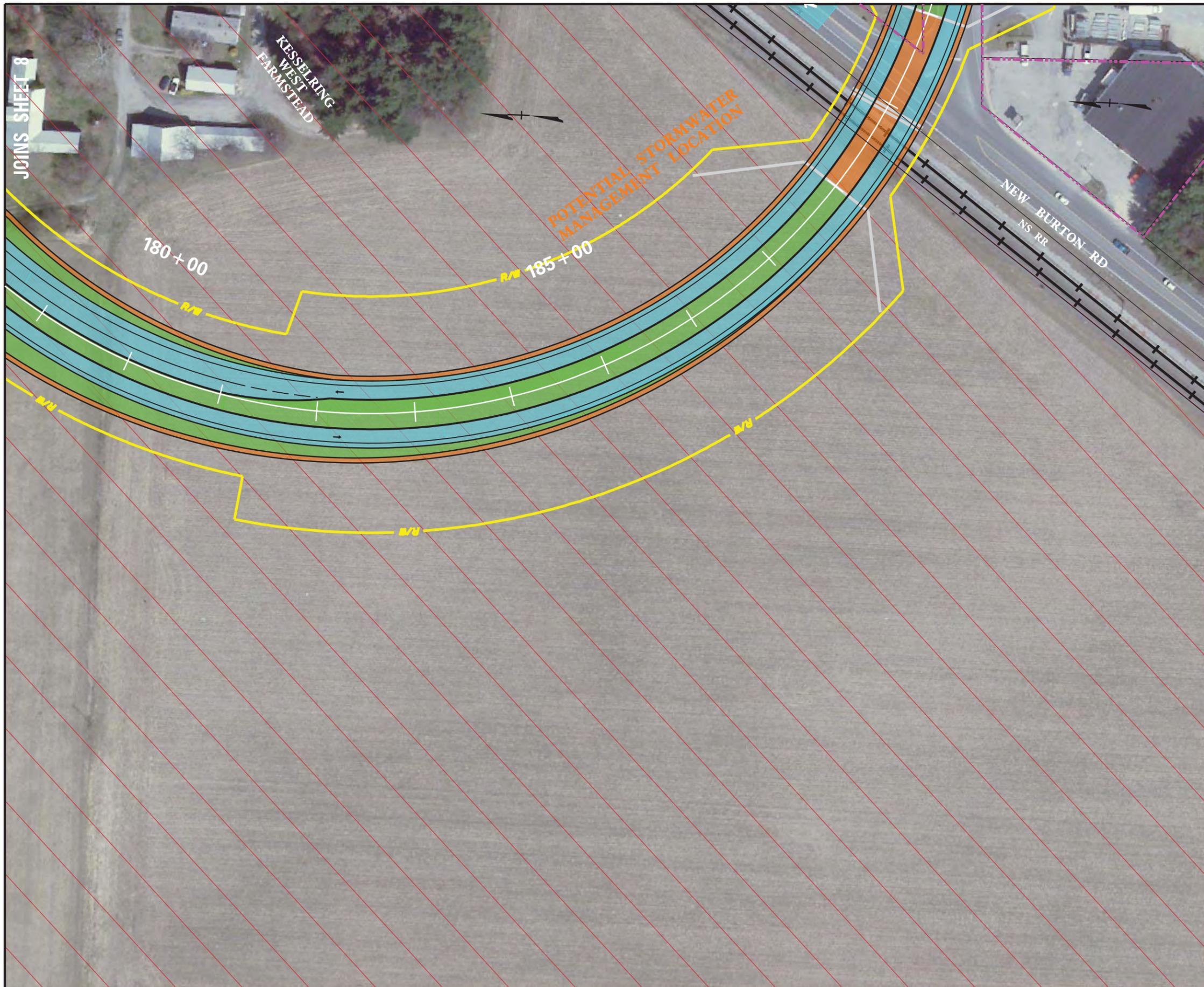
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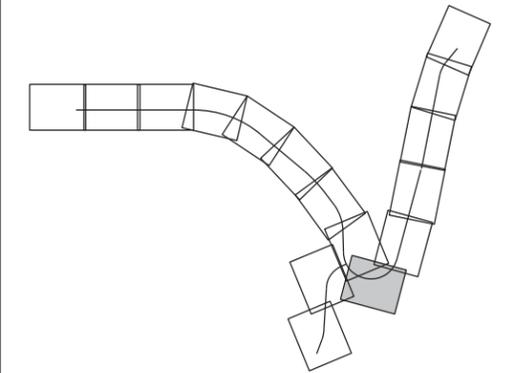
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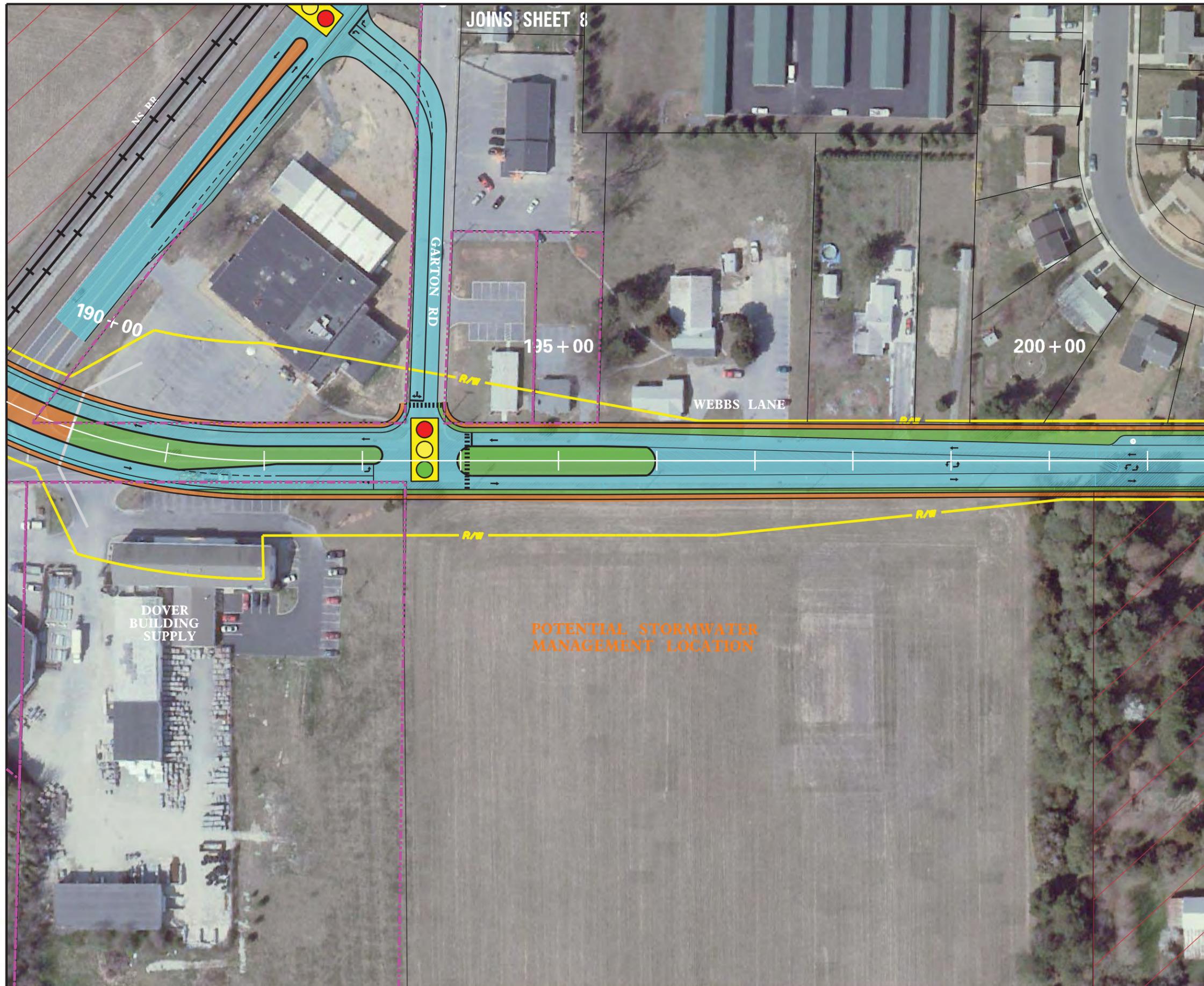
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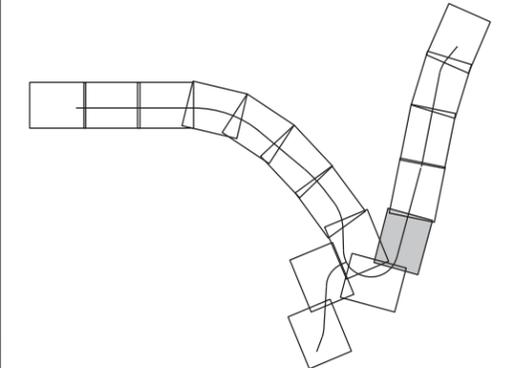
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DOVER BUILDING SUPPLY

POTENTIAL STORMWATER MANAGEMENT LOCATION

WEST DOVER CONNECTOR



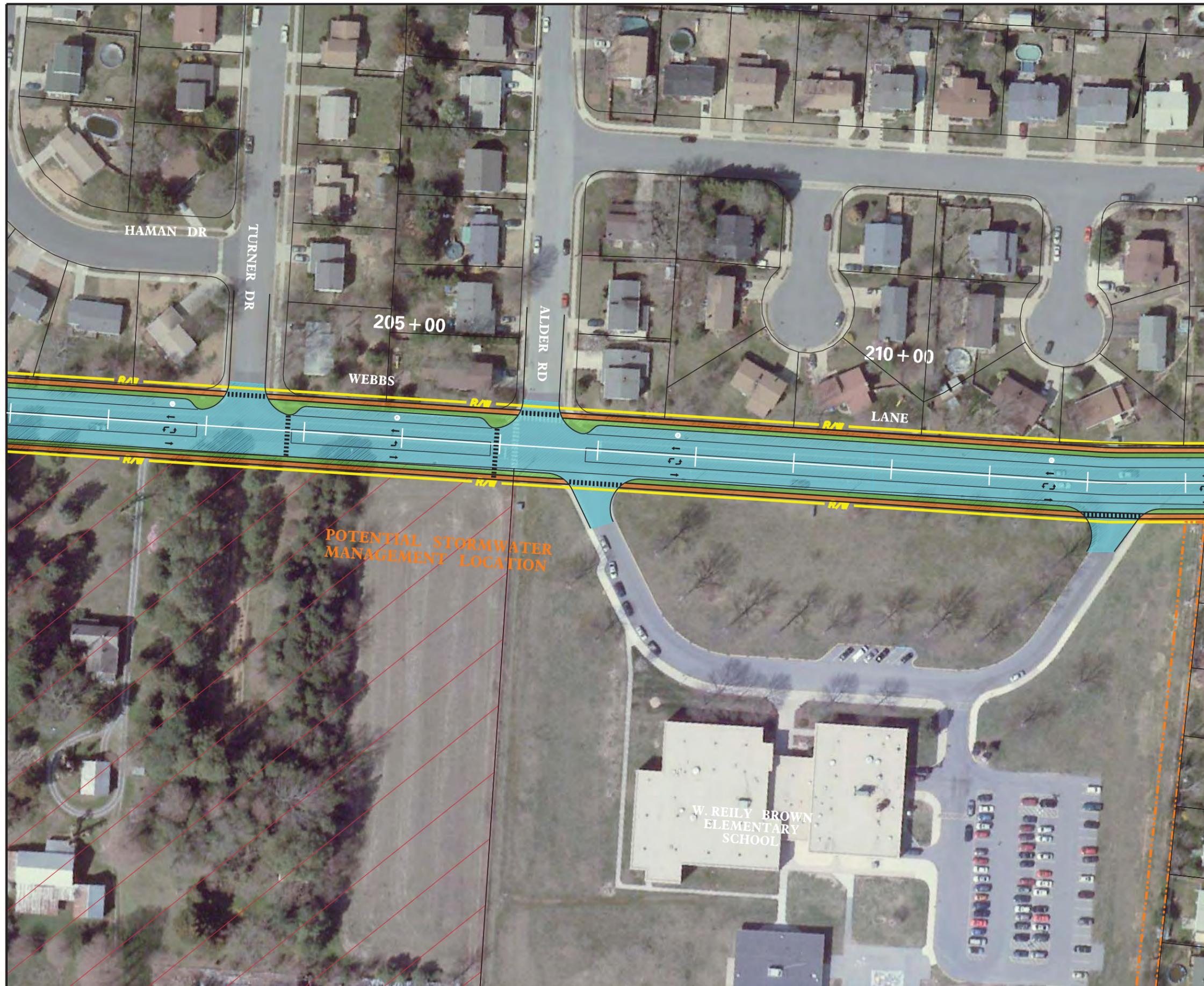
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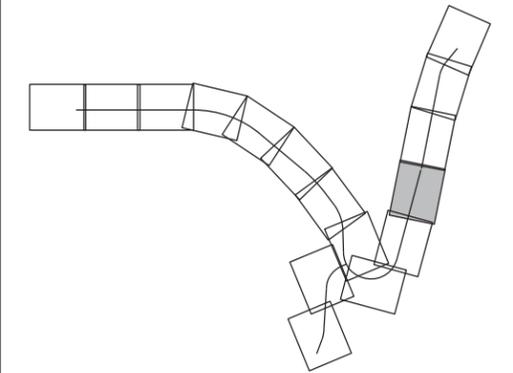
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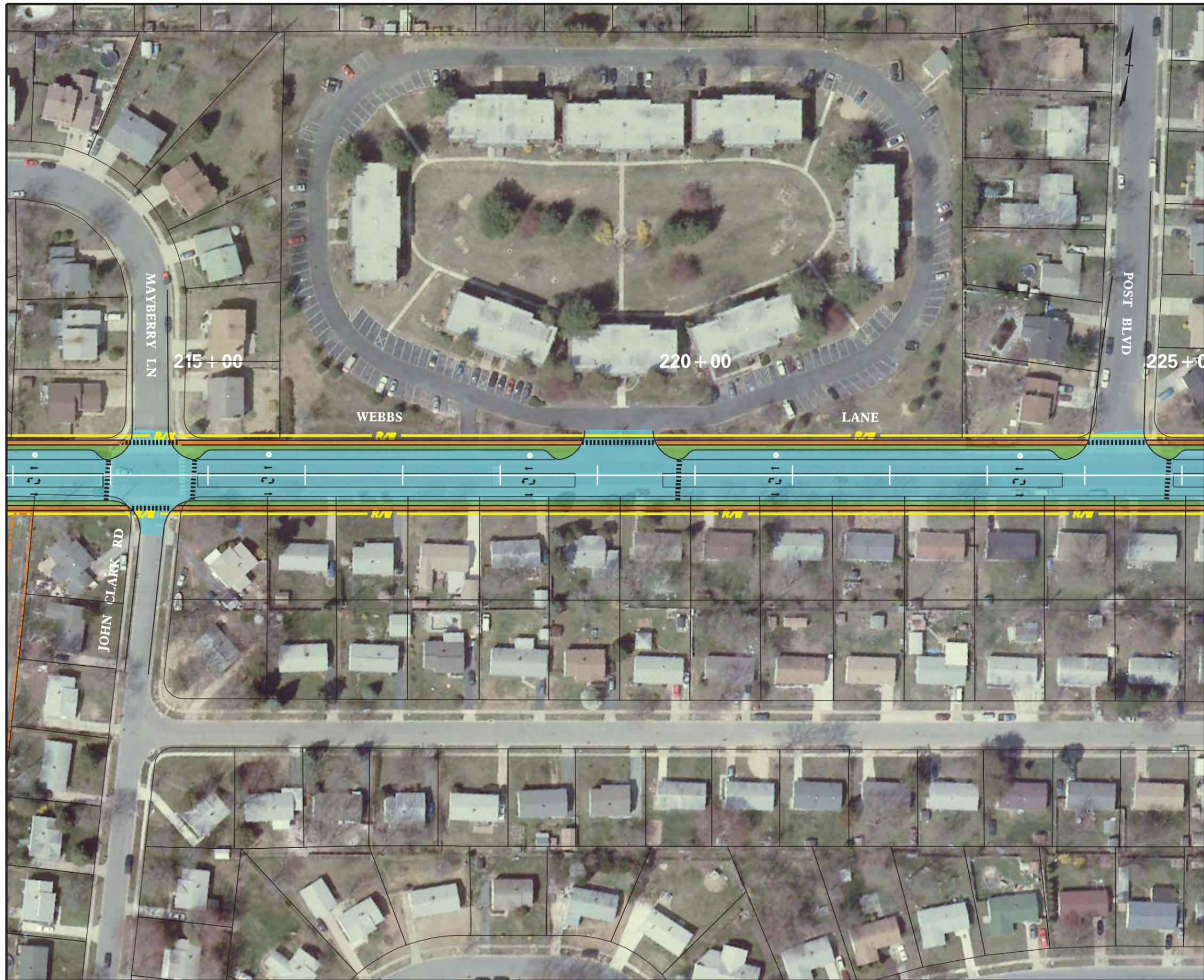
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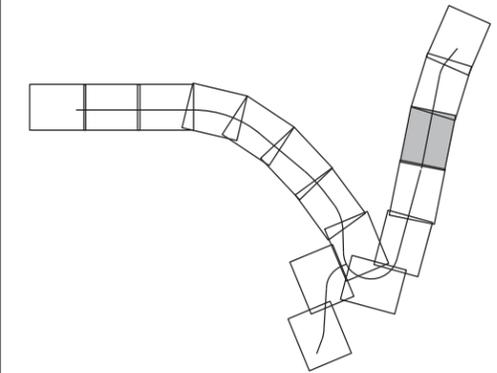
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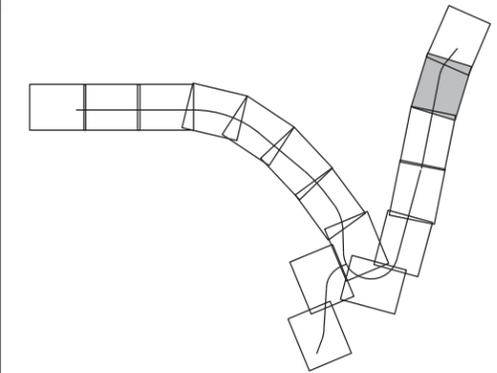
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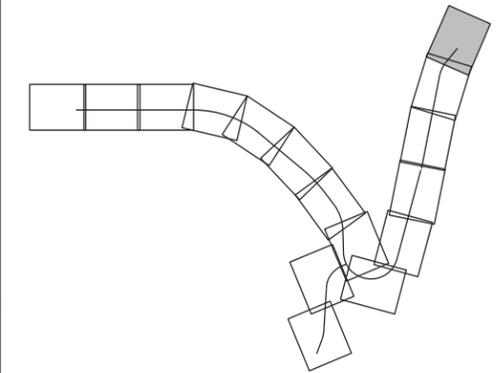
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iii. Alternative 5C (Modified)

Alternative 5C would extend Saulsbury Road south from its current terminus at North Street, cross Puncheon Run and connect to US 13 via Charles Polk Road or in its vicinity. This alternative would also provide an auxiliary connection to Wyoming Mill Road from the connector.

During the detailed study phase, a number of refinements were made to the alignment of Alternative 5C to avoid or further minimize potential impacts. To distinguish the refined alignment from that of Alternative 5C (described in Section IV), the refined alignment is known hereinafter as Alternative 5C Modified.

- Two options were evaluated that would shift the alignment of Alternative 5C Modified where it would cross Puncheon Run. Options 1 and 2 would cross Puncheon Run slightly closer to the NS Railroad than the original alignment of Alternative 5C. The shift in the alignment under either option would reduce the area of impact on the Puncheon Run wetlands and floodplain. Each would place the area of impact within the portion of the wetlands and floodplain that is previously disturbed by utility construction and other human impacts.
- Similar to the refinement made to Alternative 4, the alignment of Alternative 5C Modified passes around the building complex of the historic Kesselring Farm west of New Burton Road.
- East of New Burton Road, the Boy Scouts of America has acquired farmland, on the north side of Isaac Branch and south of Webbs Lane, for development of a future headquarters site for the Scouts. In anticipation of this development, the alignment of Alternative 5C Modified was shifted to cross New Burton Road and the farmland further to the north before turning southeast to align with Charles Polk Road. The combination of the alignment shift around the building complex of the historic Kesselring Farm described above and the shift around the Boys Scouts site yielded the need for a larger right-of-way area on the historic Kesselring Farm property to meet design standards for the approach curve and overpass configuration where the alignment crosses the railroad and New Burton Road. In addition, a small connector road is proposed to provide a two-way link to New Burton Road east of the overpass.
- As a result of coordination with residents along and in the vicinity of Charles Polk Road, Alternative 5C Modified has been refined to parallel existing Charles Polk Road to the south, enabling Charles Polk Road to continue to serve as part of the local roadway network at the southern end of Rodney Village. Alternative 5C Modified would connect with Charles Polk Road via a T-intersection connection at the western end of the development. The eastern end of Charles Polk Road would be terminated just east of the service driveway to the Rodney Village Shopping Center. A vegetated buffer would be provided between Charles Polk Road and Alternative 5C Modified.

2030 Traffic Performance, Detailed Study: With required intersection improvements, Alternative 5C Modified would improve 2030 performance of the two terminal intersections of the connector alignment (Saulsbury Road/North Street and Charles Polk Road/US 13) from an unacceptable level of service (LOS E and F) to an acceptable level (LOS C and D). All newly formed intersections along the connector alignment would also have an acceptable level of service in 2030. Alternative 5C Modified would also improve the performance of nine other study area

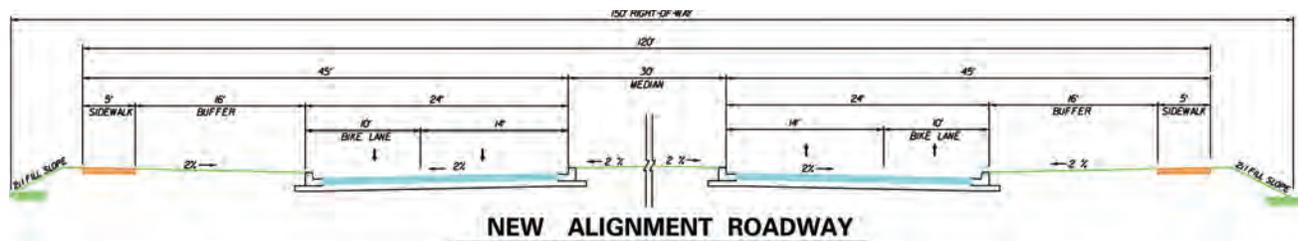
intersections with the suggested intersection improvements, four of which would show performance improvement to an acceptable level from an unacceptable level with significant delay reduction. A fifth intersection would show significant delay reduction, improving a failing condition to a near failing level (LOS E). The remaining four intersections would not require any intersection improvements. The performance of these intersections would be improved just by the provision of the Alternative 5C Modified connector.

Environmental Performance, Detailed Study: Refinements to the alignment of Alternative 5C Modified have reduced the areas of potential environmental impact compared to the impacts reported for Alternative 5C in Chapter IV. Due to the proposed new crossing of Puncheon Run, Alternative 5C Modified would have floodplain and wetlands impacts. Alternative 5C Modified would have the most floodplain impacts with respect to fill (0.57 acres) compared to other retained build alternatives. Alternative 5C Modified would have minimal fill impacts on wetlands (0.05 acres). However, shading and tree removal impacts on wetlands would be highest of all the alternatives (1.32 acres). Alternative 5C Modified would have comparatively the highest impacts on preserved agricultural land (1.31 acres) but very similar in acreage impacts as Alternative 4.

Alternative 5C Modified would have direct impacts on one historic property, the Kesselring Farm (west) property located west of New Burton Road. The alignment would traverse farmland, which is a contributing element to the historic property. These impacts will be further evaluated as part of Section 106 consultation with DE SHPO if Alternative 5C Modified is selected as the preferred alternative.

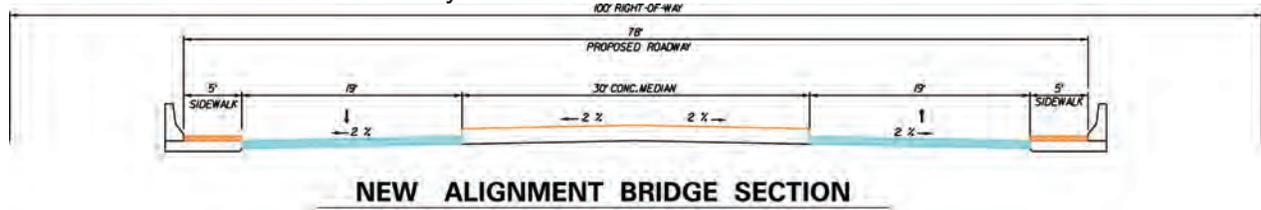
In terms of new right-of-way, Alternative 5C Modified would require a moderate number of displacements: 15 residences, two commercial properties and no industrial properties. Partial impacts (strip takes) would be lowest among the four retained build alternatives, affecting a total of 17 parcels: six residential properties, seven commercial properties, four industrial properties and no state-owned properties.

Civil Engineering Factors, Detailed Study: Alternative 5C Modified would extend Saulsbury Road from its current terminus at North Street, cross the NS Railroad and New Burton Road south of Webbs Lane and would connect to US 13 using Charles Polk Road. The new connector road alignment on the west side of the NS Railroad as well as adjacent to the Boy Scouts of America property would have a typical section as shown below. As the intersection operational needs dictate, additional lanes may be developed.



The cross-section proposed under the Alternative 5C Modified is shown above. Alternative 5C Modified would extend Saulsbury Road along the western boundary of the Eden Hill Farm parcel (as shown in Figure V-3, Sheets 1 through 3) before swinging to southwest to cross Puncheon Run and the railroad spur on a structure (as shown in Figure V-3, Sheets 4 through 6). The structure over Puncheon Run and the railroad spur would be a four-span structure (approximately 880 feet in length) with three bridge piers. The structure would maintain 23'-6" clearance over the railroad with the maximum clear height of 40' between any point on the ground and the bridge.

The typical section on the bridge structure includes a raised concrete median island, five-foot sidewalks and on-road shared bicycle lane. It is shown below.



The alignment of the connector road and bridge over Puncheon Run was refined during detailed study with the goal of minimizing impacts to the forested wetlands ecosystem along Puncheon Run. Examination of the environment along the waterway determined that the wetlands tend to be more disturbed from human activity closer to the railroad and less disturbed to the west. Human disturbance has occurred as a result of development of the railroad mainline and spur embankments, a utility right-of-way along the waterway, use of the area for tent habitation, and trash deposition. Consequently, the relative benefits of shifting the alignment of the connector road bridge further to the east toward the railroad than shown in Figure III-10 were examined.

Two options were evaluated. Option 1 would shift the bridge centerline approximately 300 feet closer to the railroad as measured along the spur, creating a curve in the alignment and necessitating a curved bridge. Option 1 is shown in Figure V-4. Option 2 would shift the bridge centerline approximately 375 feet closer to New Burton Road than the original alignment as measured along the spur, essentially placing the alignment adjacent to the railroad. In Option 2, shown in Figure V-5, the bridge would be straight. Table V-1 provides a comparison of the performance of Options 1, 2 and the original alignment. Both options would reduce impacts on wetlands, floodplains and forests compared to the original alignment. Both the options and the original alignment would impact the Eden Hill Farm stormwater management facility, requiring relocation and/or reconfiguration of the basin. The construction cost of the bridges in Options 1 and 2 would be less than the cost of the original bridge because the bridges would be shorter.

The bridges in Options 1 and, particularly, 2 would be visible to drivers on New Burton Road as well as residents and business owners on the east side of New Burton Road. In the original alignment, a band of existing tree growth approximately 320 feet deep as measured along the spur would visually buffer the bridge. In Option 1, a small stand of trees would remain adjacent to the waterway to provide some visual buffering. In Option 2, virtually none of the stand of trees would remain adjacent to the waterway. With a maximum height of 37 feet above New Burton Road, the bridge would be a dominant and new visual element alongside the New Burton Road in Options 1 and 2.

Operationally, Option 1 and the original alignment would function similarly with a horizontal design speed of at least 60 miles per hour. The horizontal curves would be long and relatively flat. Because of the change in vertical and horizontal geometry on the connector approach to the bridge in Option 2, the design speed would be no more than 40 miles per hour. Although this design speed still meets the project design criteria, the design speed reduction results in substantial and undesirable operational and safety concerns for a controlled access roadway of the type proposed. Option 1 is the preferable alignment from an operations perspective and has equivalent to minimally greater environmental impacts. For these reasons, Option 1 is recommended as a viable Puncheon Run crossing alternative alignment.

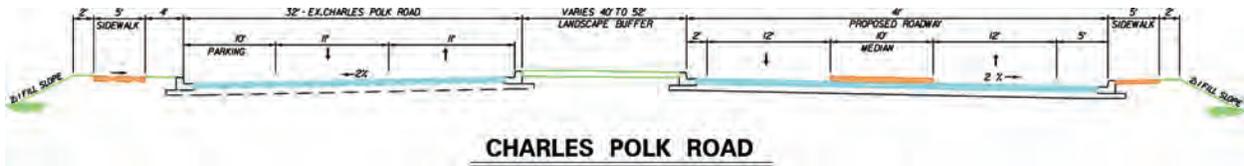
Criteria/Issue	Original Alignment	Shift Option 1	Shift Option 2
Meets Design Standards			
Bridge Geometry	Straight Bridge	Curved Bridge	Straight Bridge
Horizontal Speed	60+ mph	60+ mph	40 mph
Vertical Speed	40 mph	40 mph	40 mph
Avoids Impacts			
Puncheon Run Waterway	Yes	Yes	Yes
Railroad Siding	Yes	Yes	Yes
Utility ROW	No	No	No
Unavoidable Impacts			
Wetlands	1.27 Ac.	1.07 Ac.	0.90 Ac.
Floodplain	2.09 Ac.	1.98 Ac.	1.77 Ac.
Forest	1.94 Ac.	1.89 Ac.	1.88 Ac.
Stormwater Basin	Yes	Yes	Yes
Visual Impact	No	Yes	Yes
Mitigation			
Wetlands	Yes	Yes	Yes
Stormwater Basin	Yes	Yes	Yes
Construction Cost*	\$12.4 M	\$11.6 M	\$11.8 M

*Construction Cost Assumptions: \$180/SF for a straight girder bridge on tangent and \$195/SF for a curved girder bridge. The bridge width is 78' for all alignments. The length for original alignment is 880 feet. The length of Option 1 is 760' and Option 2 is 840' long. These values do not include any contingency factors, maintenance of stream/railroad, or mitigation costs.

South of Puncheon Run, the connector alignment would pass around the west side of the building complex of the historic Kesselring Farm located west of New Burton Road, curving back east (as shown in Figure V-3, Sheet 7 through 9) before crossing the NS Railroad and New Burton Road on another structure (as shown in Figure V-3, Sheets 12 and 13). This structure would be a single-span structure approximately 200 feet long across the railroad and New Burton Road. The new connector road would then traverse the northern portion of existing farmland east of New Burton Road (as shown in Figure V-3, Sheets 13 through 17). A two-way at-grade connector road would be provided to New Burton Road (as shown in Figure V-3, Sheets 13 and 14).

DeIDOT met with the Rodney Village community during detailed study to discuss Alternative 5C Modified and obtain input in regard to an appropriate configuration of Charles Polk Road and access to the connector. This meeting resulted in agreement that Charles Polk Road would be retained for local circulation to and from the Rodney Village community; however, it would not connect directly to US 13 but rather intersect the new connector road. In response to community input, two access options were developed. The first option, using a T-intersection with the new connector road, is shown with this alternative in Figure V-3, Sheet 16. The second option, to provide a roundabout, is displayed with the Alternative 7C alignment in Figure V-6, Sheet 15. Either of the options (T-intersection or Roundabout) could be selected with Alternative 5C Modified and vice versa. Existing Charles Polk Road would be separated from the new connector road using a raised landscape buffer, planted heavily with native trees and plant species to serve as a visual barrier and reduce noise impacts on the adjacent neighborhood (as shown in Figure V-3, Sheets 16 and 17).

The new connector road would connect with US 13 at the current intersection of Charles Polk Road (as shown in Figure V-3, Sheet 18). The intersection of Charles Polk Road with US 13 would be improved as per the operational needs identified under the detailed traffic analysis. A typical section of the new connector road and local frontage road is shown below.



In addition, Alternative 5C Modified would provide an auxiliary connection to Wyoming Mill Road from the new connector road (as shown in Figure V-3, Sheets 9 through 11).

Alternative 5C Modified would require 16.70 acres of new pavement while 0.34 acres of existing pavement would be a part of this alignment. Stormwater management locations have been conceptually identified to adequately handle stormwater runoff that would be caused by the new impervious pavement surface associated with this alternative. The specific requirements for stormwater management, their exact locations, and the selection of Best Management Practices will be made in preliminary design.

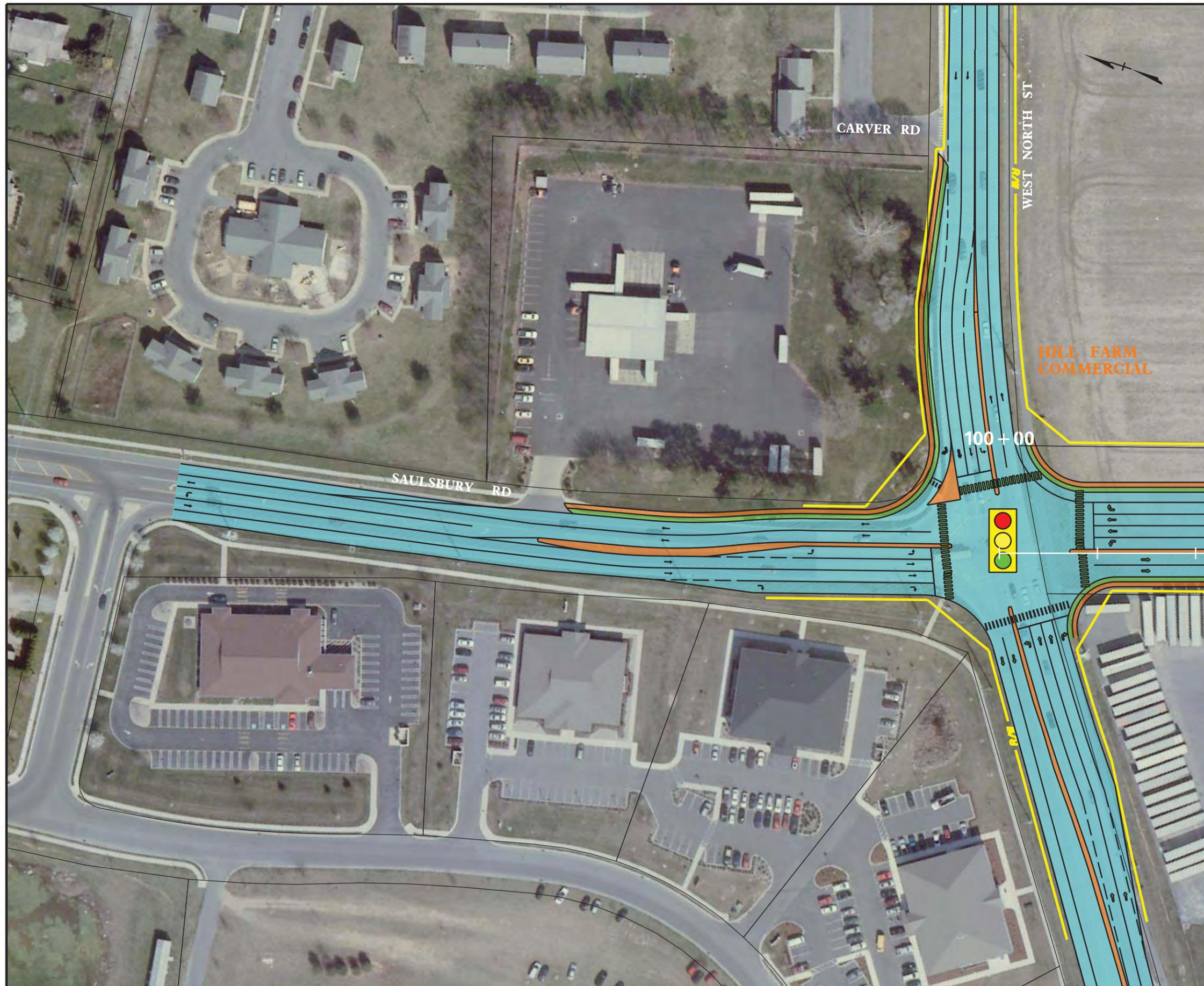
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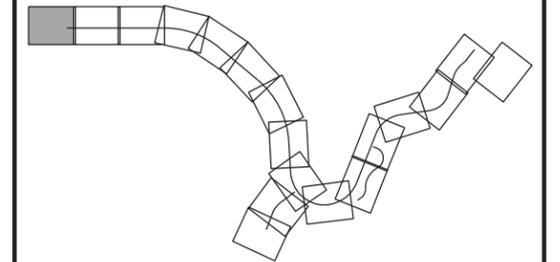
WEST DOVER CONNECTOR

**KEY MAP
ALTERNATIVE 5C MOD**





WEST DOVER CONNECTOR



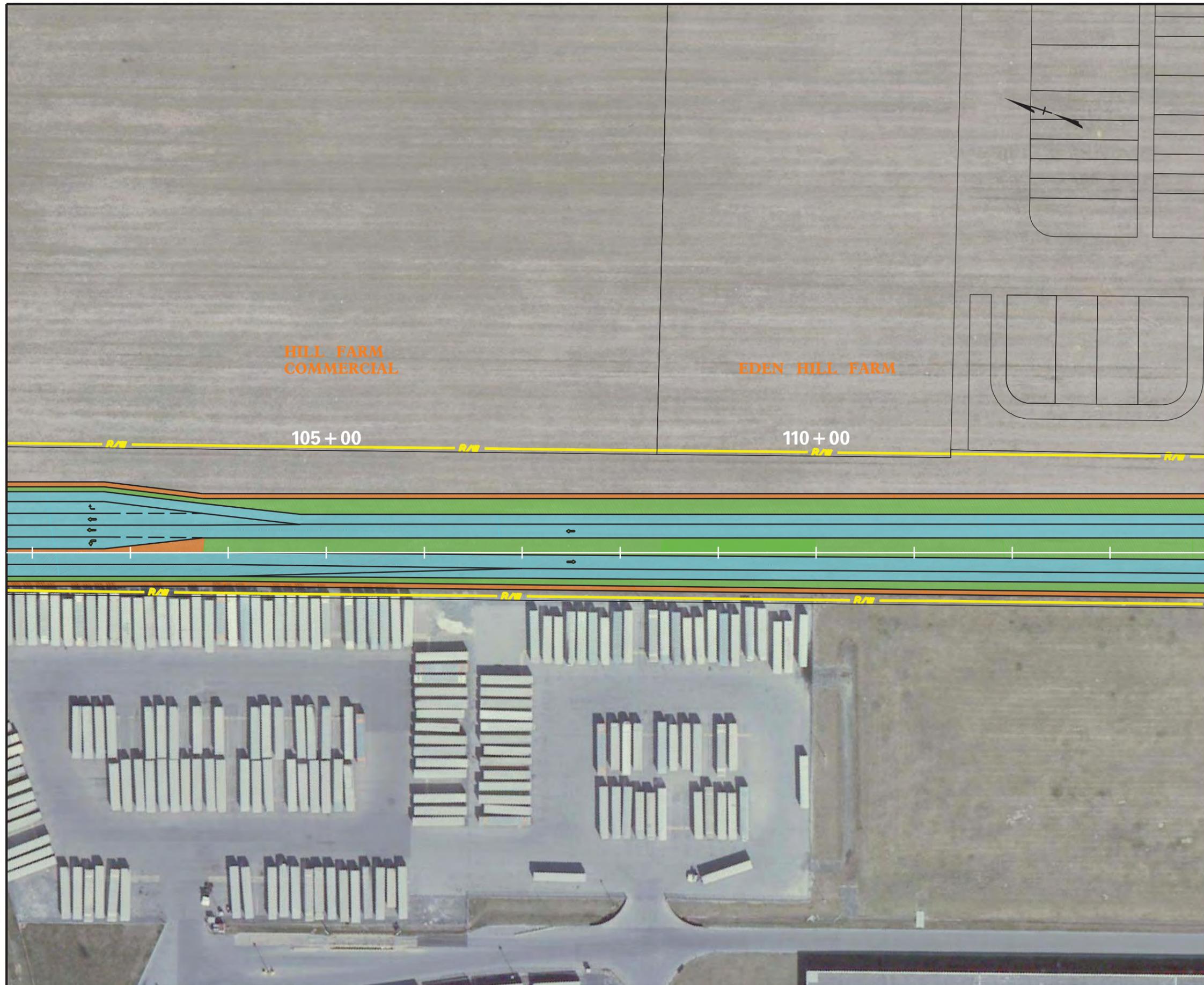
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-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

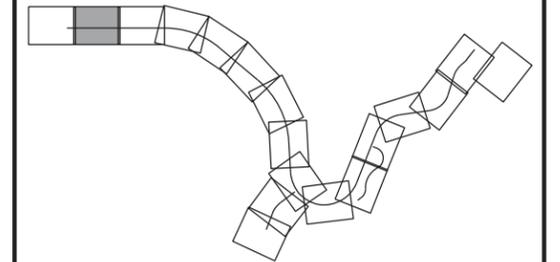
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WEST DOVER CONNECTOR



LEGEND:

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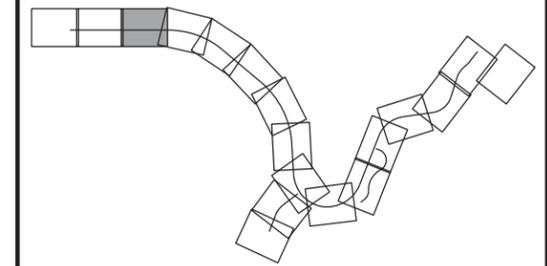
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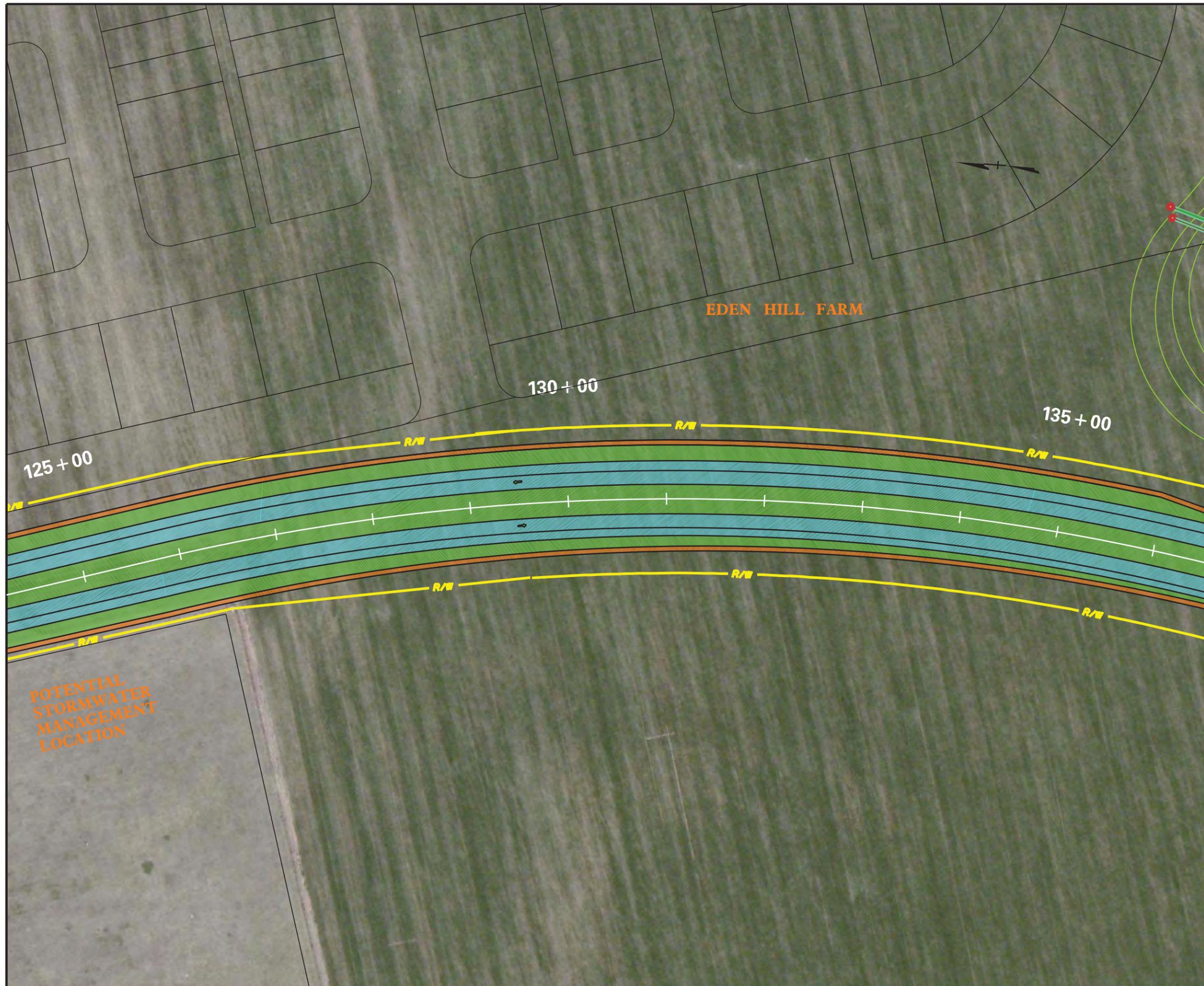
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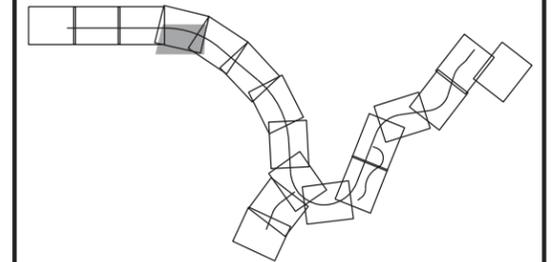
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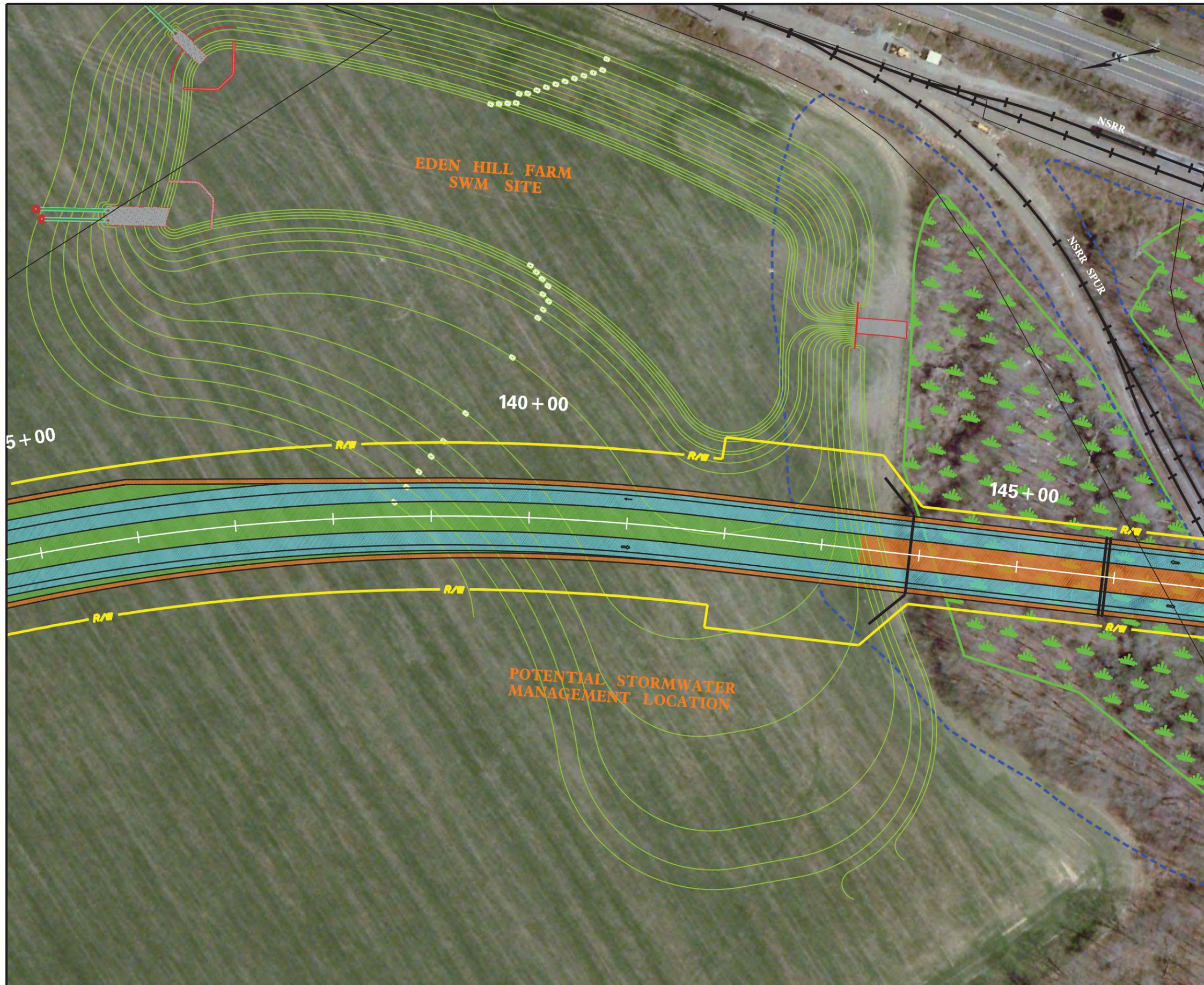
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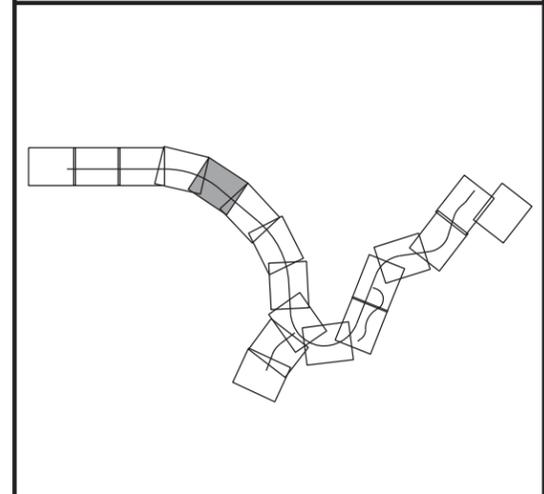
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WEST DOVER CONNECTOR



LEGEND:

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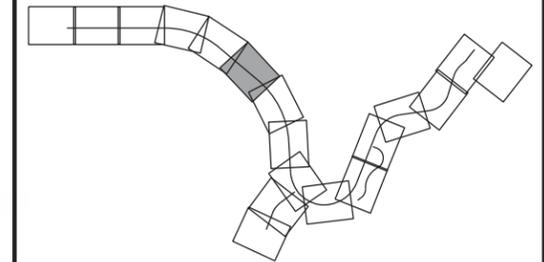
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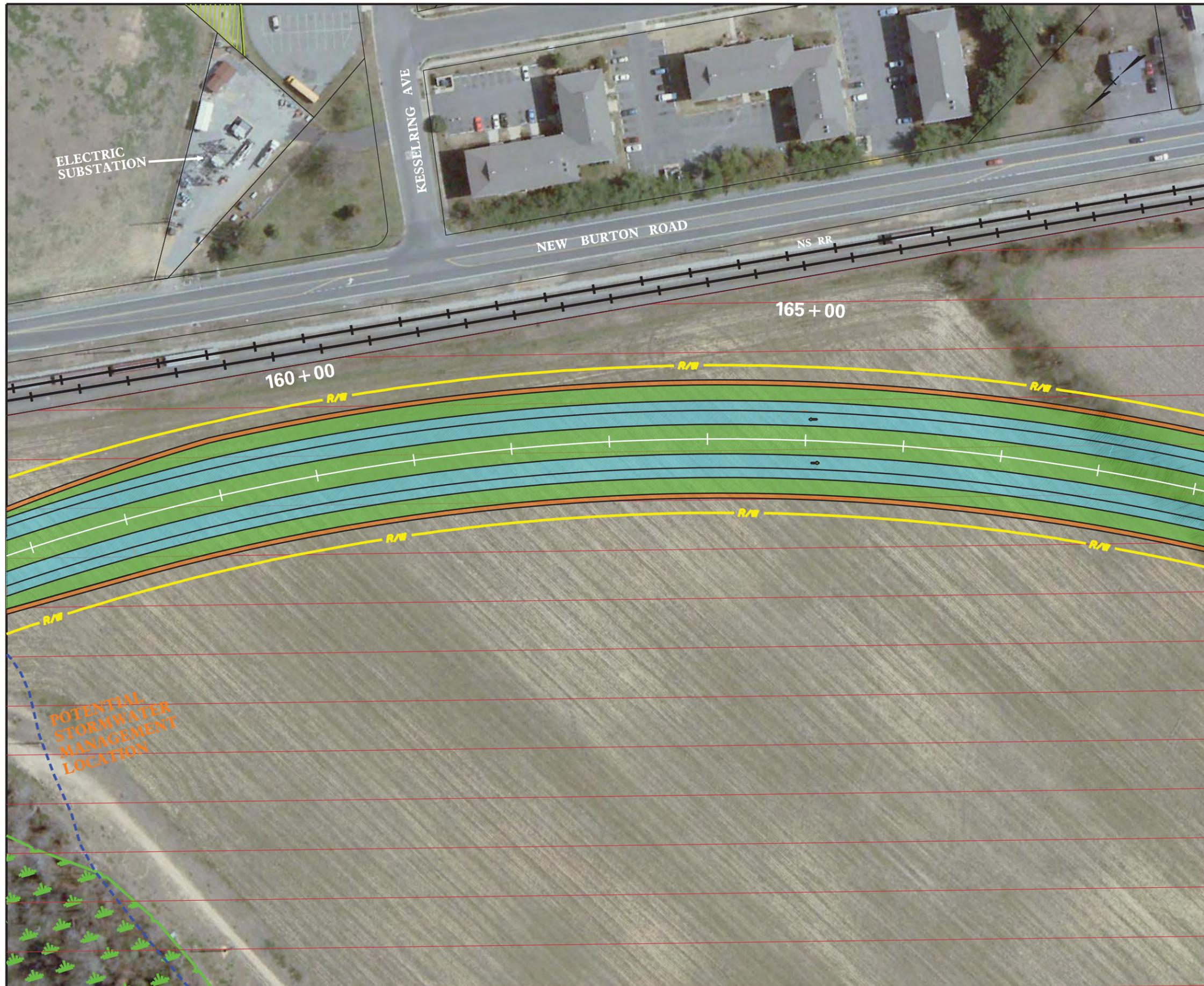
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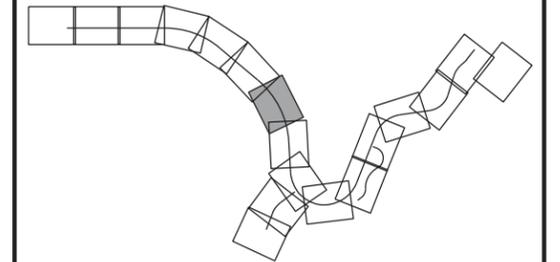
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WEST DOVER CONNECTOR



LEGEND:

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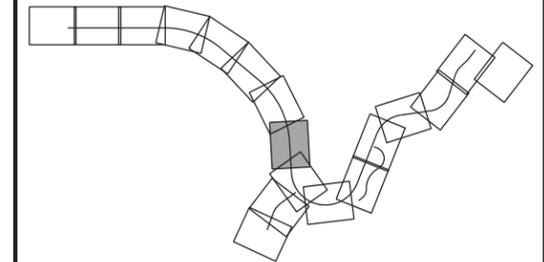
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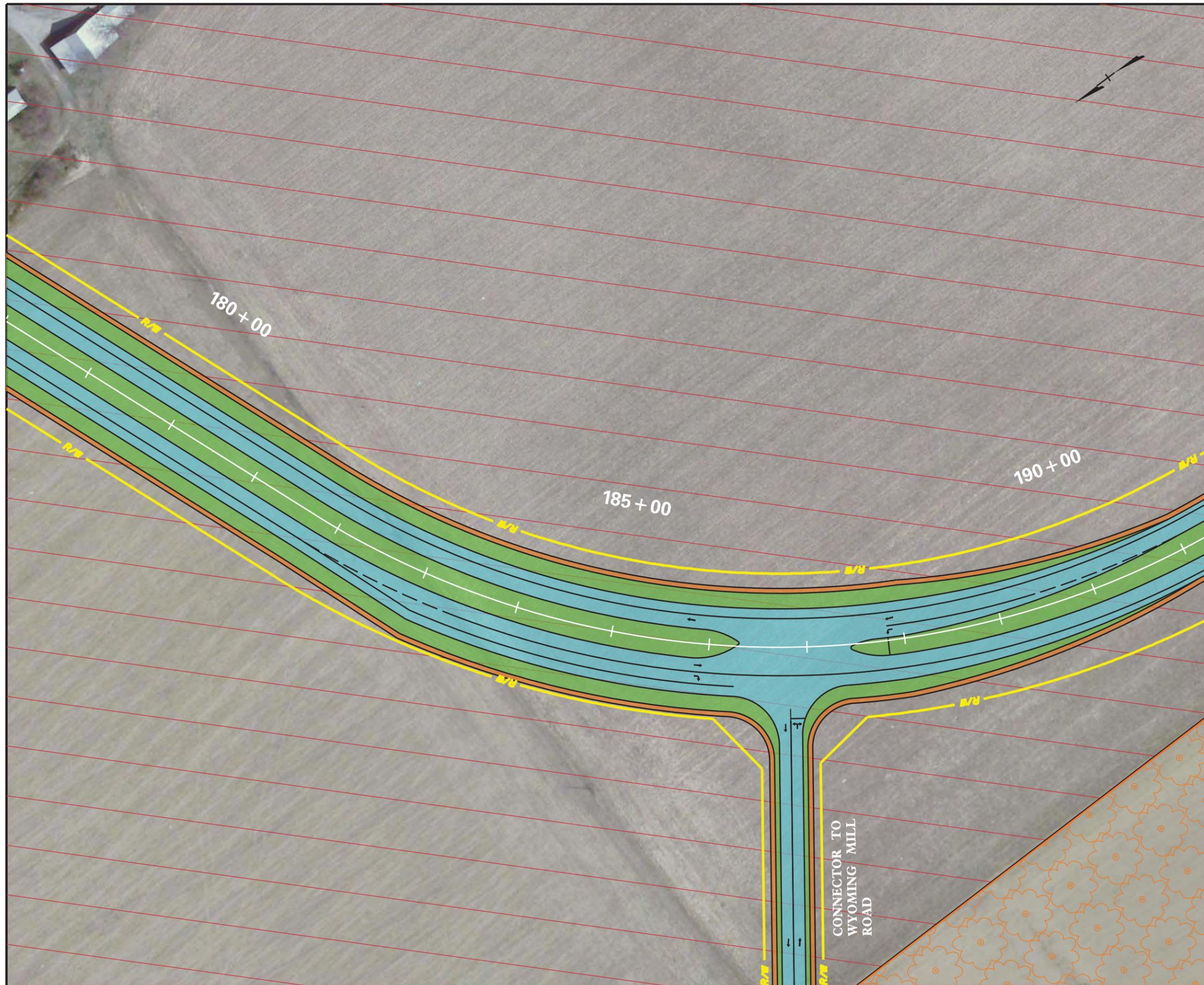
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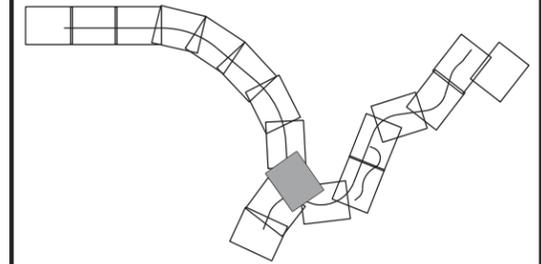
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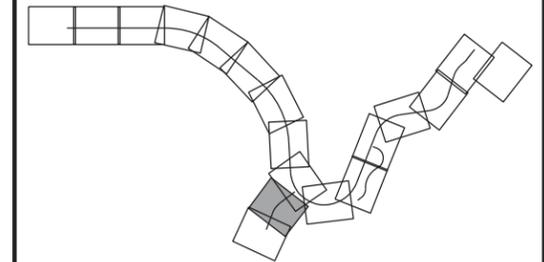
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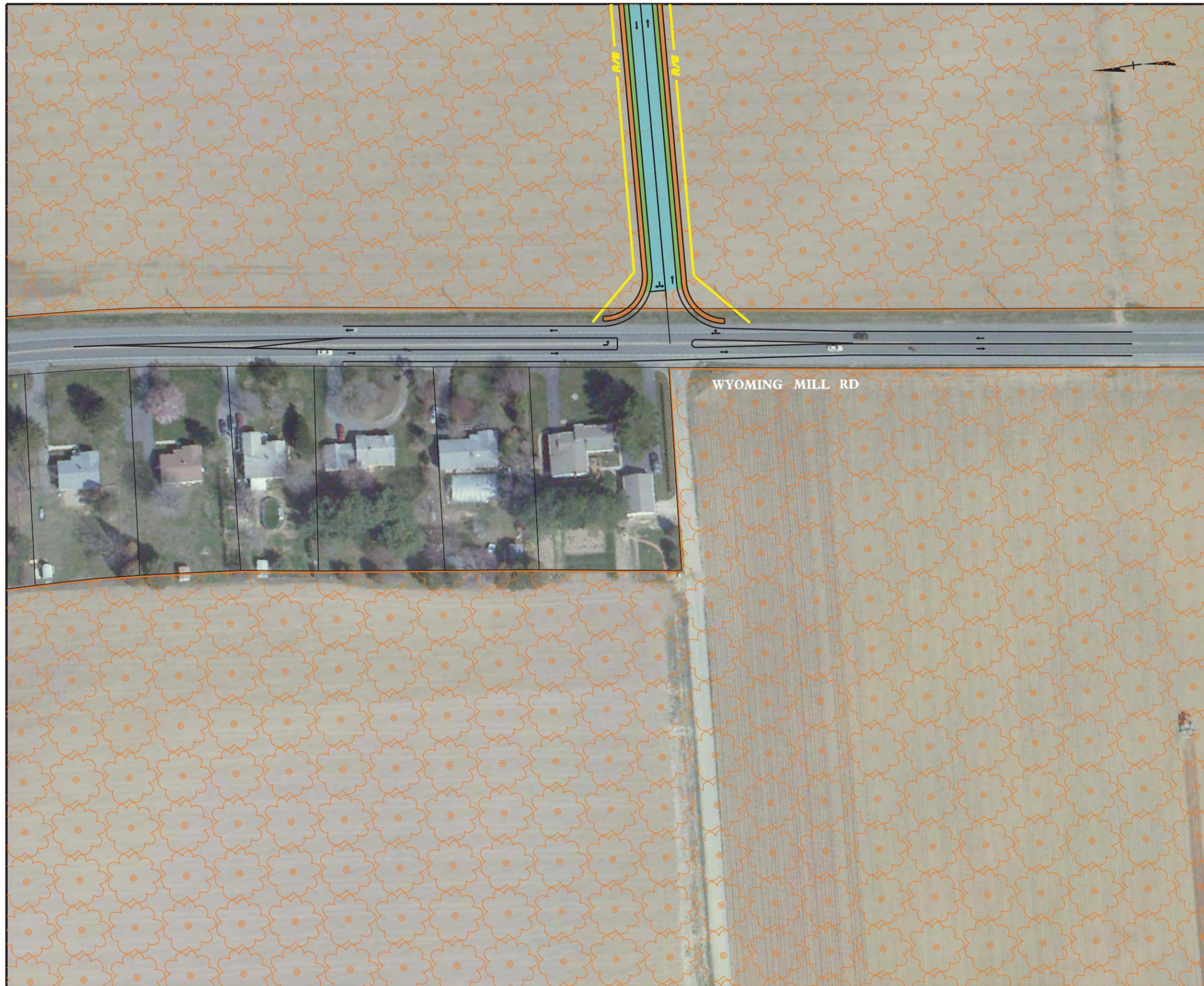
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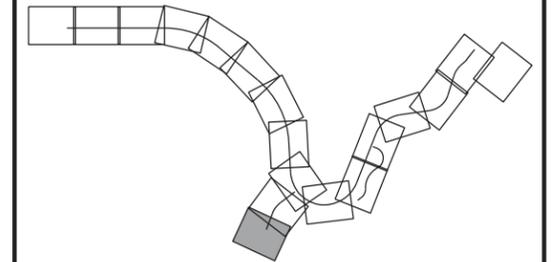
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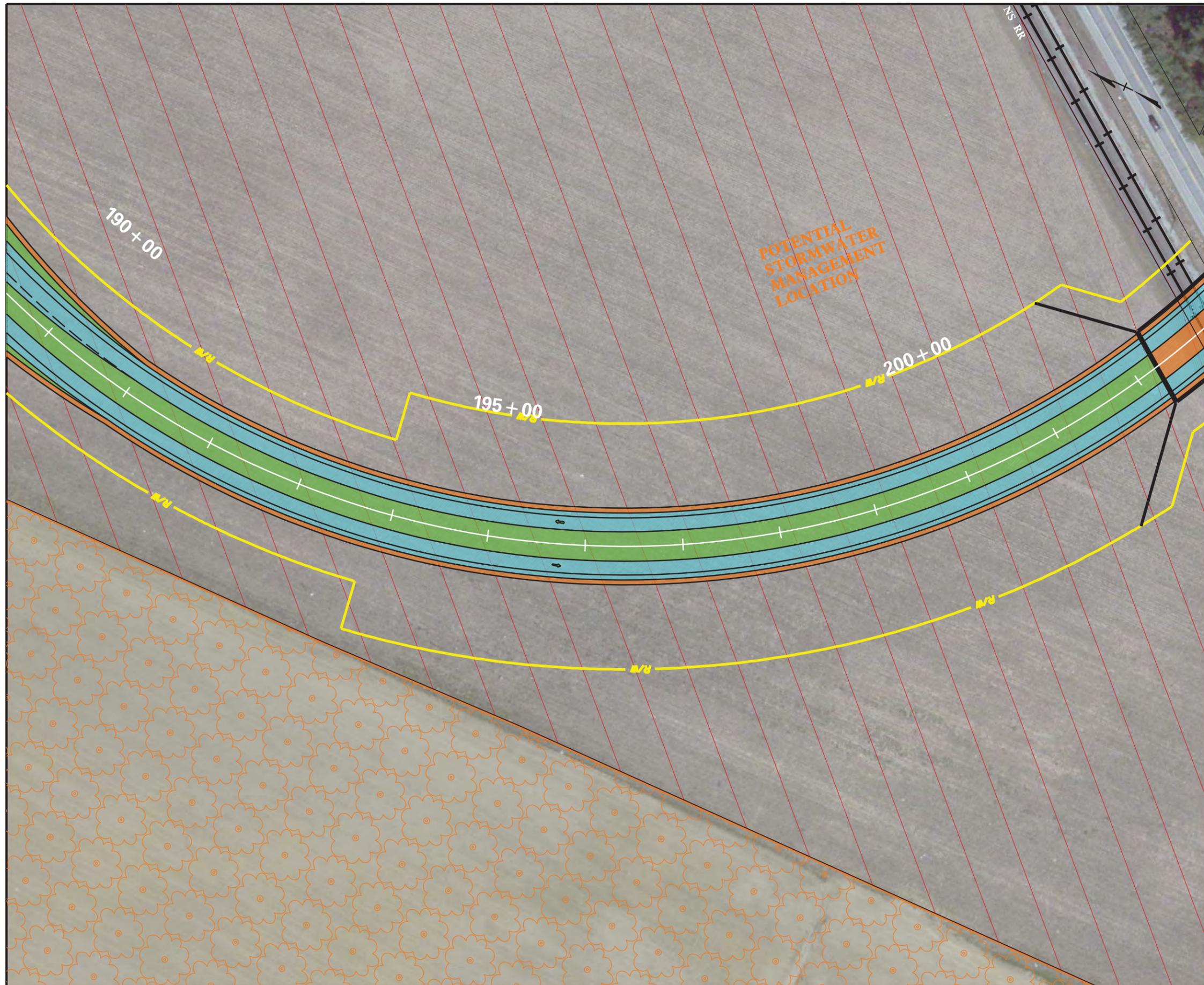
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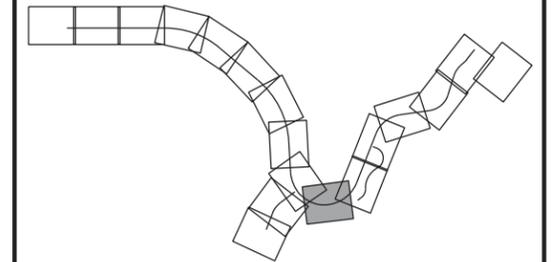
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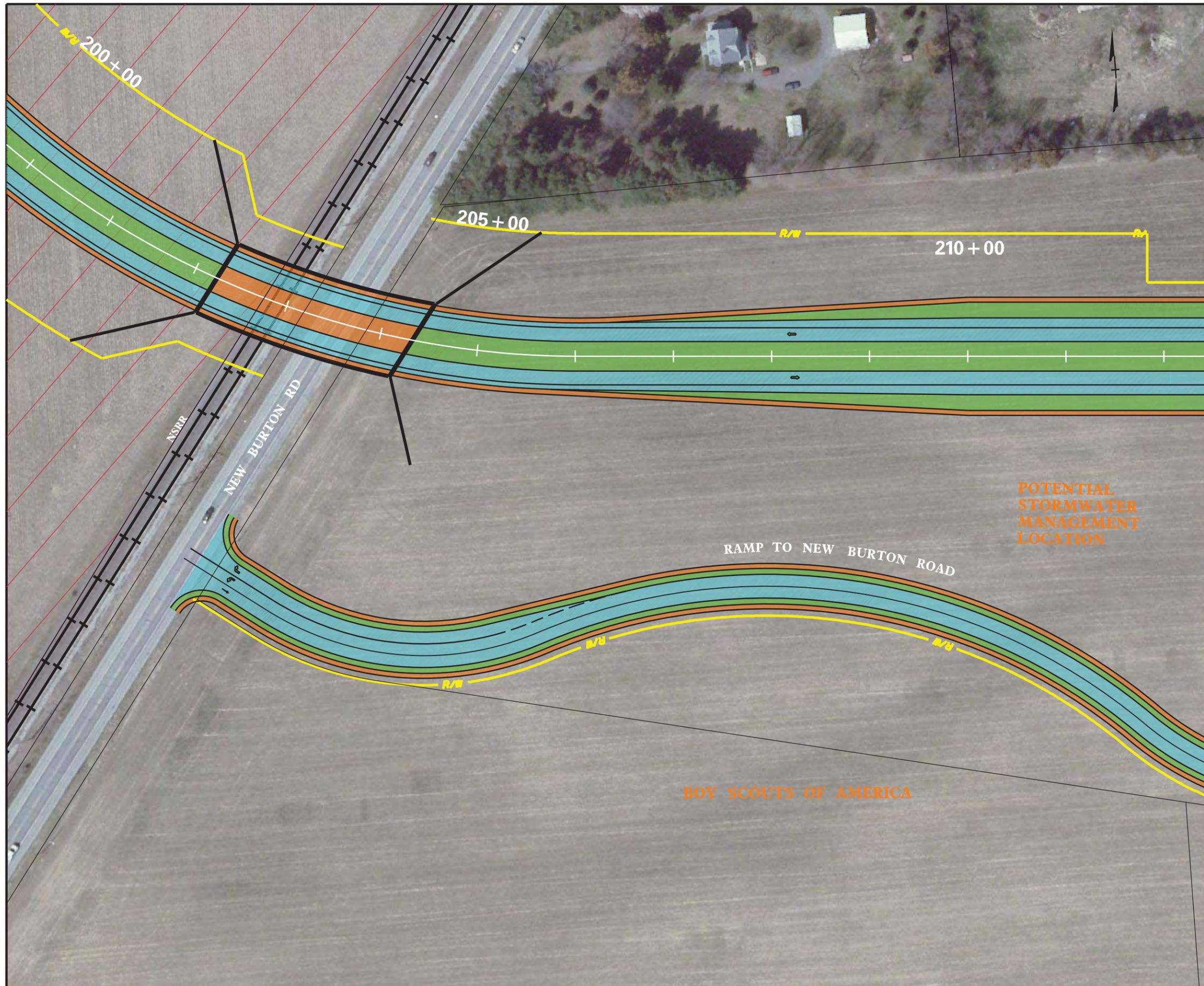
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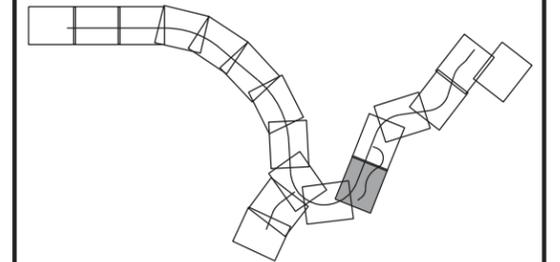
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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
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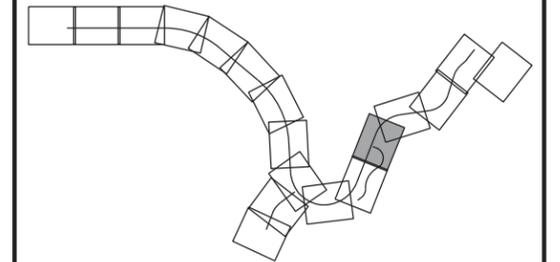
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WEST DOVER CONNECTOR



LEGEND:

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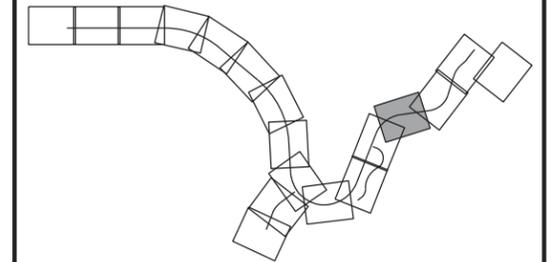
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WEST DOVER CONNECTOR



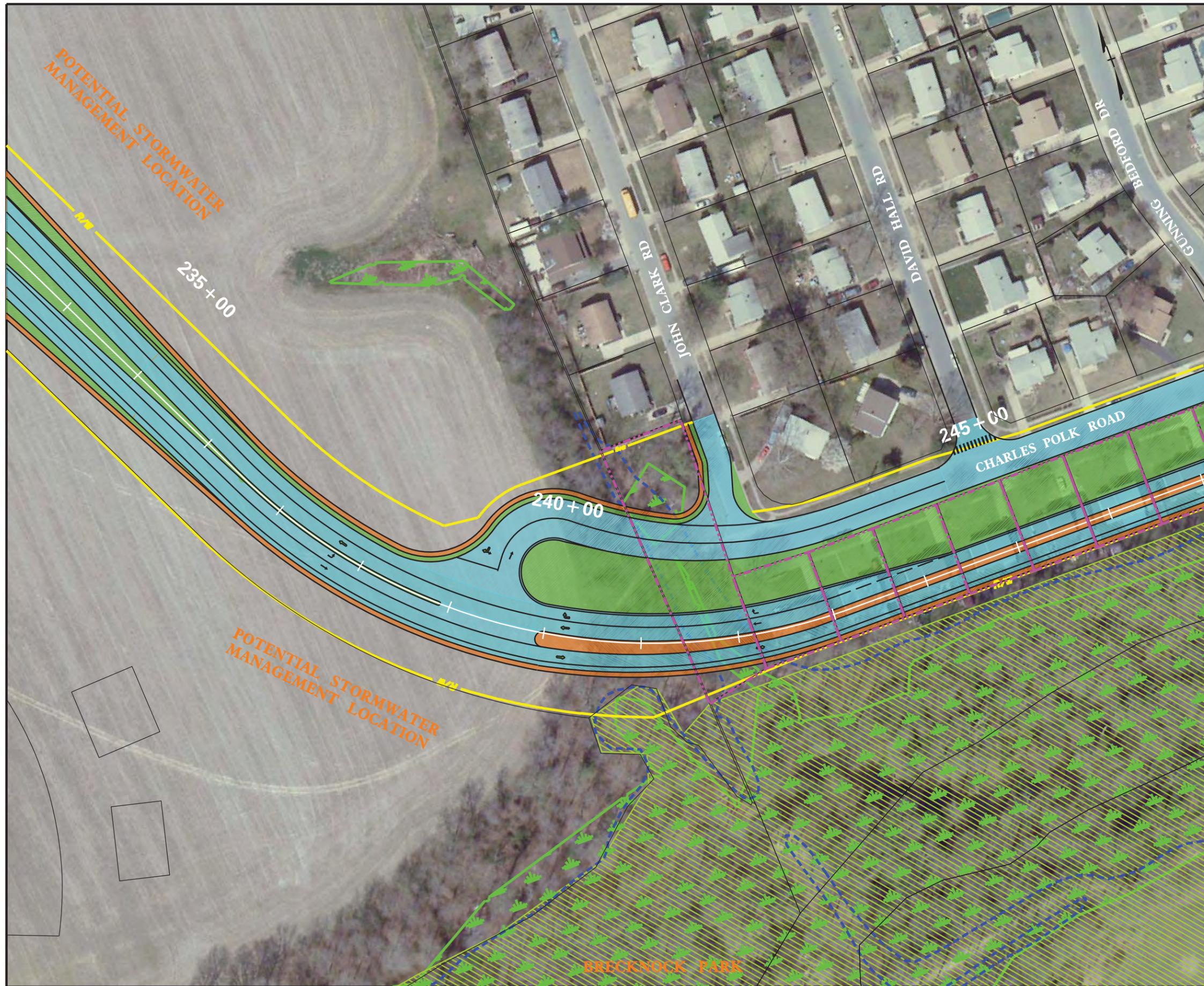
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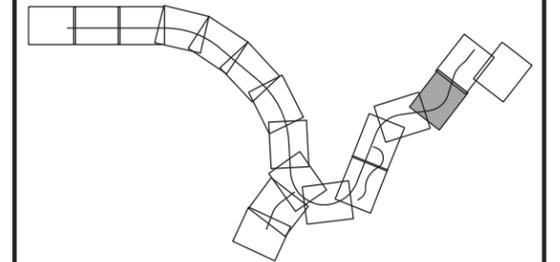
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WEST DOVER CONNECTOR



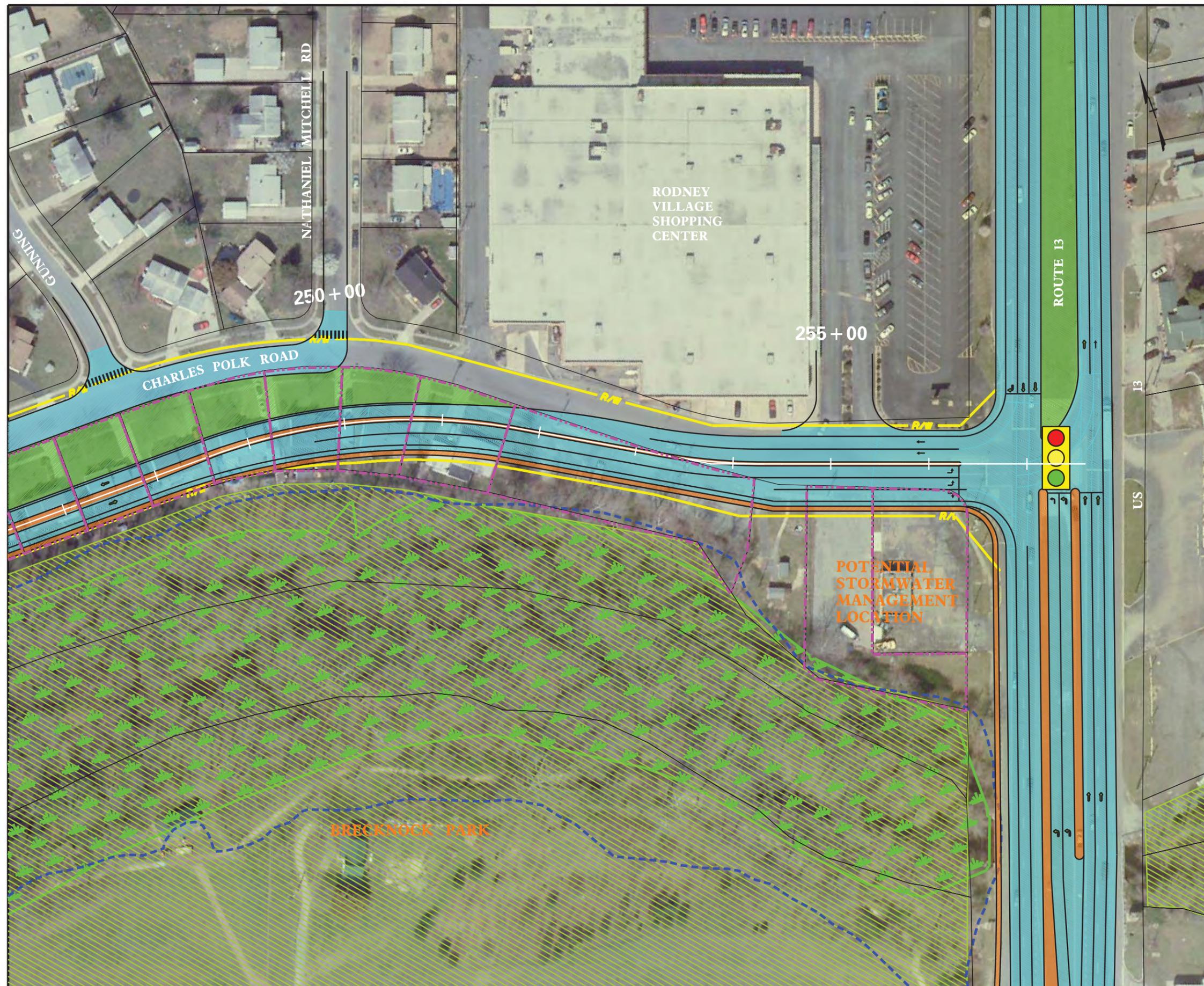
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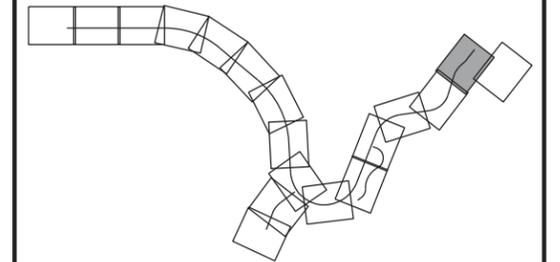
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WEST DOVER CONNECTOR



LEGEND:

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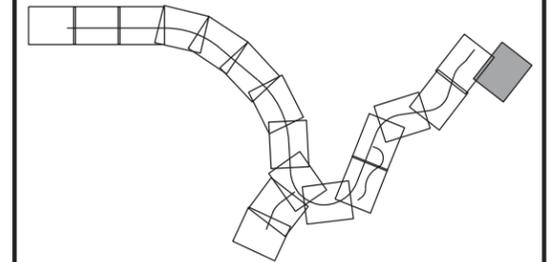
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WEST DOVER CONNECTOR



LEGEND:

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-  RAILROAD
-  HISTORIC PROPERTY

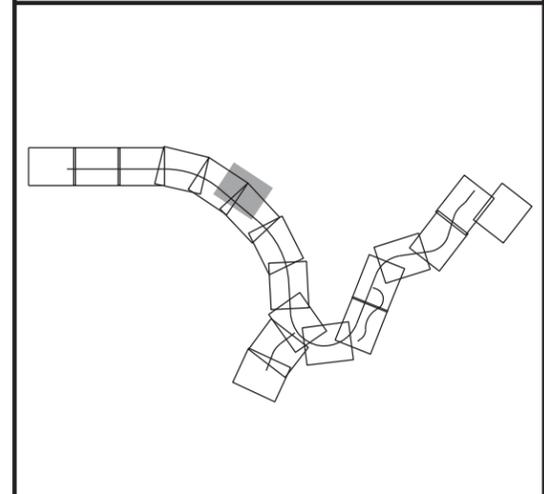
SHEET 18 of 18
ALTERNATIVE 5C MOD.

AUGUST 2010





WEST DOVER CONNECTOR



LEGEND:

-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

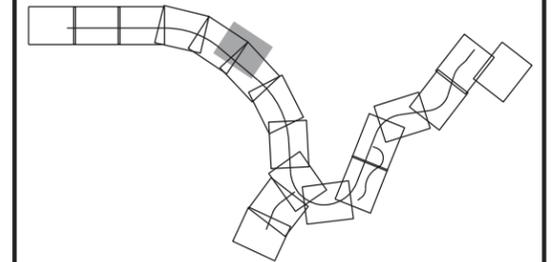
FIGURE V-4: PUNCHEON RUN CROSSING - OPTION 1
ALTERNATIVE 5C MOD.

AUGUST 2010





WEST DOVER CONNECTOR



LEGEND:

-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

FIGURE V-5: PUNCHEON RUN CROSSING - OPTION 2

ALTERNATIVE 5C MOD.

AUGUST 2010



iv. Alternative 7C

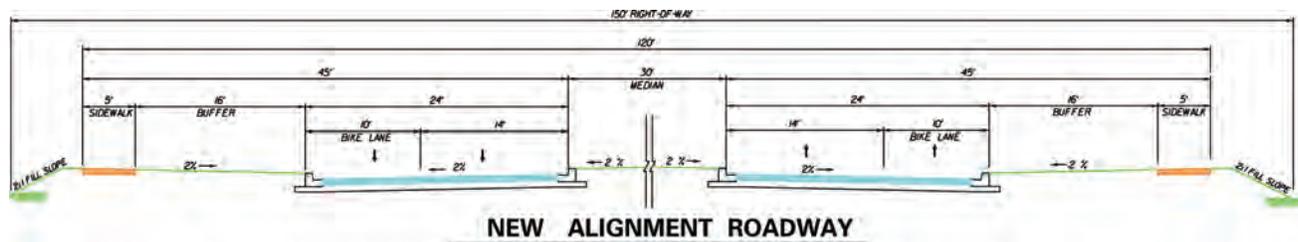
In Alternative 7C, the new connector would cross Eden Hill Farm, the NS Railroad and New Burton Road, use New Burton Road and connect to US 13 via Charles Polk Road or in its vicinity.

2030 Traffic Performance, Detailed Study: With required intersection improvements, Alternative 7C would improve 2030 performance of five major existing intersections along the connector alignment from an unacceptable level (LOS E or F) to an acceptable level (LOS D or above). All newly formed intersections along the connector alignment would also have an acceptable level of service in 2030. Alternative 7C would also help improve performance of seven other study area intersections, two of which would show performance improvement to an acceptable level from an unacceptable level with significant delay reduction. Three of these seven intersections would not require any intersection improvements; the performance of these intersections would be improved just by the provision of the Alternative 7C connector.

Environmental Performance, Detailed Study: Refinements to the alignment of Alternative 7C have reduced the areas of potential environmental impact compared to the impacts reported in Chapter IV. Alternative 7C would not have a new crossing of Puncheon Run. Instead, the existing crossing on New Burton Road would be widened. Alternative 7C would have the lowest floodplain impacts with respect to fill (0.14 acres). Alternative 7C would have moderate fill (0.08 acres) as well as shading and tree removal impacts (0.14 acres) on wetlands. Alternative 7C would have no impacts on preserved agricultural land. Alternative 7C would have no direct or indirect impacts on historic properties in the project study area.

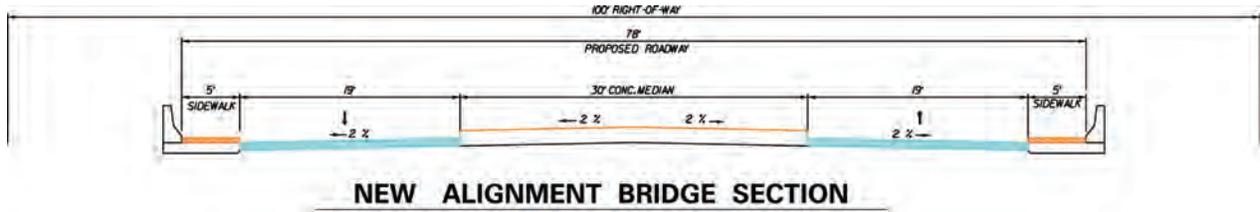
In terms of new right-of-way, Alternative 7C would require a high number of displacements: 34 residences (12 on Eden Hill Farm), three commercial properties and no industrial properties. Partial impacts (strip takes) would be moderate to high, affecting a total of 51 parcels: 31 residential properties, 14 commercial properties, six industrial properties and no state-owned properties.

Civil Engineering Factors, Detailed Study: Alternative 7C would extend Saulsbury Road from its current terminus at North Street, cross the NS Railroad (including its sidings) and New Burton Road north of Wyoming Avenue, use New Burton Road and would connect to US 13 using Charles Polk Road. The new connector road alignment on the west side of the railroad as well as adjacent to the Boy Scouts of America would have a typical section as shown below except at intersections where lane configuration would be as per the intersection operational needs.

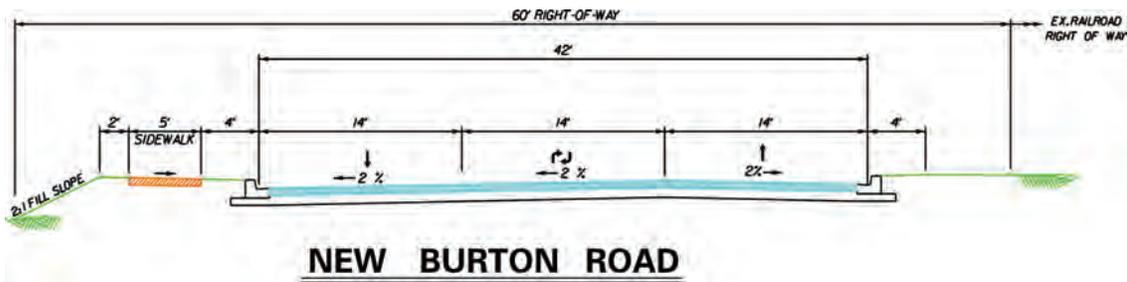


The cross-section proposed under the Alternative 7C is shown above. Alternative 7C would extend Saulsbury Road along the western boundary of the Eden Hill Farm parcel (as shown in Figure V-6, Sheets 2 through 4) before swinging to southeast (as shown in Figure V-6, Sheet 4) to cross the NS Railroad and New Burton Road on a structure (as shown in Figure V-6, Sheet 5). The structure over the railroad and New Burton Road would be a two-span structure

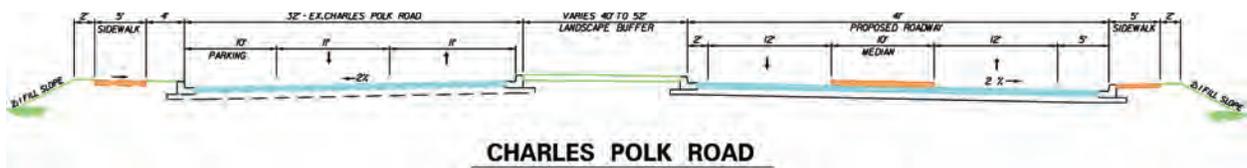
(approximately 300 feet in length). The structure would maintain 23'-6" clearance over the railroad. The typical section of the alignment on new bridge structure is shown below.



After crossing the NS Railroad and New Burton Road, the alignment would connect to New Burton Road using a series of ramps and intersections (as shown in Figure V-6, Sheet 6). The new connector road would then continue along New Burton Road (as shown in Figure V-6, Sheets 7 through 12) before it would run adjacent to the Boys Scouts of America and connect to US 13 at Charles Polk Road (as shown in Figure V-6, Sheets 12 through 15). New Burton Road would be improved and the existing structure across Puncheon Run would be widened. A typical section along New Burton Road is shown below.

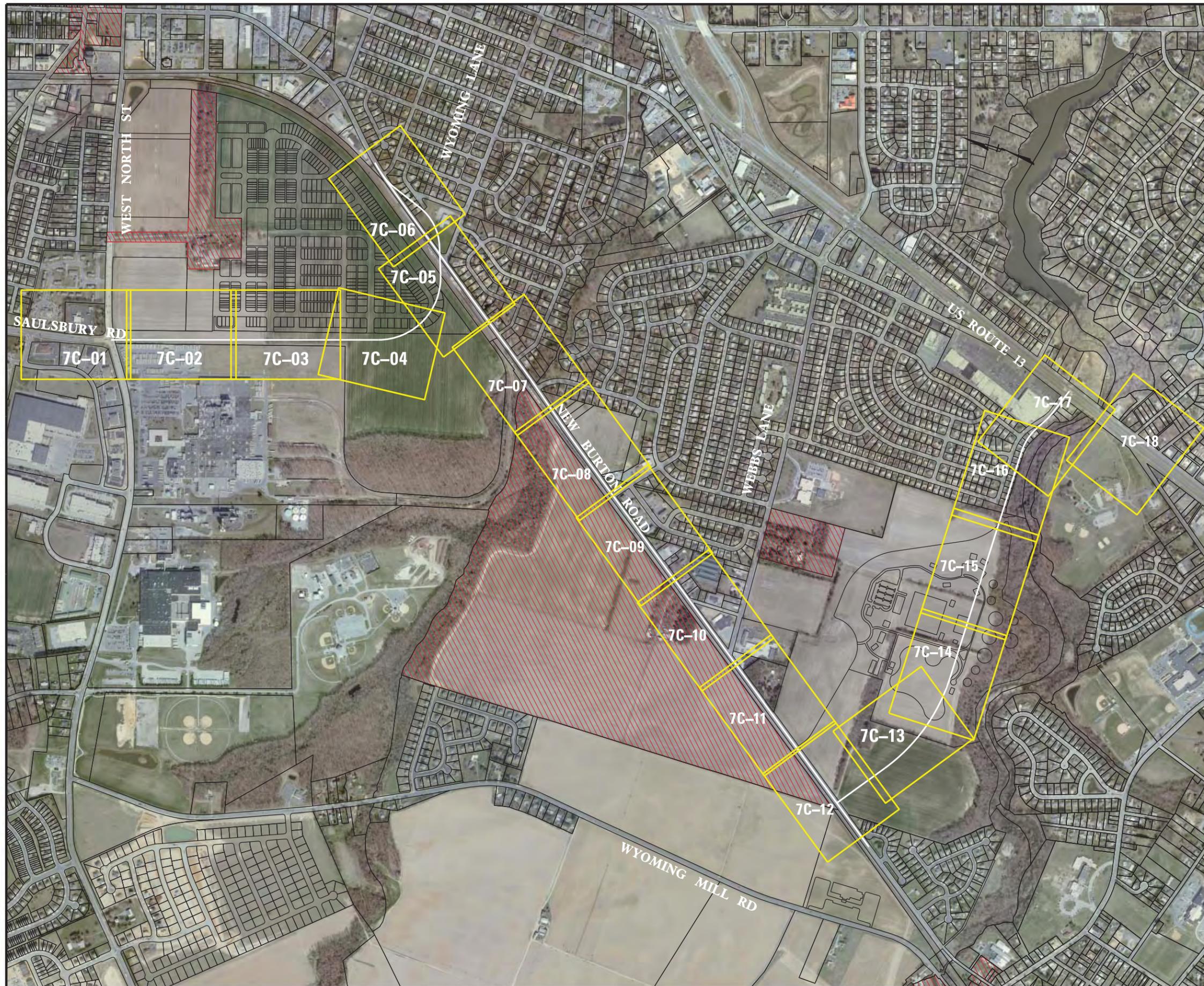


As with Alternative 5C Modified, Charles Polk Road would be retained for local circulation to and from the Rodney Village community. However, Charles Polk Road would not connect directly to US 13; but instead would intersect the new connector road. Two options have been developed for this revised access for Rodney Village. The first option, using a T-intersection with the new connector road, is shown in Alternative 5C Modified in Figure V-3, Sheet 16. The second option, providing a roundabout, is displayed under this alignment in Figure V-6 Sheet 15. Either of the options (T-intersection or Roundabout) could be selected with Alternative 7C and vice versa. Existing Charles Polk Road would be separated from the new connector road using a raised landscape buffer, planted heavily with native trees and plant species to serve as a visual barrier and reduce noise impacts on the adjacent neighborhood (as shown in Figure V-6, Sheet 16 and 17). The new connector road would connect with US 13 at the current intersection of Charles Polk Road (as shown in Figure V-6, Sheet 17). The intersection of Charles Polk Road with US 13 would be improved as per the operational needs identified under the detailed traffic analysis. A typical section of the new connector road and local frontage road is shown below.



The Alternative 7C alignment would require 12.17 acres of new pavement while 10.56 acres of existing pavement would be a part of this alignment. Stormwater management areas have been conceptually identified to adequately handle stormwater runoff caused by the new impervious pavement surface.

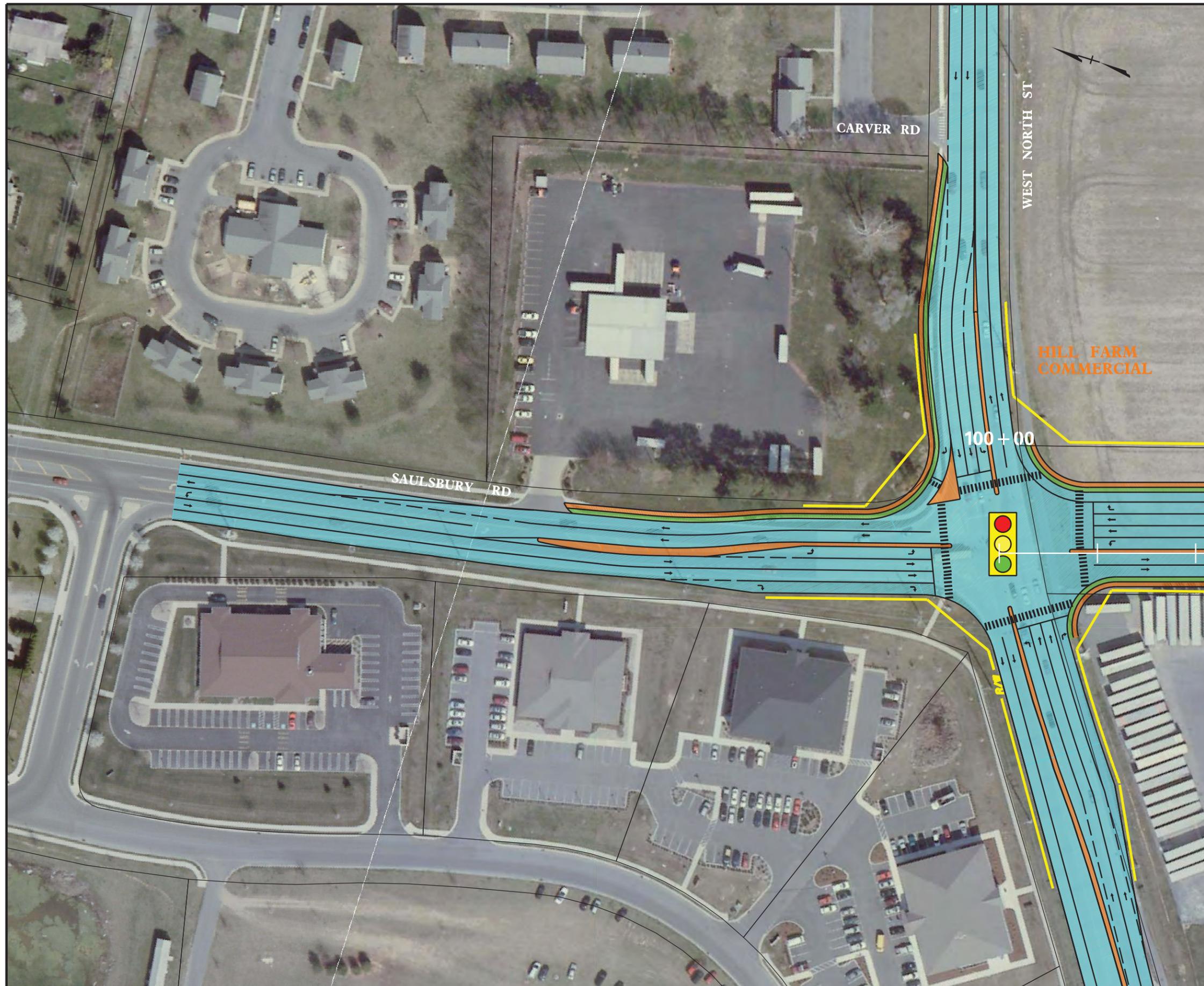
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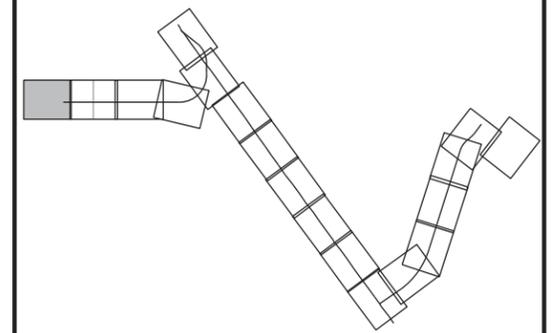
WEST DOVER CONNECTOR

**KEY MAP
ALTERNATIVE 7C**





WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

SHEET 1 of 18
ALTERNATIVE 7C

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WEST DOVER CONNECTOR

LEGEND:

- ROADWAY
- SIDEWALK /MEDIAN
- LANDSCAPE/MEDIAN BUFFER
- WETLANDS
- PARCEL DISPLACEMENTS
- FLOODPLAIN
- RIGHT OF WAY
- AGRICULTURAL PRESERVATION
- PARKS
- RAILROAD
- HISTORIC PROPERTY

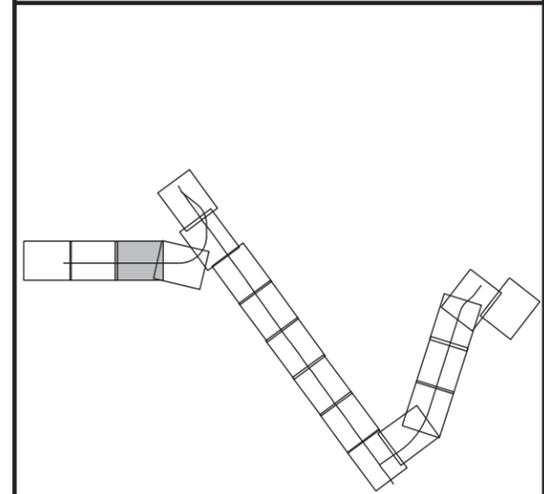
SHEET 2 of 18
ALTERNATIVE 7C

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WEST DOVER CONNECTOR

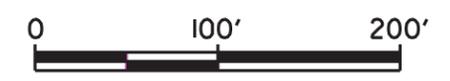


LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

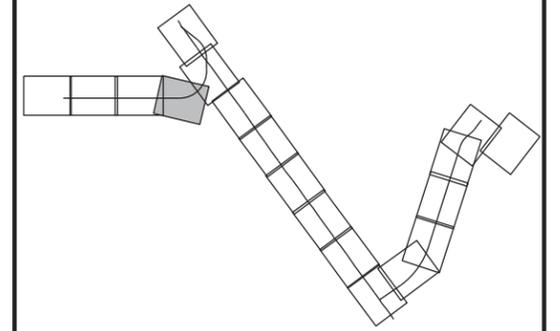
SHEET 3 of 18
ALTERNATIVE 7C

AUGUST 2010





WEST DOVER CONNECTOR



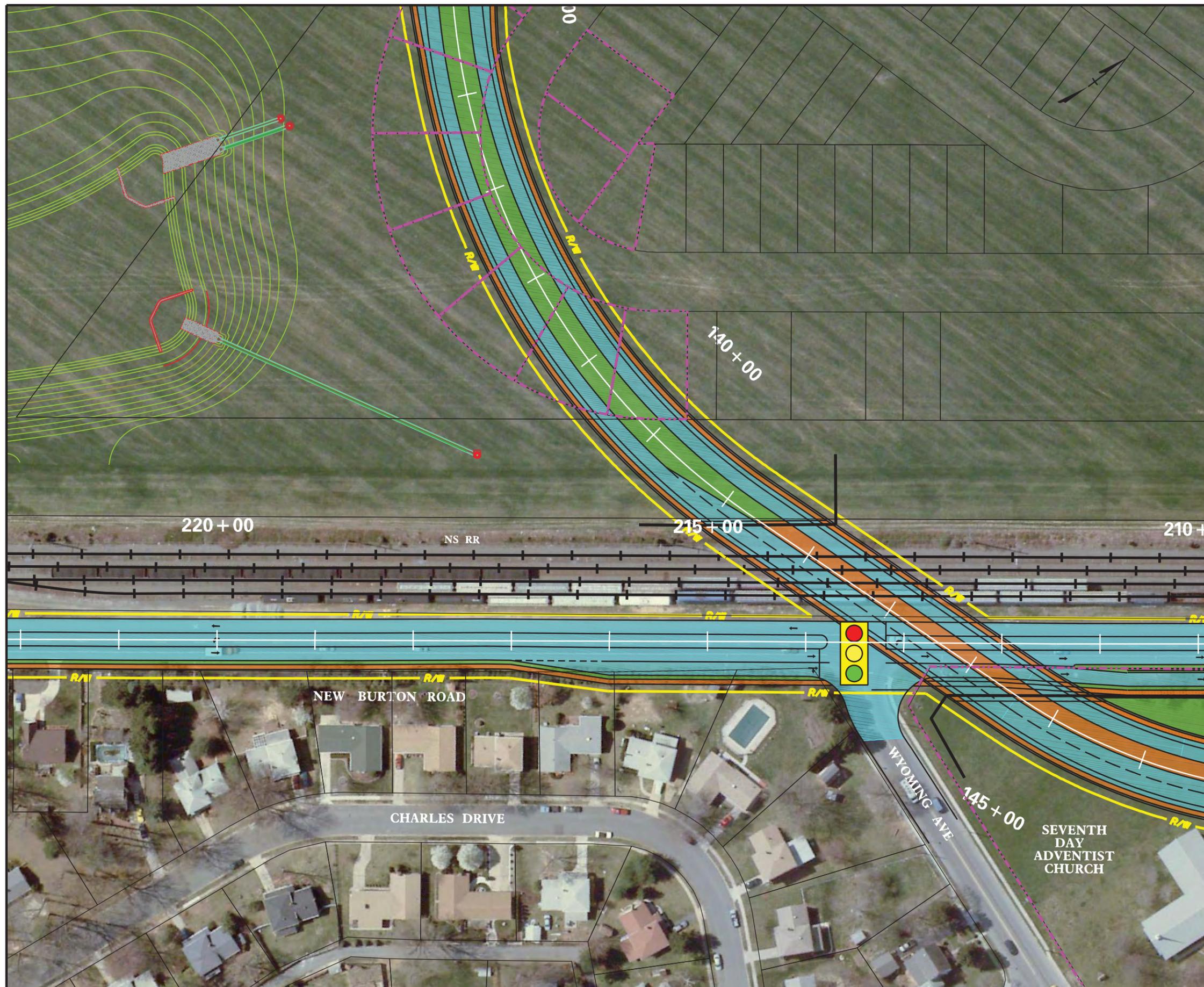
LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

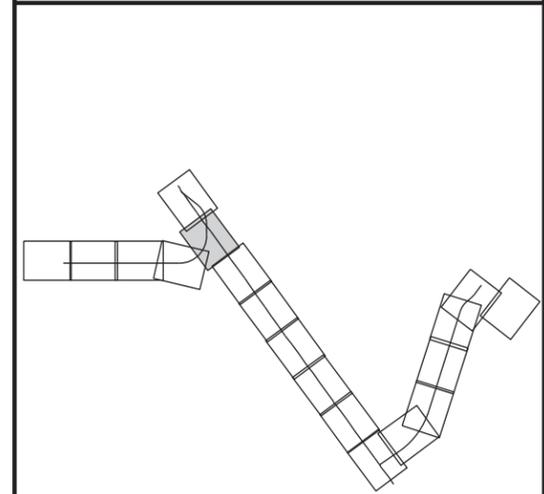
SHEET 4 of 18
ALTERNATIVE 7C

AUGUST 2010





WEST DOVER CONNECTOR



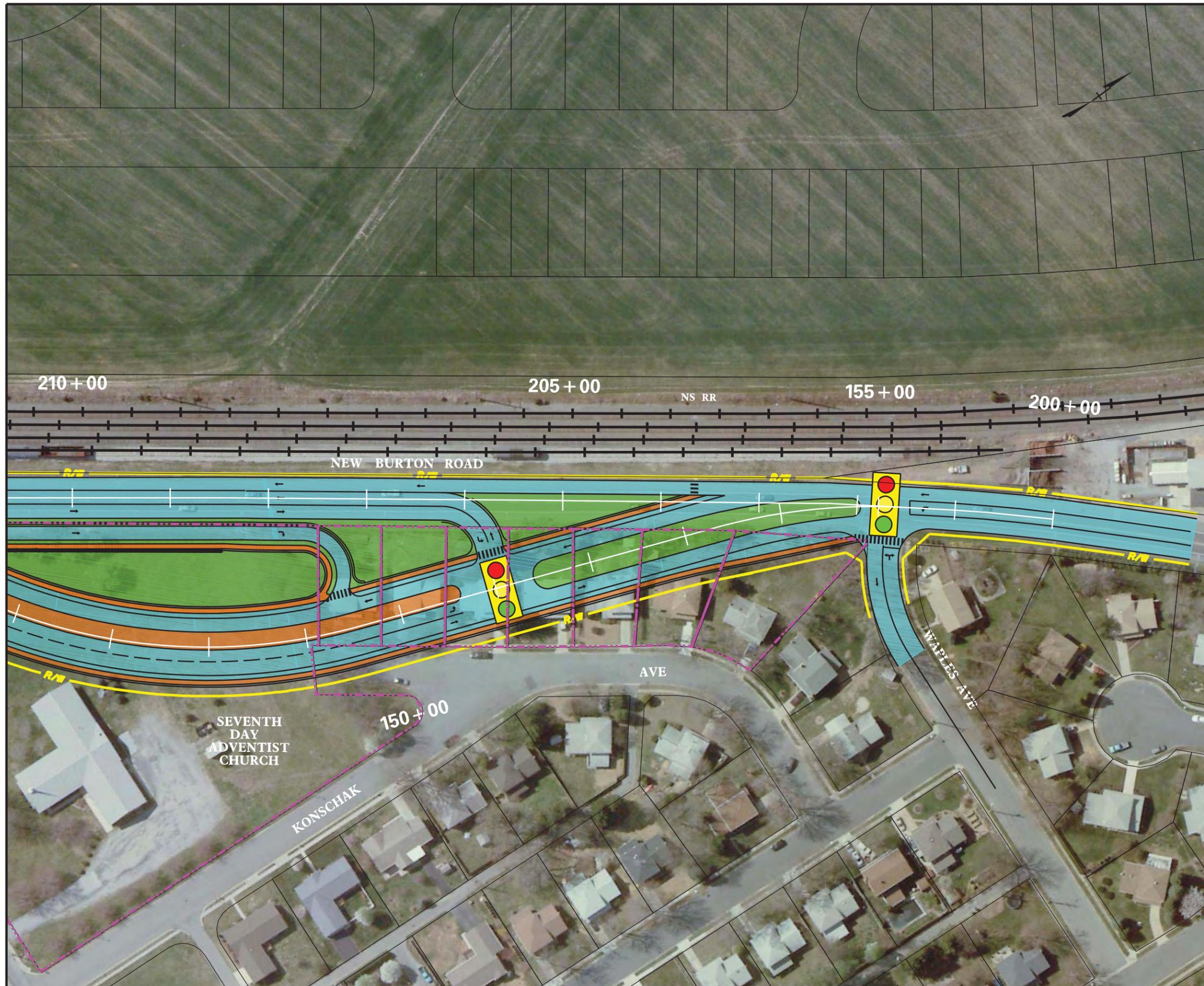
LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

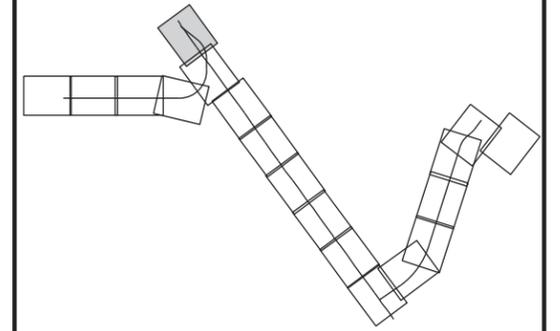
SHEET 5 of 18
ALTERNATIVE 7C

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WEST DOVER CONNECTOR



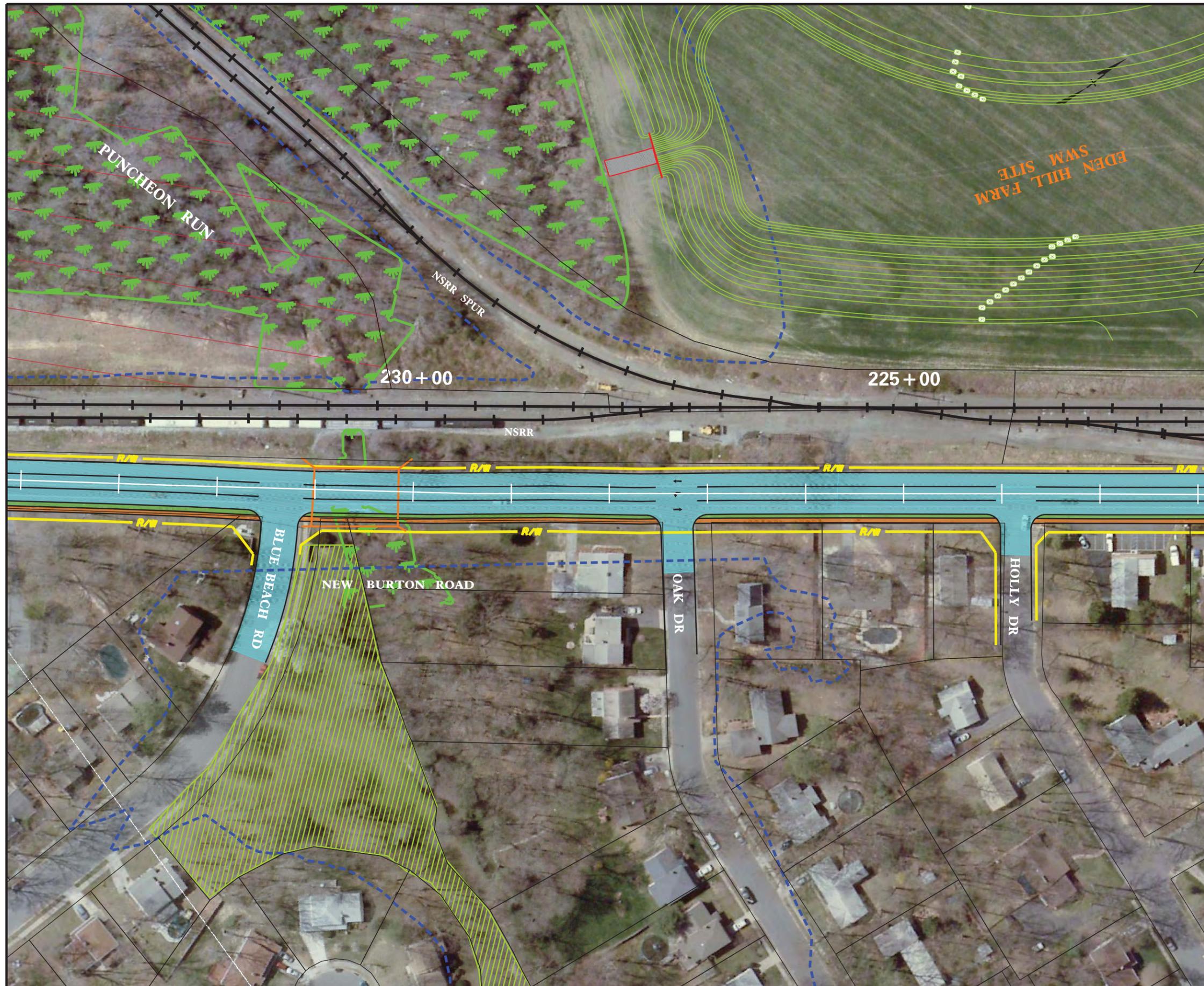
LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

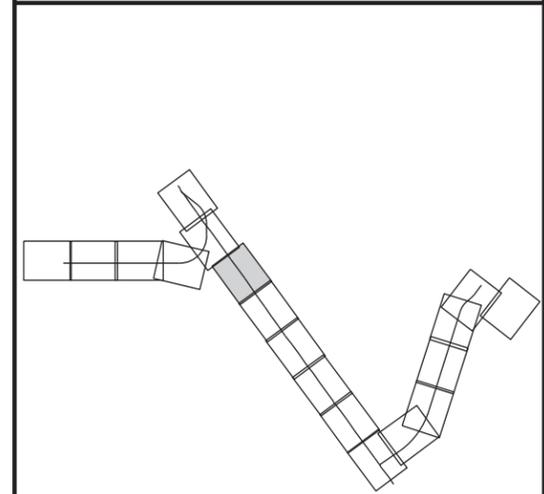
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ALTERNATIVE 7C

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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

SHEET 7 of 18
ALTERNATIVE 7C

AUGUST 2010





WEST DOVER CONNECTOR

LEGEND:

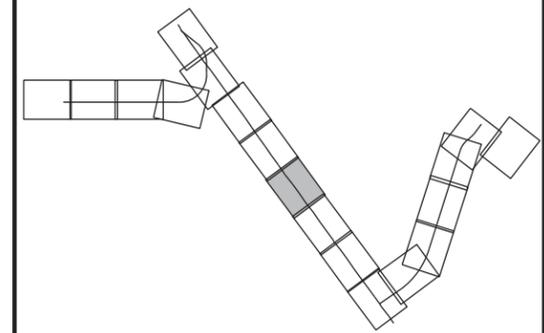
- ROADWAY
- SIDEWALK /MEDIAN
- LANDSCAPE/MEDIAN BUFFER
- WETLANDS
- PARCEL DISPLACEMENTS
- FLOODPLAIN
- RIGHT OF WAY
- AGRICULTURAL PRESERVATION
- PARKS
- RAILROAD
- HISTORIC PROPERTY

**SHEET 8 of 18
ALTERNATIVE 7C**

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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

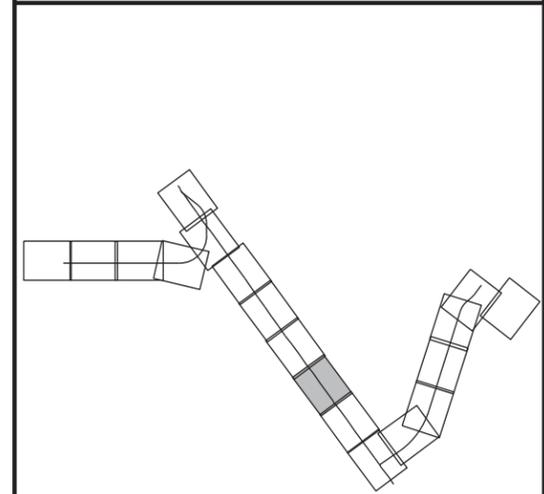
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ALTERNATIVE 7C

AUGUST 2010





WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

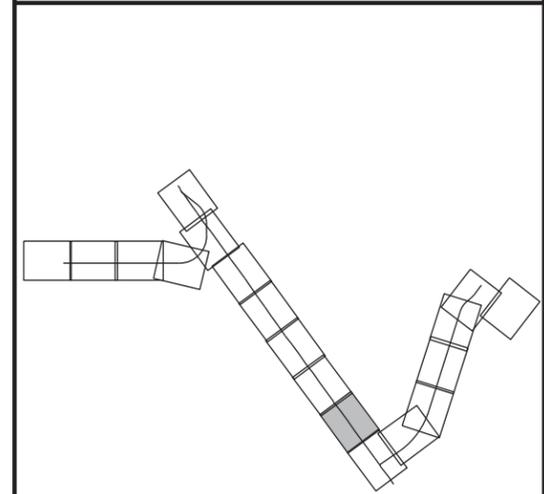
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ALTERNATIVE 7C

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WEST DOVER CONNECTOR



LEGEND:

- ROADWAY
- SIDEWALK /MEDIAN
- LANDSCAPE/MEDIAN BUFFER
- WETLANDS
- PARCEL DISPLACEMENTS
- FLOODPLAIN
- RIGHT OF WAY
- AGRICULTURAL PRESERVATION
- PARKS
- RAILROAD
- HISTORIC PROPERTY

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ALTERNATIVE 7C

AUGUST 2010





WEST DOVER CONNECTOR

LEGEND:

- ROADWAY
- SIDEWALK / MEDIAN
- LANDSCAPE/MEDIAN BUFFER
- WETLANDS
- PARCEL DISPLACEMENTS
- FLOODPLAIN
- RIGHT OF WAY
- AGRICULTURAL PRESERVATION
- PARKS
- RAILROAD
- HISTORIC PROPERTY

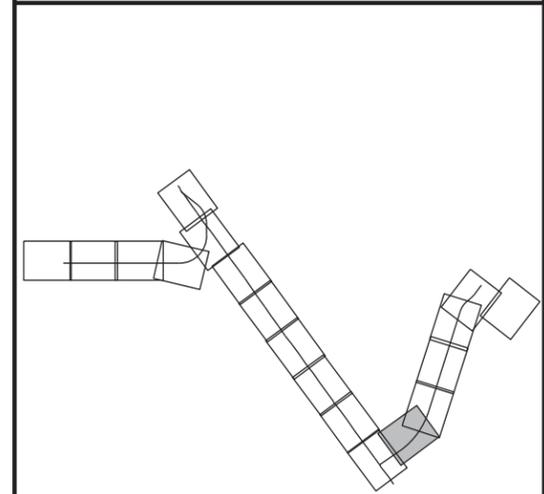
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ALTERNATIVE 7C

AUGUST 2010

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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

SHEET 13 of 18
ALTERNATIVE 7C

AUGUST 2010





WEST DOVER CONNECTOR

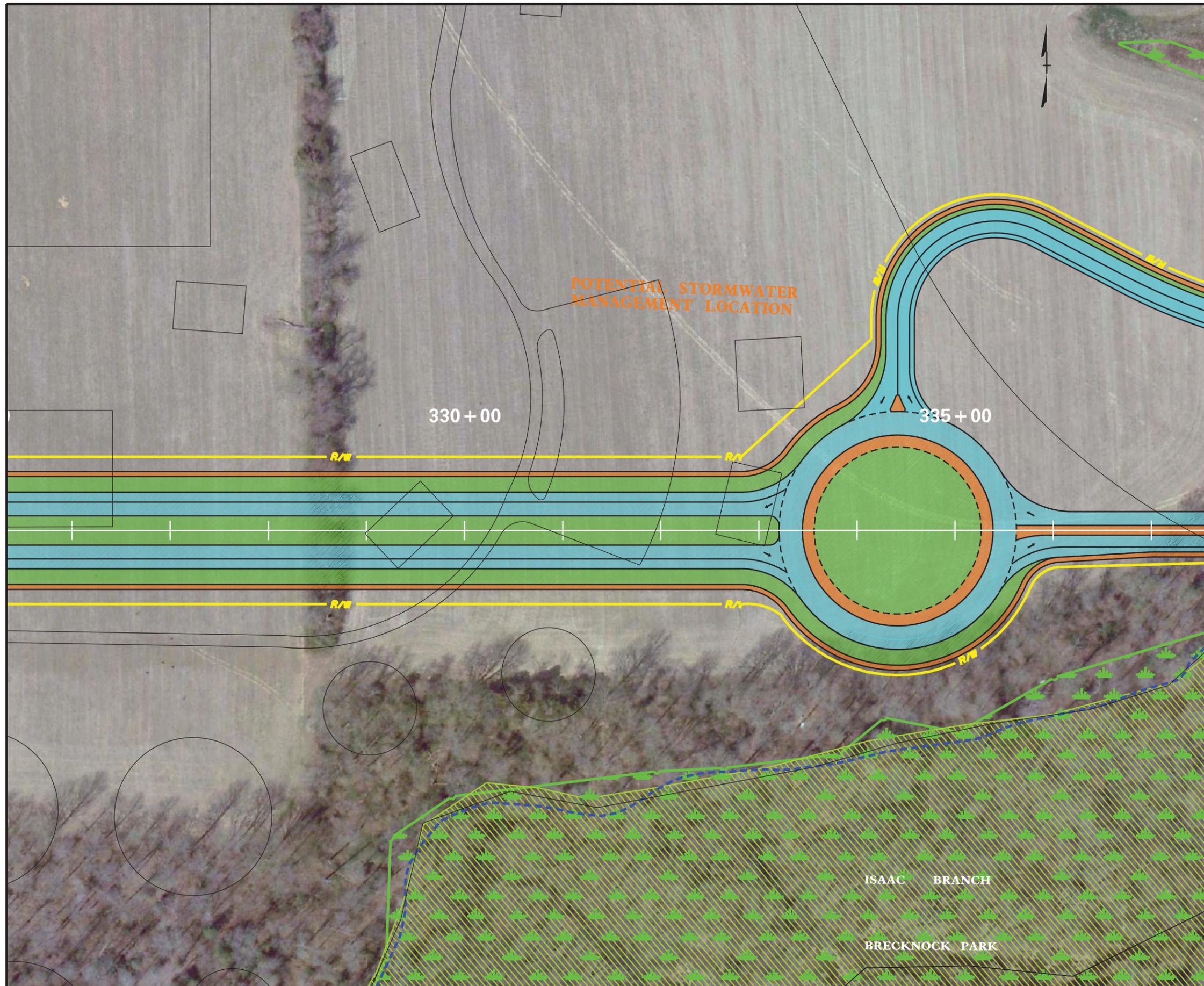
LEGEND:

- ROADWAY
- SIDEWALK / MEDIAN
- LANDSCAPE/MEDIAN BUFFER
- WETLANDS
- PARCEL DISPLACEMENTS
- FLOODPLAIN
- RIGHT OF WAY
- AGRICULTURAL PRESERVATION
- PARKS
- RAILROAD
- HISTORIC PROPERTY

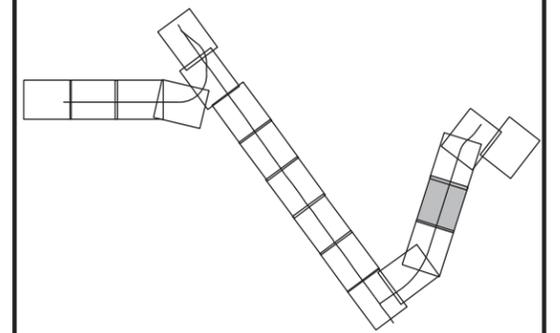
**SHEET 14 of 18
ALTERNATIVE 7C**

AUGUST 2010

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WEST DOVER CONNECTOR



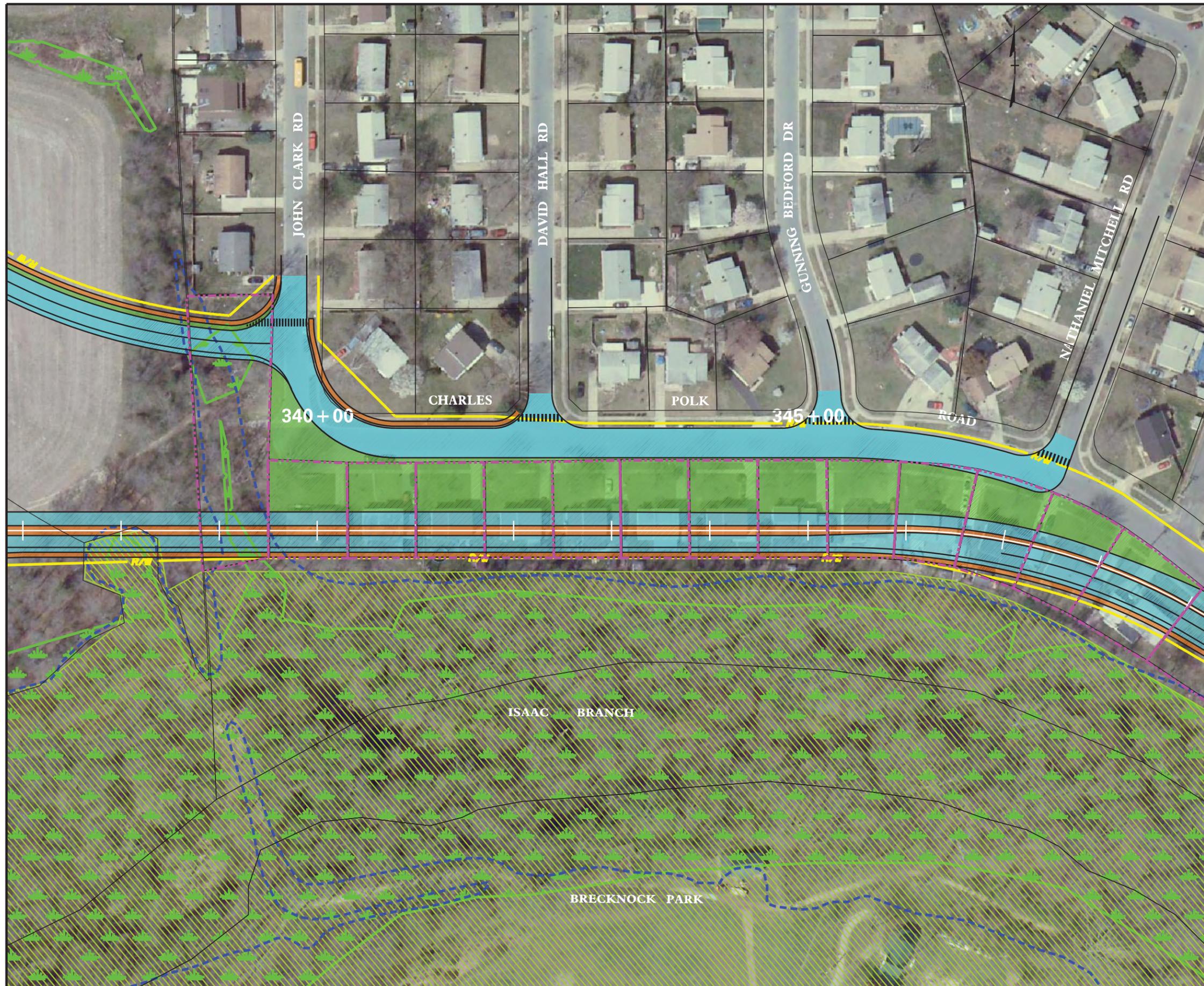
LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

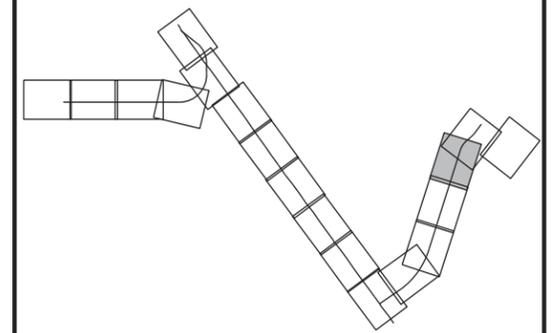
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ALTERNATIVE 7C

AUGUST 2010





WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

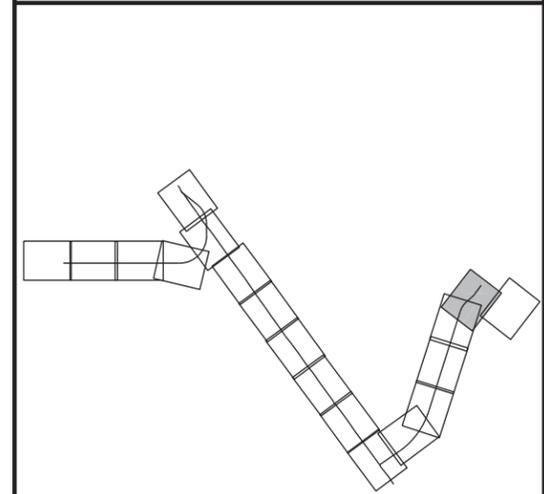
SHEET 16 of 18
ALTERNATIVE 7C

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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

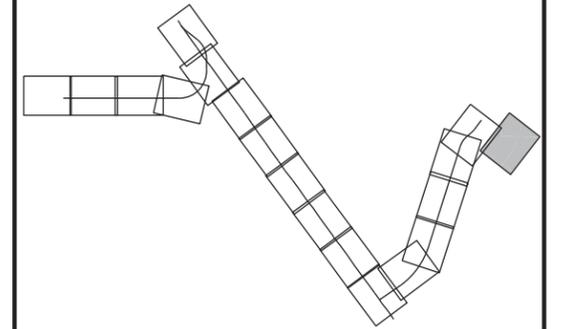
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ALTERNATIVE 7C

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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK /MEDIAN
-  LANDSCAPE/MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

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ALTERNATIVE 7C

AUGUST 2010



v. Alternative 7D

In Alternative 7D, the new connector would cross Eden Hill Farm, the NS Railroad and New Burton Road, use New Burton Road and connect to US 13 via Webbs Lane.

2030 Traffic Performance, Detailed Study: With required intersection improvements, Alternative 7D would improve 2030 performance of six existing intersections along the connector alignment from an unacceptable level (LOS E or F) to an acceptable level (LOS D or above). All newly formed intersections along the connector alignment would also have an acceptable level of service in 2030. Alternative 7D would also improve performance of seven other study area intersections, two of which would show performance improvement to an acceptable level from an unacceptable level with significant delay reduction. Three of these seven intersections would not require any intersection improvements; the performance of these intersections would be improved just by the provision of the Alternative 7D connector.

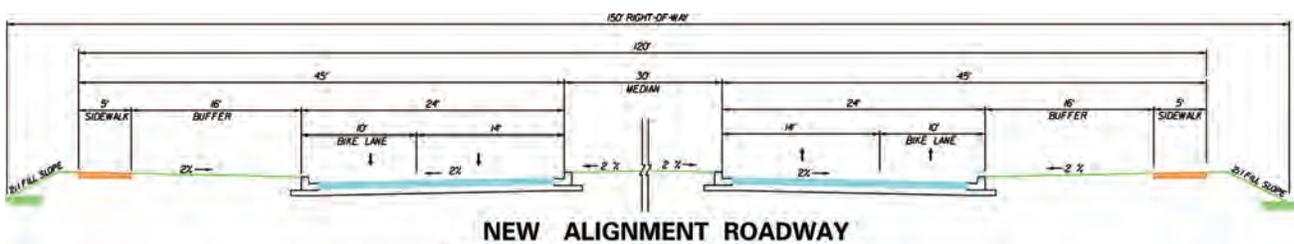
Environmental Performance, Detailed Study: Refinements to the alignment of Alternative 7D have reduced the areas of potential environmental impact compared to the impacts reported in Chapter IV. Alternative 7D would not have a new crossing of Puncheon Run. Instead, the existing crossing at New Burton Road would be widened. Alternative 7D would not have any floodplain impacts in terms of fill. Least fill would be required in wetlands (0.02 acres) and least shading and tree removal impacts (0.02 acres) in wetlands would occur. Alternative 7D would have no impacts on preserved agricultural land.

Alternative 7D would likely have an indirect impact on the eligible H. Jenkins House located on the south side of Webbs Lane east of New Burton Road due to project-related improvements along Webbs Lane. Any impacts would be further evaluated as part of Section 106 consultation with DE SHPO if Alternative 7D is selected as the preferred alternative.

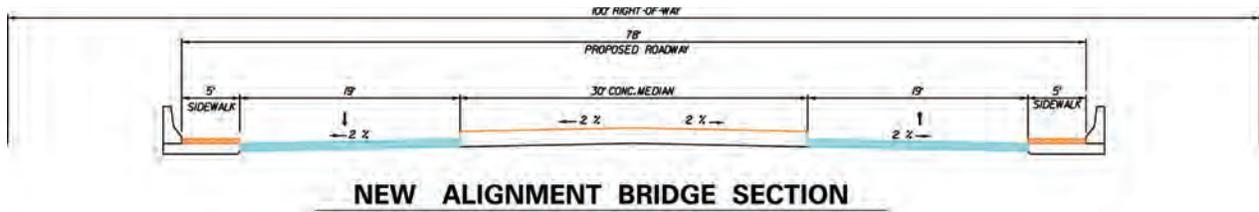
In terms of new right-of-way, Alternative 7D would require a low to moderate number of displacements: 19 residences (12 on Eden Hill Farm), one commercial property and no industrial properties. Partial impacts (strip takes) would be high, affecting a total of 102 parcels: 72 residential properties, 25 commercial properties, three industrial properties and two state-owned properties.

Alternative 7D has the potential for disproportionate impacts on minority populations along Webbs Lane due to partial impacts for new right-of-way and additional traffic volume.

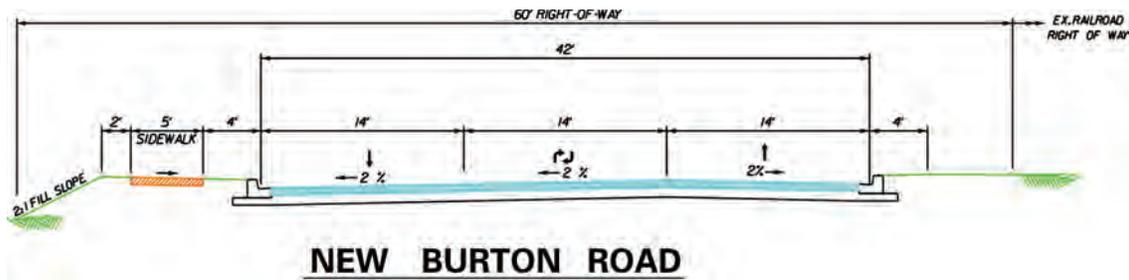
Civil Engineering Factors, Detailed Study: Alternative 7D would extend Saulsbury Road from its current terminus at North Street, cross NS Railroad and New Burton Road north of Wyoming Avenue, use New Burton Road and would connect to US 13 using Webbs Lane. The new connector road alignment on the west side of the NS Railroad would have a typical section as shown below except at intersections where lane configuration would be as per the intersection operational needs.



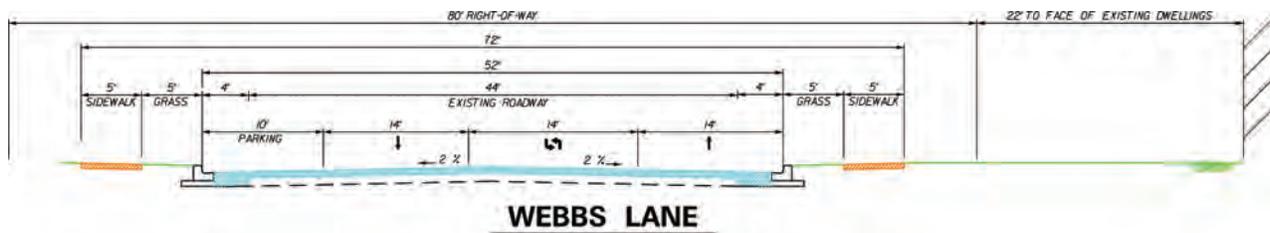
The cross-section proposed under the Alternative 7D is shown above. Alternative 7D would extend Saulsbury Road along the western boundary of the Eden Hill Farm parcel (as shown in Figure V-7, Sheets 2 through 4) before swinging to southeast (as shown in Figure V-7, Sheet 4) to cross the NS Railroad and New Burton Road on a structure (as shown in Figure V-7, Sheet 5). The structure over the railroad and New Burton Road would be a two-span structure (approximately 300 feet in length). The structure would maintain 23'-6" clearance over the railroad. The typical section of the alignment on new bridge structure is shown below.



After crossing the NS Railroad and New Burton Road, the alignment would connect to New Burton Road using a series of ramps and intersections (as shown in Figure V-7, Sheet 6). The new connector road would then continue along New Burton Road and Webbs Lane (as shown in Figure V-7, Sheets 7 through 15) to connect to US 13. New Burton Road would be improved and the existing structure across Puncheon Run would be widened. A typical section along New Burton Road is shown below.



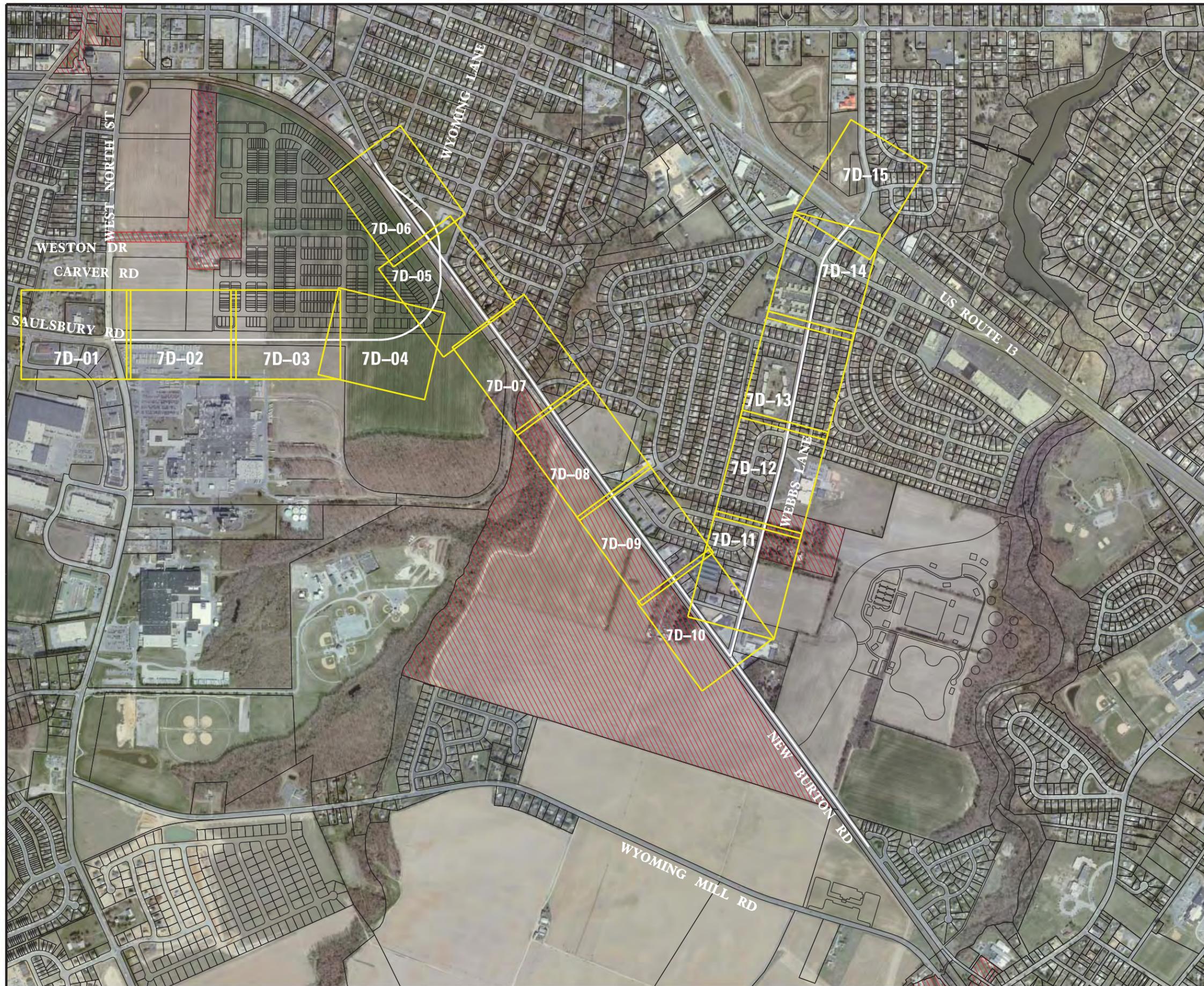
Webbs Lane would also be improved up to the intersection with US 13. A typical section along Webbs Lane is shown below.



As previously mentioned, the residential properties along the south side of Webbs Lane would incur partial impacts (strip takes) along their frontage with an average of 22 feet remaining between the face of the existing dwelling and the proposed right-of-way line. Alternative 7D would result in loss of parking on the south side of Webbs Lane while parking on the north side would be maintained as shown in Figure V-7 Sheets 10 through 15. Intersections along Webbs Lane would be improved as per the operational needs identified under the detailed traffic analysis.

The Alternative 7D alignment would require 6.20 acres of new pavement while 13.89 acres of existing pavement would be a part of this alignment. Stormwater management areas have been conceptually identified, with specific location to be determined during preliminary design, to adequately handle stormwater runoff caused by the new impervious pavement surface.

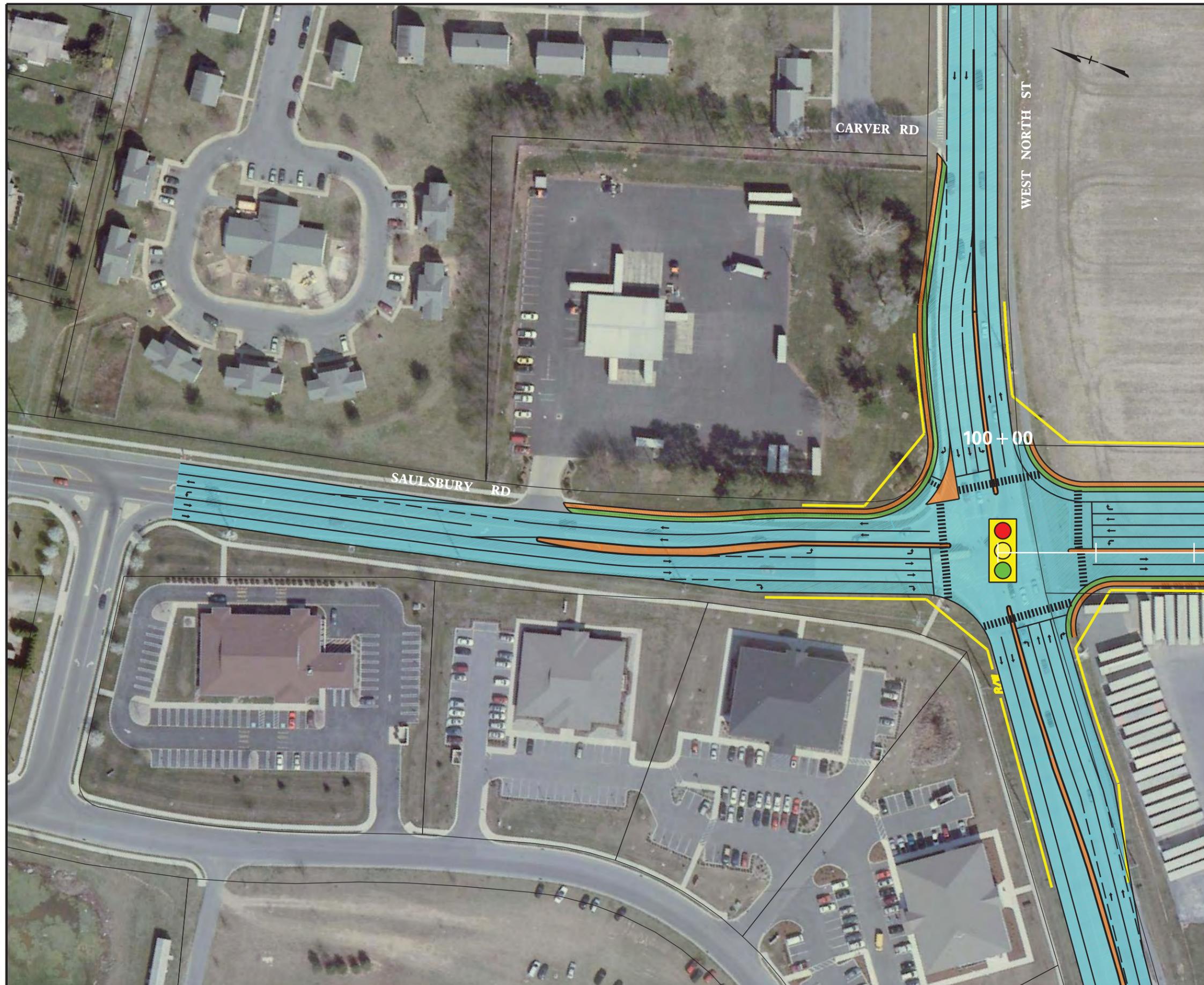
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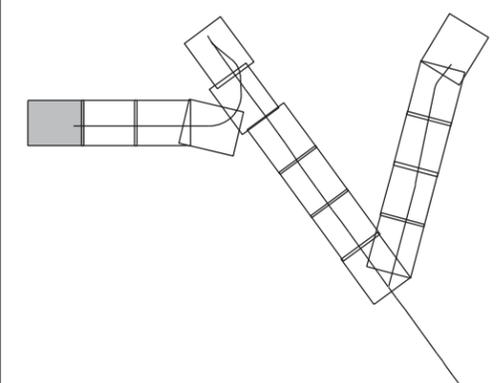
WEST DOVER CONNECTOR

**KEY MAP
ALTERNATIVE 7D**





WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

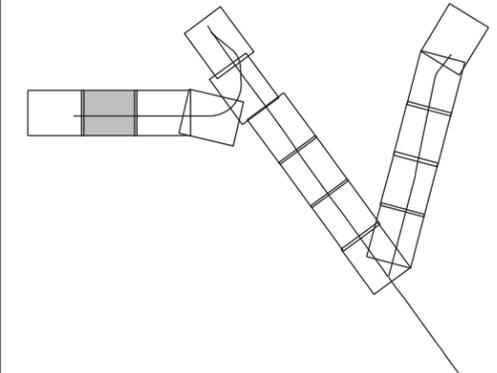
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ALTERNATIVE 7D

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WEST DOVER CONNECTOR



LEGEND:

- ROADWAY
- SIDEWALK / MEDIAN
- LANDSCAPE / MEDIAN BUFFER
- WETLANDS
- PARCEL DISPLACEMENTS
- FLOODPLAIN
- RIGHT OF WAY
- AGRICULTURAL PRESERVATION
- PARKS
- RAILROAD
- HISTORIC PROPERTY

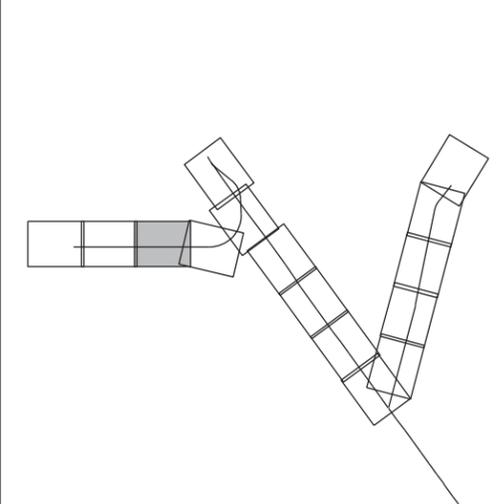
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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

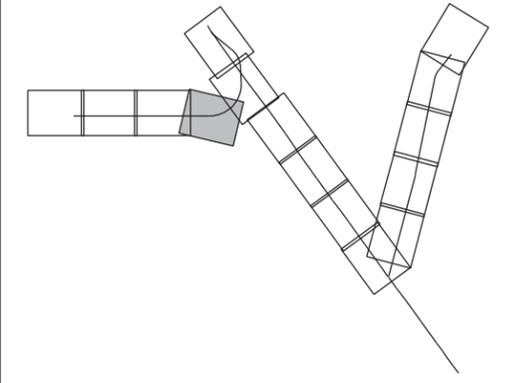
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WEST DOVER CONNECTOR



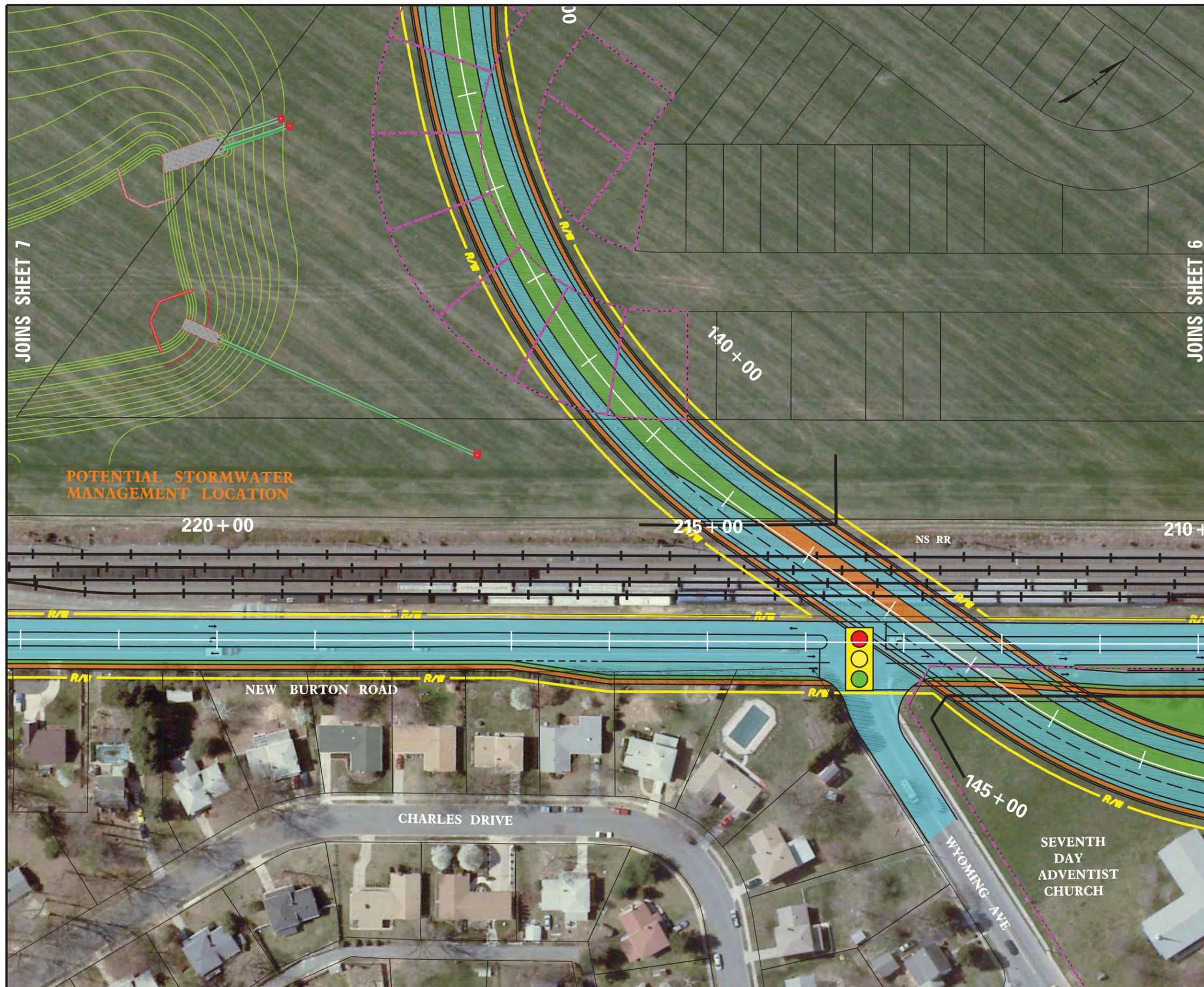
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-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

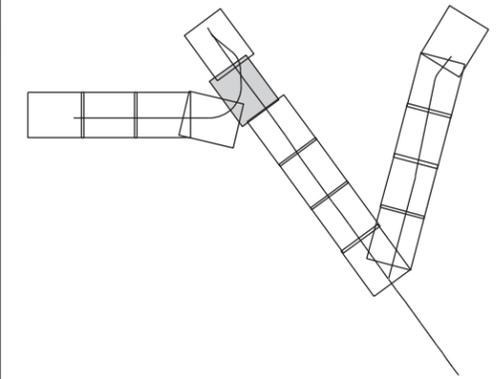
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ALTERNATIVE 7D

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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
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-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

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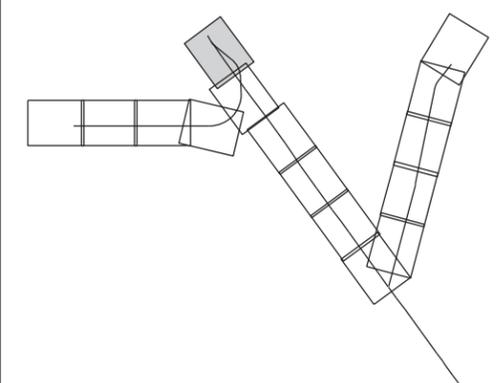
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JOINS SHEET 5

WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

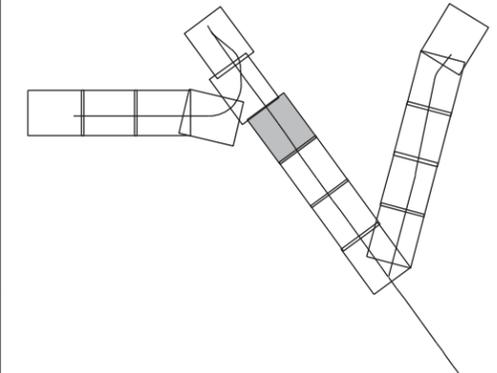
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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

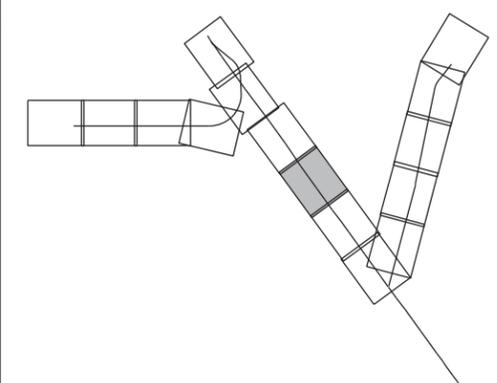
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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
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-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

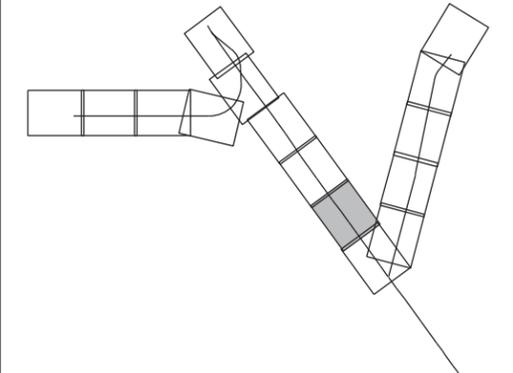
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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
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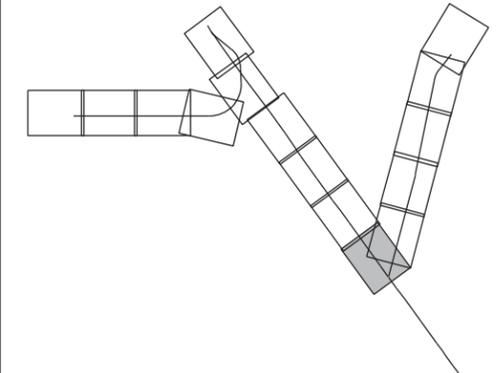
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WEST DOVER CONNECTOR



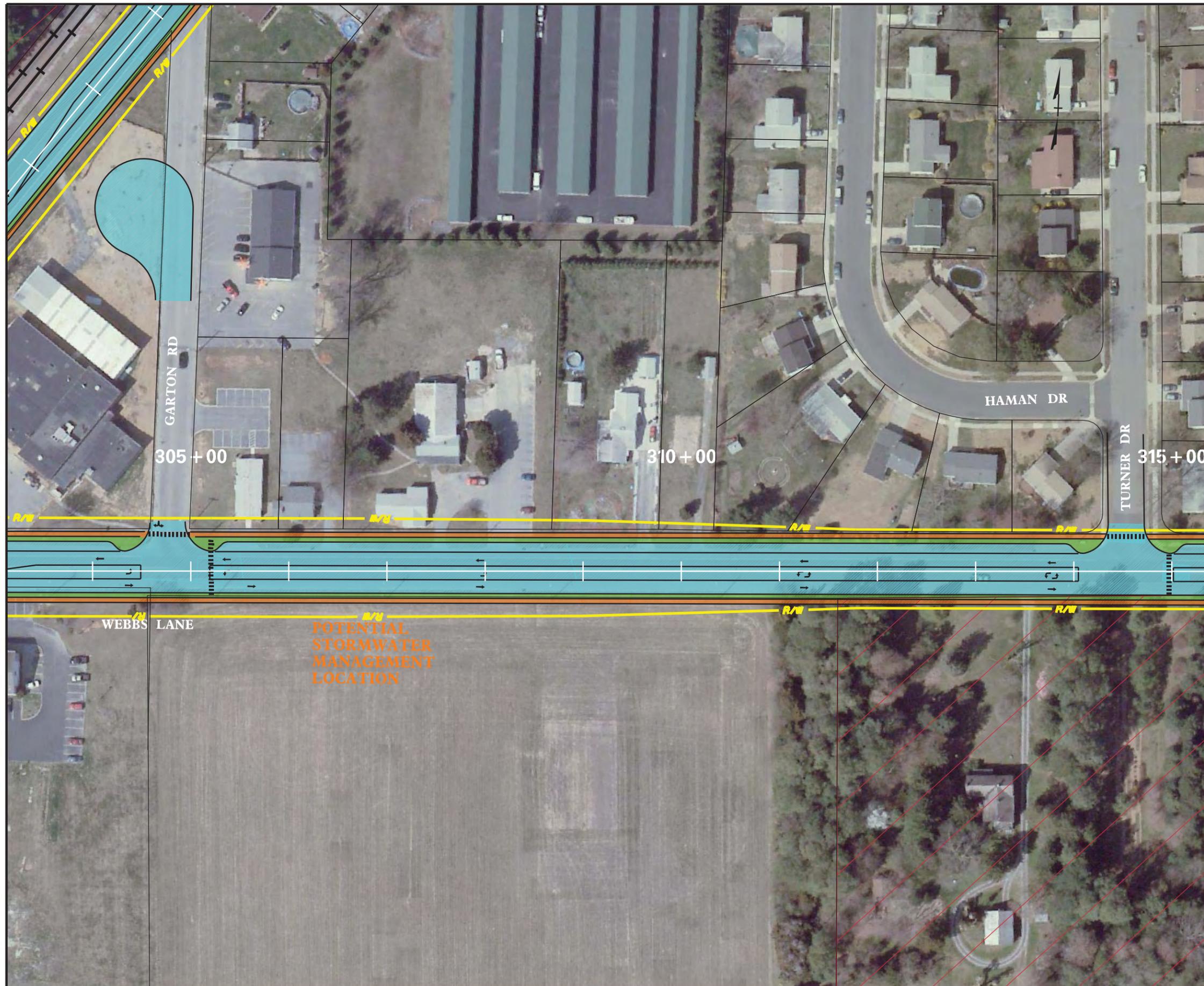
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- WETLANDS
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- FLOODPLAIN
- RIGHT OF WAY
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- PARKS
- RAILROAD
- HISTORIC PROPERTY

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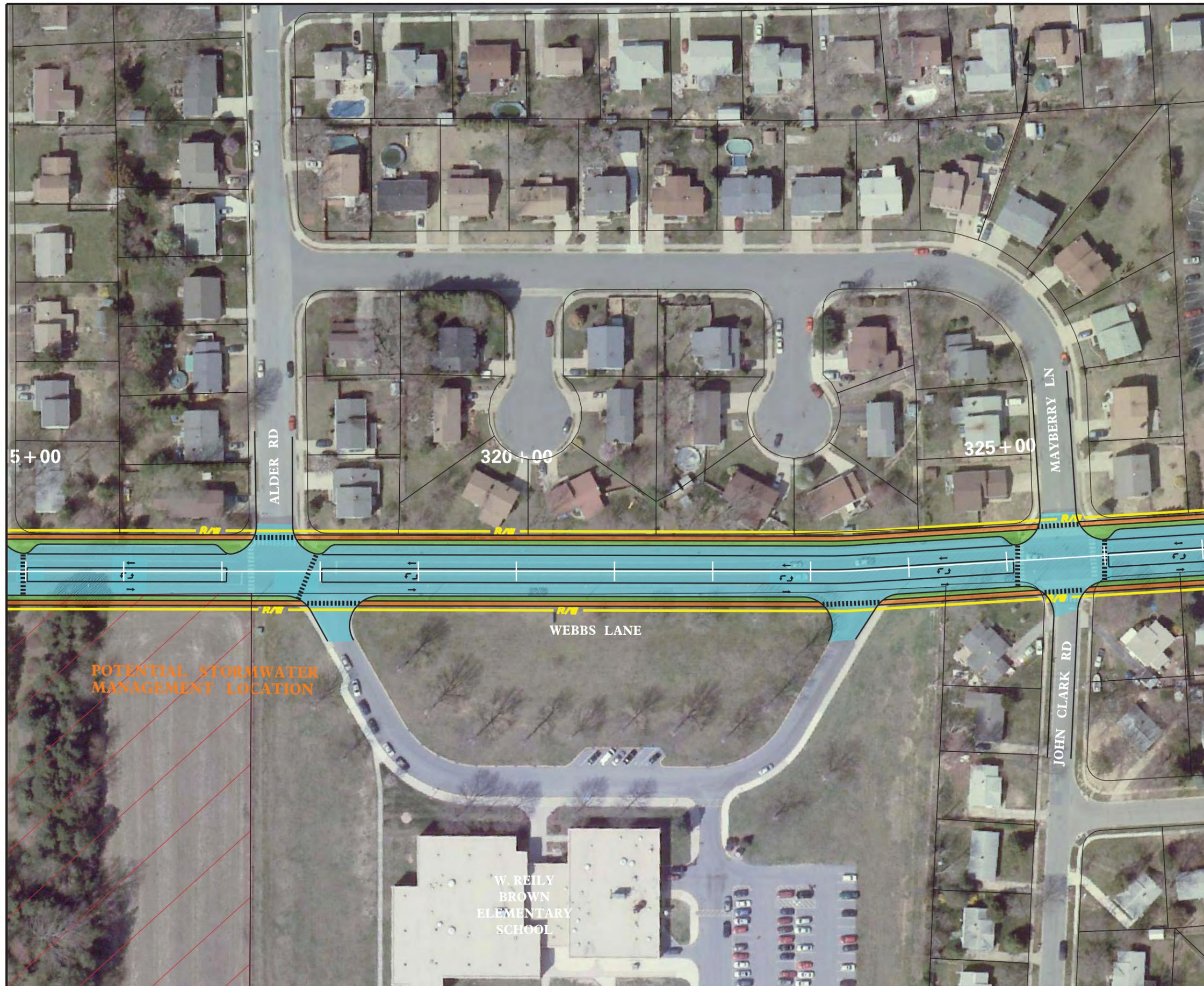
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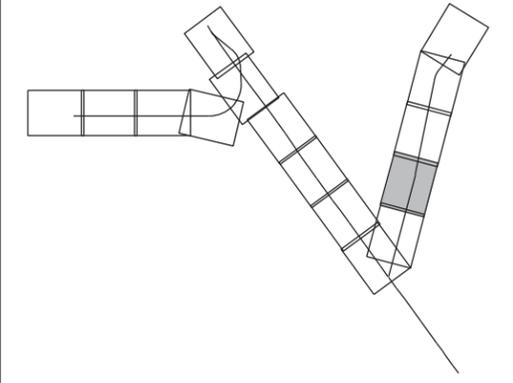
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- LANDSCAPE / MEDIAN BUFFER
- WETLANDS
- PARCEL DISPLACEMENTS
- FLOODPLAIN
- RIGHT OF WAY
- AGRICULTURAL PRESERVATION
- PARKS
- RAILROAD
- HISTORIC PROPERTY

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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

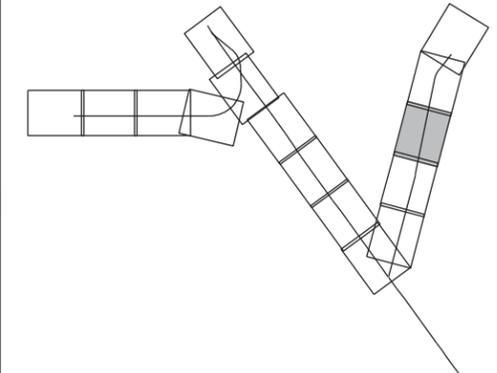
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WEST DOVER CONNECTOR



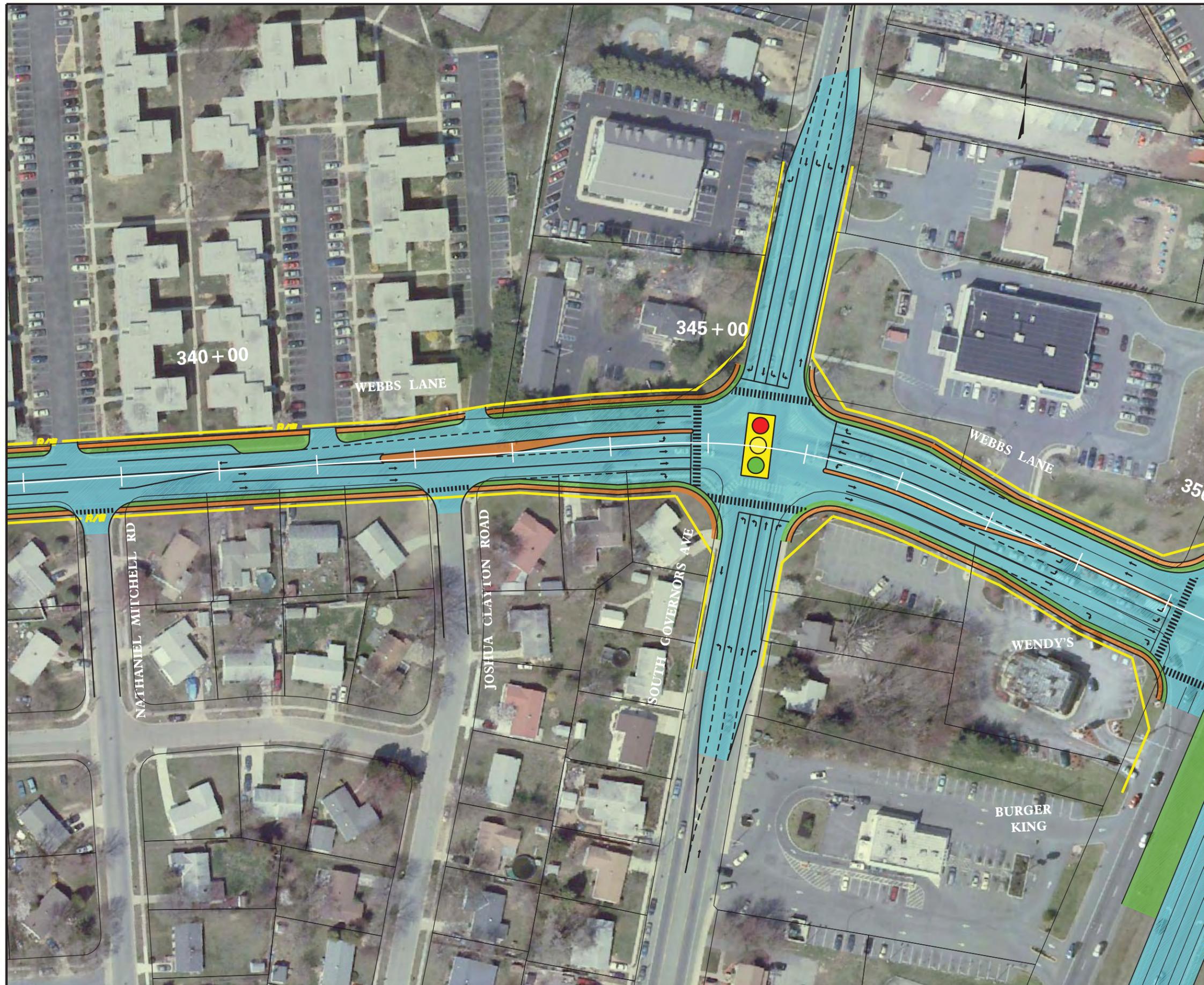
LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

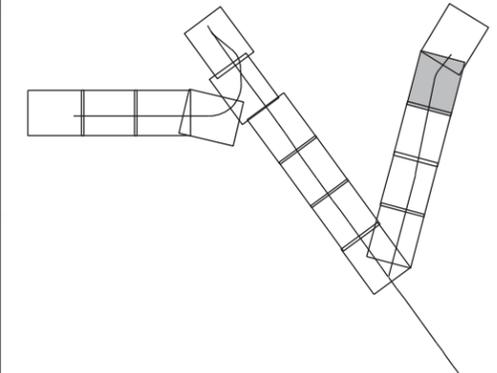
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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
-  AGRICULTURAL PRESERVATION
-  PARKS
-  RAILROAD
-  HISTORIC PROPERTY

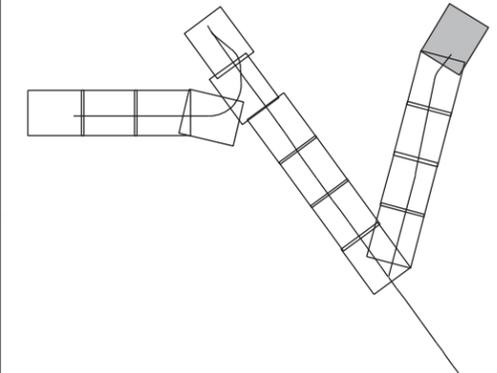
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WEST DOVER CONNECTOR



LEGEND:

-  ROADWAY
-  SIDEWALK / MEDIAN
-  LANDSCAPE / MEDIAN BUFFER
-  WETLANDS
-  PARCEL DISPLACEMENTS
-  FLOODPLAIN
-  RIGHT OF WAY
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-  PARKS
-  RAILROAD
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C. COMPARATIVE DISCUSSION OF RETAINED ALTERNATIVES

This section provides a comparative discussion of the retained alternatives from three perspectives: 2030 traffic performance which relates directly to responsiveness to the project Purpose and Need; environmental impacts performance; and engineering factors performance. As with the preliminary screening process presented in Chapter IV, and in accordance with environmental procedures established under NEPA, the first and most critical measure of alternatives performance is responsiveness to the project Purpose and Need. Performance related to environmental and engineering issues are relevant only to the alternatives that are deemed prudent at the conclusion of the project need analysis.

i. 2030 Traffic Performance

The following comparative discussion of the retained alternatives from the perspective of traffic performance is organized by project Need topic:

- Traffic Congestion
- Projected Growth
- System Linkage and Continuity
- Impacts on Historic Districts/Areas
- Emergency Service Accessibility
- Safety
- Planning Context

No-Build Alternative (Alternative 1)

The preliminary traffic analysis results indicated that Alternative 1 (the No-Build Alternative) will do nothing to address study area traffic problems that are the basis of the project Purpose and Need. The detailed traffic analysis results confirmed that 2030 study area intersection traffic performance would excessively deteriorate during the evening peak hour in Alternative 1. Projected growth in the greater Dover area would exacerbate traffic congestion and potentially lead to adverse effects on emergency service accessibility and overall safety. Within the study area, new traffic generated by the Eden Hill Farm development in the study area is anticipated to contribute to future traffic problems.

Build Alternatives (Alternatives 4, 5C Modified, 7C and 7D)

This section presents a comparative discussion of the performance of the “build” alternatives in the context of the project Purpose and Need; Table V-2 provides an at-a-glance summary of the needs criteria and the performance of each alternative.

Existing and Future Traffic Congestion

The preliminary traffic analysis results, presented in Chapter IV, indicated that the four retained build alternatives would resolve the traffic problems cited in the project Purpose and Need to varying degrees. The preliminary analysis results indicated that Alternatives 4 and 5C would provide high to moderate overall traffic benefits; Alternative 7C and Alternative 7D would provide high to moderate benefits in four areas and would have a negative impact in one area.

The detailed traffic analysis results verified the finding that all retained build alternatives would significantly improve the performance of study area intersections in the evening peak hour.

Alternative 5C Modified would perform best at minimizing the amount of improvements needed to address peak period intersection levels of service and delay. Alternatives 4, 7C and 7D would perform moderately in response to this criterion. Alternatives 4 and 5C Modified would respond best at maximizing the number of existing intersections with improved levels of service without undertaking any intersection improvements. In each case, reduction in traffic at three intersections would obviate the need for intersection improvements. Alternatives 7C and 7D would benefit two intersections in that manner.

Projected Growth

The detailed study results indicate that Alternative 5C Modified would perform best at capturing through traffic, thereby removing the highest volumes of through traffic from currently burdened streets. In addition, Alternative 5C Modified would traverse near or within largely undeveloped properties that have been identified as part of the Kent County's Growth Area. Because of its proximity to these parcels, Alternative 5C Modified would best support traffic generated by future development of those parcels. Alternatives 4, 7C and 7D are remote from some large study area parcels and would be considerably less effective in collecting and directing traffic from future development on the west side of Dover.

System Linkage and Continuity

Among the four retained build alternatives, two are off-alignment alternatives (Alternatives 4 and 5C Modified) while the remaining two are on-alignment alternatives (Alternatives 7C and 7D). The off-alignment alternatives would provide a new roadway alignment parallel to New Burton Road on the west side of the NS Railroad while the on-alignment alternatives would use New Burton Road. Several criteria were examined during detailed study to evaluate alternatives performance in terms of system linkage and continuity: direct connection to US 13; change in traffic volume on New Burton Road; change in cut-through traffic volumes; circulation across the NS Railroad; and performance of the connector/US 13 intersection. These criteria play a role individually and collectively in how efficiently the alternatives would collect and distribute traffic in the study area.

- Direct connection to US 13: The traffic analysis results show that the off-alignment alternatives would provide higher traffic benefits than the on-alignment alternatives in making a direct connection to US 13. These benefits relate to traffic flow and driver expectation as measured by the number of intersections and turning movements along each alternative, as well as interchange configurations and operations. In general, the highest traffic flow benefits are achieved when the fewest intersections and turning movements are involved, and interchange operations are consistent with driver expectation.

The detailed analysis results demonstrate that, in the case of the off-alignment alternatives (4 and 5C Modified), fewer intersections would lie in the path of the new connector road compared to the number of intersections in the path of the on-alignment alternatives. Specifically, Alternative 5C Modified would have the least number of intersections at five, while Alternative 7D would have the most at 18. Alternatives 4 and 7C would have 11 and 12 intersections, respectively. Thus, traffic on Alternative 5C Modified would have the least interaction with movements onto and off of the connector. By the same token, Alternative 5C Modified would have only three stop or signal controlled intersections along the mainline of the connector while Alternative 4 would have four such intersections and Alternatives 7C and 7D would have six each.

Examination of the alternatives from the perspective of required turning movements indicates that Alternatives 4 and 5C Modified would require no turning movements

between end points in order to travel on the connector route. Because Alternatives 7C and 7D would use a combination of existing roads and new alignments, two turning movements would be required between end points to travel on the connector route.

The on-alignment alternatives (7C and 7D) would connect to New Burton Road using a tight radius loop ramp configuration that would necessitate having a lower operating speed due to its geometry. The loop ramp would connect to New Burton Road with signalized intersection control. Southbound travelers on the connector would have to make a left turn onto New Burton Road to continue along the connector route; northbound travelers would have to make a right turn at the same intersection.

Once on New Burton Road, travelers using Alternative 7C or 7D would have to pass through 12 or 18 other intersections, respectively, before reaching US 13. The lack of access control, which is characteristic of New Burton Road and Webbs Lane in the case of Alternative 7D, would affect driver expectation and driver behavior by imparting a stop and go, local traffic flow experience. Alternative 4 travelers would pass through 11 other intersections before reaching US 13, primarily because of the continuous access characteristics of Webbs Lane. In contrast, travelers on Alternative 5C Modified would encounter only five intersections, giving drivers the most controlled access experience of any of the alternatives.

The foregoing findings indicate that Alternative 5C Modified would provide the least interruption in traffic flow and turning, while Alternative 4 would provide a moderate amount of traffic flow interruption. Alternatives 7C and 7D would have the most interruption in traffic flow and turning. In view of this analysis, Alternative 5C Modified is determined to provide the most direct connection to US 13 compared to the other alternatives. With almost 90% of its alignment as a new controlled access roadway, Alternative 5C Modified would provide the highest mobility benefits and least friction from side street and driveway traffic of the retained build alternatives. Alternative 4 would perform at a moderate level and Alternative 7C and 7D would provide the least direct connections. In fact, the other alternatives (4, 7C and 7D) would support the need for a direct connection considerably less effectively. Further, Alternative 5C Modified would necessitate improvement of the fewest intersections to handle traffic flows associated with the West Dover Connector.

- Change in traffic volume on New Burton Road: The Working Group and general public expressed concerns about traffic volumes, and the potential for increased traffic volumes due to the project, on New Burton Road. Since the off-alignment alternatives (4 and 5C Modified) would remove significant traffic from New Burton Road, most of the New Burton Road intersections would show substantial intersection performance improvement without the need for physical intersection improvements.
- Change in cut-through traffic volumes: An element of the project need is to reduce cut-through traffic on local streets. An advantage of the off-alignment alternatives (4 and 5C Modified) over on-alignment alternatives (7C and 7D) is that the off-alignment alternatives would significantly reduce cut-through traffic on lower classification roadways between New Burton Road and Governors Avenue. Since the on-alignment alternatives would use New Burton Road, cut-through traffic cannot be discouraged. Thus, unless specific traffic calming treatments are introduced along the lower classification roadways, it is possible that under Alternatives 7C or 7D, higher through

traffic volumes would use the lower classification roadways between New Burton Road and Governors Avenue.

- Improve circulation across NS Railroad: While Alternatives 4, 5C Modified, 7C and 7D would improve circulation across the NS Railroad by providing a new, grade-separated crossing of the railroad, Alternative 4 would provide the most central location for a new crossing of the railroad. As described in the Purpose and Need, there is a 2.9 mile stretch of railroad in the study area between the crossings at North Street and Wyoming Mill Road. A crossing in the Webbs Lane area is approximately the center point between the two existing crossings. Alternative 5C Modified would cross somewhat further to the south and Alternatives 7C and 7D would cross the railroad toward the northern end of the study area.
- Performance of Connector/US 13 intersection: Another distinction between the retained build alternatives is that Alternatives 4 and 7D would connect to US 13 using Webbs Lane while Alternatives 5C Modified and 7C would connect to US 13 using Charles Polk Road. From traffic engineering and signal design perspective, the Charles Polk Road intersection with US 13, being a three-leg intersection, can be designed with a three-phase signal. In contrast, the Webbs Lane intersection with US 13 is a conventional four-leg intersection and would require a four-phase signal since turning movements in all directions are prominent. Considering a constant signal cycle operation length, the fewer number of signal phases directly correlates with increased green-time and better overall intersection operation.

Roadway geometry at and near intersections is also a comparative factor in assessing traffic performance. In Alternatives 4 and 7D, the Webbs Lane intersection with US 13 is close to the Webbs Lane/Governors Avenue intersection. Thus, the operation of the eastbound approach to the Webbs Lane/US 13 intersection and the westbound approach to the Webbs Lane/Governors Avenue intersection are constrained by the available vehicle storage length of Webbs Lane between these two intersections. In comparison, the Charles Polk Road intersection with US 13 in Alternatives 5C Modified and 7C does not have this limitation.

To summarize, Alternative 5C Modified would consistently perform best among the retained build alternatives in response to the system linkage and continuity element of the project Need. Alternative 4 would perform less well, and on-alignment Alternatives 7C and 7D would perform least well.

Impacts on Historic Districts/Areas

High traffic volumes and traffic congestion in historic districts/areas can have direct and indirect adverse impacts on historic structures and the setting or context of the resources. Reducing traffic volumes and congestion in historic districts/areas typically benefits the resources. Alternatives 4 and 5C Modified would perform best at diverting through traffic from the North Street historic area. Alternatives 7C and 7D would not be as effective in capturing through traffic from the North Street area due to their northerly connector alignments and the use of New Burton Road. Through traffic destined for the central Dover area is likely to continue to use North Street.

Alternative 5C Modified would perform best at diverting through traffic from the Camden and Wyoming Historic Districts because of the more southerly alignment of the connector and the new connection to Wyoming-Mill Road. Alternatives 4 and 7C would provide moderate relief while Alternative 7C would provide the least relief.

Emergency Service Accessibility

Two factors combine to provide the best solution for emergency access: direct route and travel time. Whereas Alternative 4 would provide the most central location for a new railroad crossing, traffic on the portion of Alternative 4 that would be on alignment with Webbs Lane would experience friction in the forms of entering and exiting traffic at mainline intersections, driveways, and the elementary school. These conditions have the potential to adversely affect emergency response time. Alternatives 7C and 7D exhibit similar, but potentially more significant, potential for friction along New Burton Road. As an off-alignment alternative, Alternative 5C Modified would provide both a direct route across the railroad and the least potential local traffic friction. Thus, Alternative 5C Modified would perform best in terms of overall emergency service accessibility.

Improve Safety

In this analysis, safety improvement was measured by a combination of factors: the potential to reduce left-turn movements, avoid turns or movements that are contrary to driver expectation, minimize the number of intersections and driveways along an alignment, and support bicycle and pedestrian modes. As described above, traffic using Alternatives 4 and 5C Modified would require no turning movements between end points in order to travel on the connector route. Because Alternatives 7C and 7D would use a combination of existing roads and new alignments, two turning movements would be required between end points to travel on the connector route. Alternatives 7C and 7D would also require southbound drivers to travel northward on the approach to the New Burton Road intersection and then turn left to go south toward US 13. These movements are contrary to southbound driver expectation and could cause driver confusion and hesitation, potentially affecting safety. Alternatives 4 and 5C Modified would have no such reverse movements.

In summary, Alternative 5C Modified would perform best at minimizing the number of left-turn movements between Saulsbury Road and North Street, avoiding turns or movements that are contrary to driver expectation, and minimizing the number of intersections and driveways along the connector mainline. Alternative 7C would perform moderately well given the off-alignment components north and south of New Burton Road. Alternatives 4 and 7D would perform the worst because of the on-alignment elements along Webbs Lane and New Burton Road. All alternatives would support bicycle and pedestrian modes; however, Alternative 5C Modified provides the best connection for these modes between Schutte and Brecknock Parks.

Previously Established Planning Context

All retained build alternatives would perform equally well in response to City of Dover and Dover/Kent County MPO plans.

Overall Summary of Performance – Project Need

Detailed study of the retained build alternatives in the context of the elements of the project Need indicates that Alternative 5C Modified would consistently perform at the highest level among the retained build alternatives in response to each element of the project Need. Alternative 4 would not perform as well overall, while on-alignment Alternatives 7C and 7D would perform the least well by a considerable margin. These analysis results provide a refined picture of the performance of the retained alternatives compared to the findings of the Step One analysis. In particular, Alternative 5C Modified would have the most overall benefits in terms of addressing existing and future traffic congestion in the study area, accommodating projected growth, improving system linkage and continuity, reducing traffic on roadways in historic districts/areas, addressing emergency service accessibility, and improving safety. For these reasons, Alternative 5C Modified provides the best response to project Needs and is the prudent alternative to pursue.

Table V-2: Alternative Performance – Purpose and Need

Needs Criteria	Alternative				
	1	4	5C Modified	7C	7D
Existing and Future Traffic Congestion	Worst	Moderate	Best	Moderate	Moderate
Minimizes improvements needed to address peak period intersection levels of service and delay	N/A	Moderate	Best	Moderate	Moderate
Maximizes number of existing intersections with improved levels of service without any intersection improvements	Worst - 0	Best - 3	Best - 3	Moderate - 2	Moderate - 2
Projected Growth	No	Moderate	Best	Moderate	Worst
Captures through traffic	No	Moderate	Best	Moderate	Least
Supports future parcel development	No	Moderate	Best	Moderate	Least
System Linkage and Continuity	No	Moderate	Best	Worst	Worst
Provides direct connection to US 13 for through traffic:	No	Moderate	Best	Moderate	Worst
Percent of route that is controlled access	None - 0%	Moderate - 60%	Best - 90%	Moderate - 60%	Worst - 30%
Adds new link to roadway network	No	Moderate	Best	Moderate	Worst
Minimizes number of Stop or signal controls for mainline Connector traffic	N/A	Moderate - 4	Best - 3	Worst - 6	Worst - 6
Minimizes number of intersections along mainline Connector route	N/A	Moderate - 11	Best - 5	Moderate - 12	Worst - 18
Change in traffic volume on New Burton Road	Increase-Moderate	Decrease - Moderate	Decrease - Best	Increase-High	Increase-High
Change in cut through traffic volumes on lower classification roads	Increase - High	Decrease - Moderate	Decrease - High	Increase - Moderate	Increase - Moderate
Improves circulation across Norfolk-Southern Railroad	No	Best	Moderate	Moderate	Moderate
Performance of Connector/US 13 intersection	N/A	Moderate	Best	Best	Moderate
Impacts on Historic District /Areas	Worst	Moderate	Best	Moderate	Moderate
Reduces through traffic in the North Street Historic Area	No	Best	Best	Moderate	Moderate
Reduces through traffic in the Camden-Wyoming Historic District	No	Moderate	Best	Moderate	Least
Emergency Service Accessibility	No	Moderate	Best	Moderate	Worst
Performance as another travel option across Norfolk-Southern Railroad	No	Best	Moderate	Worst	Worst
Minimizes friction for travelers on mainline connector		Moderate	Best	Moderate	Worst
Improve Safety	Worst	Best	Best	Moderate	Moderate
Minimizes number of turning movements required to travel on connector route (excluding end points and auxiliary ramps)	N/A	Best - 0	Best - 0	Moderate - 2	Moderate - 2

Needs Criteria	Alternative						
	1	4	5C Modified	7C	7D		
Minimizes potential for driver confusion	No	Best	Best	Worst	Worst		
Minimizes existing intersections and driveways along Connector mainline	No	Worst - 53	Best - 5	Moderate - 28	Worst - 77		
Supports bicycle and pedestrian modes	No	Yes	Yes, Best	Yes	Yes		Yes
Previously Established Planning Context	Worst	Best	Best	Best	Best		Best
Consistent with City and MPO plans	No	Yes	Yes	Yes	Yes		Yes

ii. Environmental Impacts

In the detailed study phase, design refinements were made to the retained build alternatives based on traffic needs, civil engineering factors, community concerns and environmental constraints. Priority was given to avoiding adverse impacts wherever possible and minimizing unavoidable adverse impacts. Subsequent to design refinement, the remaining impacts of the retained alternatives were quantified and presented in Table V-3 (data table) for the following parameters:

Environmental Factors:

- Floodplains, streams and wetlands
- Preserved agricultural land
- Historic properties (National Register listed and eligible)

Engineering Factors:

- New pavement
- Right-of-way impacts
 - Displacements
 - Partial impacts (strip takes)

A “Consumer Reports” style performance rating system was developed to enable comparison of the retained alternatives. Within each parameter, comparative ranges of performance (best-to-worst or most-to-least) were determined, and simple symbols were used to represent the ranges. As presented in Table V-4 (scoring sheet), this system enables a visual comparison of the retained alternatives with one another.

The performance of the alternatives in terms of the environmental factors is described below. Section iii below describes the performance of the alternatives in terms of the engineering factors.

Table V-3 – Alternatives Performance: Environmental and Engineering Data Sheet

Environmental and Engineering Factors	Retained Alternative				
	1	4	5C Modified	7C	7D
Floodplain Impacts (acres)					
Fill (acres) (a)	0	0.35	0.57	0.14	0
Stream Impacts (linear feet)					
Stream Impacts (linear feet)	0	146	146	117	117
Wetlands Impacts (acres)					
Fill (acres) (a)	0	0	0.05	0.08	0.02
Shading and tree removal (acres) (b)	0	1.27	1.32	0.14	0.02
Preserved Agricultural Land (acres)					
Preserved Agricultural Land (acres)	0	1.25	1.31	0	0
Historic Property Impacts (c)					
Direct (number)	0	1	1	0	0
Indirect (number)	0	1	0	0	1
Pavement					
New pavement (acres)	0.00	10.79	16.70	12.17	6.20
Existing pavement (acres)	0.00	5.28	0.34	10.56	13.89
Displacements (number)					
Residential	0	0	15	34	19
Commercial	0	5	2	3	1
Industrial	0	0	0	0	0
Total Displacements	0	5	17	37	20
Partial Impacts (number)					
Residential	0	49	6	31	72
Commercial	0	13	7	14	25
Industrial	0	1	4	6	3
State Land	0	2	0	0	2
Total Partial Impacts	0	65	17	51	102

(a) Fill associated with bridge piers, embankment and roadway filling.

(b) Acreage of ROW overlying the environmental area.

(c) Properties considered: Eden Hill Farm, Kesselring Farm and H. Jenkins House.

Table V-4 – Alternatives Performance: Environmental and Engineering Scoring Sheet

Environmental and Engineering Factors	Retained Alternative						
	1	4	5C Modified	7C	7D		
Floodplain Impacts (acres)							
Fill (acres) (a)		○	○-	●			
Stream Impacts (linear feet)		○	○	●			
Wetlands Impacts (acres)							
Fill (acres) (a)		●	●	○			
Shading and tree removal (acres) (b)		○-	○-	○			
Preserved Agricultural Land Impacts (acres)		○	○				
Historic Property Impacts (c)							
Direct (number)		●	●				
Possible Indirect (number)		●					●
Pavement							
New pavement (acres)		○	○-	○			●
Existing pavement (acres)		○	●	○-			○-
Displacements (number)		●	○	○-			○
Partial Impacts (number)		○	●	○			○-
(a) Fill associated with bridge piers, embankment and roadway filling. (b) Acreage of ROW overlying the environmental area. (c) Properties considered: Eden Hill Farm, Kesseling Farm and H. Jenkins House.							
Legend							
	No impacts						
●	Least impacts of Retained Alternatives						
○	Moderate impacts compared to other Retained Alternatives						
○-	Most impacts of Retained Alternatives						

Wetlands, Floodplains and Streams

In all retained alternatives, although conceptual design efforts have strived to avoid or minimize impacts in the design of the waterway crossings, some unavoidable impacts would occur. On-alignment Alternatives 7C and 7D would have the least overall impacts on wetlands, floodplains and streams because the existing New Burton Road crossing of Puncheon Run would be used. In contrast, off-alignment Alternatives 4 and 5C Modified would require a new crossing of Puncheon Run. However, it should be noted that widening the bridge on New Burton Road in Alternative 7C would result in the most wetlands fill of any of the retained alternatives.

Taking a closer look at the impact quantities in Table V-3 indicates that, whereas the environmental impacts of the alternatives vary, the differences in the totals for some parameters are quite small. For example, the area of fill in floodplains and wetlands varies by tenths or hundredths of an acre among the alternatives.

Preserved Agricultural Lands

On-alignment Alternatives 7C and 7D would have no impact on preserved agricultural lands as no auxiliary connector to Wyoming Mill Road is possible. Off-alignment Alternatives 4 and 5C Modified would have unavoidable impacts on preserved agricultural lands. Of these, Alternative 4 would have the least impact.

Historic Properties

Alternatives 4 and 5C Modified would each have one direct and similar impact on the eligible Kesselring Farm property. In both alternatives, the roadway alignment would loop around the west side of the building complex, impacting the agricultural fields that are contributing elements to the historic property. Alternatives 4 and 7D would each likely have one indirect impact on the eligible H. Jenkins House as a result of improvements made to Webbs Lane. Alternative 7C would have no direct or indirect impacts on historic properties.

With the development by others of lands surrounding the National Register-listed Eden Hill Farm, the retained build alternatives would have no direct or indirect impact on the property as the new roadway would be visually remote from the house, outbuildings, and immediately surrounding land that are the remaining intact contributing elements of the property.

Overall Summary of Performance – Environmental Factors

Of the retained alternatives, Alternative 1 (No-Build) is the only alternative that would have no environmental impacts on wetlands, floodplains, streams, preserved agricultural lands, or historic properties.

Tables V-3 and V-4 demonstrate that Alternatives 4, 5C Modified and 7D would perform better than Alternative 7C in the area of wetlands fill. This difference largely has to do with the magnitude of impact incurred by Alternative 7C by widening the New Burton Road bridge over Puncheon Run combined with a small impact near Isaac Branch.

Alternatives 7C and 7D would perform best in terms of the least impacts on floodplains and streams because the existing New Burton Road crossing of Puncheon Run would be used with some widening. Alternatives 4 and 5C Modified would have greater impacts on floodplains and streams.

Alternatives 7C and 7D would also perform the best in terms of having the least impacts on preserved agricultural land and no direct impacts on historic properties. Alternatives 4 and 5C

Modified would have equivalent direct impacts on the eligible Kesselring Farm, but would otherwise avoid directly impacting other historic properties in the study area.

iii. Civil Engineering Factors

Right-of-Way Impacts

Of the retained alternatives, Alternative 1 (No-Build) is the only alternative that would require no new right-of-way.

Tables V-3 and V-4 demonstrate that Alternatives 4 and 5C Modified would perform better than Alternatives 7C and 7D by requiring fewer displacements (in the case of Alternative 4), and partial impacts (in the case of 5C Modified). These differences largely have to do with the magnitude of impacts required to widen New Burton Road to accommodate connector traffic. The number of displacements and partial impacts required to implement Alternative 7C and, particularly, 7D is considerably greater than the number of impacts required to implement Alternative 4 and, particularly, 5C Modified.

Considering right-of-way impacts, Alternative 4 and would perform best in terms of fewest overall displacements, followed by 5C Modified and 7D. However, Alternative 5C Modified would perform best in terms of fewest partial impacts, followed at a distance by Alternatives 4 and 7C.

New Pavement

Of the retained build alternatives, Alternative 7D would require the least area of new pavement. Alternatives 4 and 7C would require a moderate amount of new pavement, and Alternative 5C Modified would require the most new pavement.

Stormwater Management Area

Conceptual design has determined that sufficient area can be found to provide appropriate stormwater management for each retained build alternative. Of the retained build alternatives, Alternative 7D would require the least area for stormwater management. Alternatives 4 and 7C would require a moderate area, and Alternative 5C Modified would require the most area for stormwater management.

Overall Summary of Performance – Engineering Factors

Of the retained alternatives, Alternative 1 (No-Build) is the only alternative that would require no new right-of-way, pavement or stormwater management area.

No single build alternative would perform best overall in terms of engineering factors. The highest performers are: Alternative 4 with fewest displacements, Alternative 5C Modified with the fewest partial impacts, and 7D with least acreage of new pavement and stormwater management area.

D. STEP THREE - SUMMARY OF DETAILED STUDY FINDINGS

Detailed study of the five retained alternatives (1, 4, 5C Modified, 7C and 7D) involved conceptual engineering design of each retained alternative, initial refinement of design elements to avoid or minimize impacts, and refined calculations of traffic and environmental performance. This closer look provided for a clearer understanding of the potential functions, operations and impacts of the each alternative, enabling a more refined assessment of advantages and disadvantages.

Project Need

In particular, the performance of each retained alternative in response to the project Need was refined during detailed study. Specifically, a closer look at the alternatives in the context of each of the project needs criteria determined that Alternative 5C Modified would perform the best of the retained alternatives. Alternative 5C Modified would outperform the other alternatives in addressing existing and future traffic congestion, accommodating projected growth, enhancing system linkage and continuity, reducing impacts on historic districts/areas, improving emergency service accessibility, and improving safety.

Alternative 4 would respond to the project needs at a moderate level, while Alternatives 7C and 7D would perform the least well. In fact, the combined drawbacks of Alternatives 7C and 7D in terms of: capturing insufficient through traffic; providing an indirect connection to US 13; increasing traffic on New Burton Road; potential for increasing cut-through traffic on lower classification streets east of New Burton Road; and exhibiting dramatically high friction for mainline corridor traffic because of the number of intersections, driveways and turning movements, directly contradict the purpose of the West Dover Connector project. These compromises, considered in conjunction with the existence of high performing alternatives, render Alternatives 7C and 7D not prudent.

The detailed study results support the screening finding (Chapter IV) that the No-Build Alternative would be unresponsive to the project needs. Given the presence of other higher performing alternatives, the No-Build Alternative is determined to be not prudent.

Environmental and Engineering Factors

During detailed study, the performance of each retained alternative in terms of environmental impacts and engineering factors was also examined. As described in Sections C.ii and C.iii above, Alternatives 4 and 5C Modified tended to have fewer right-of-way acquisition impacts while Alternatives 7C and 7D tended to have fewer natural environment impacts. These differences largely relate to Alternatives 4 and 5C Modified being primarily off-alignment (new roadway) while 7C and 7D would be on-alignment (using existing roadways).

Taking a closer look at the impact quantities in Table V-3 indicates that, whereas the environmental and engineering impacts of the alternatives vary, the differences in the totals for some parameters are quite small. For example, the area of fill in floodplains and wetlands varies by tenths or hundredths of an acre among the alternatives. In contrast, the absolute numbers of right-of-way impacts are, in many cases, dramatically different. For example, 17 partial impacts under Alternative 5C Modified is significantly smaller than 102 partial impacts under Alternative 7D.

As Alternatives 4 and 5C Modified were determined during detailed study to be the only prudent alternatives to pursue in terms of addressing project Need, the performance of these alternatives in the context of engineering and environmental factors was considered. This analysis shows that while Alternative 4 would have slightly less impact on floodplains, Alternative 5C Modified would have significantly fewer partial impacts and fewer potential indirect impacts on historic properties. Unlike Alternative 4, Alternative 5C Modified would also avoid the potential for disproportionate effects on minority populations along Webbs Lane. Both alternatives would have similar or the same impacts on wetlands, streams, and direct historic property effects. Thus, each alternative has its trade-offs; neither alternative has the least impacts in all environmental areas.

As indicated in Chapter IV, the resource agencies favored the alternatives with fewer natural and historic resources impacts while the Working Group and general public favored alternatives that minimized new property impacts and displacements. The Working Group and general public also indicated concerns about pedestrian safety along Webbs Lane in Alternatives 4 and 7C. These preferences, in combination with the environmental and engineering findings, favor Alternative 5C Modified over Alternative 4.

When this finding is combined with the results of the project need analysis, Alternative 5C Modified is the prudent choice as it would be the best performer in terms of the project Need by a substantial margin and it would edge out Alternative 4 by incurring the least overall environmental harm.

E. SELECTION OF A PREFERRED ALTERNATIVE

Detailed study, Step Three, yielded refined and more comprehensive analysis results for the four retained build alternatives and the No-Build alternative. DeIDOT will report these results to stakeholders, the public and the environmental Resource Agencies and seek their feedback. Based on the results of the three-step alternatives evaluation and pending the outcome of stakeholder, public and resource agency feedback, DeIDOT expects to select Alternative 5C Modified as the state's recommended preferred alternative. If FHWA concurs with this selection, a decision will subsequently be made to advance the preferred alternative, at which time a National Environmental Policy Act document and a Section 4(f) evaluation will be completed.