FEASIBILITY STUDY

FOR

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS

BROKEN LAND PARKWAY / US ROUTE 29
NORTH-SOUTH CONNECTOR ROAD

Howard County
MARYLAND

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December 2011

Note:
This is an initial draft report presented to Howard County by the Howard Hughes Corporation. The County staff is in the process of reviewing this document and has not yet accepted it. Any questions or concerns regarding this draft report should be directed to the Howard Hughes Corporation.

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SUMMARY REPORT

I. Introduction/Purpose/Need

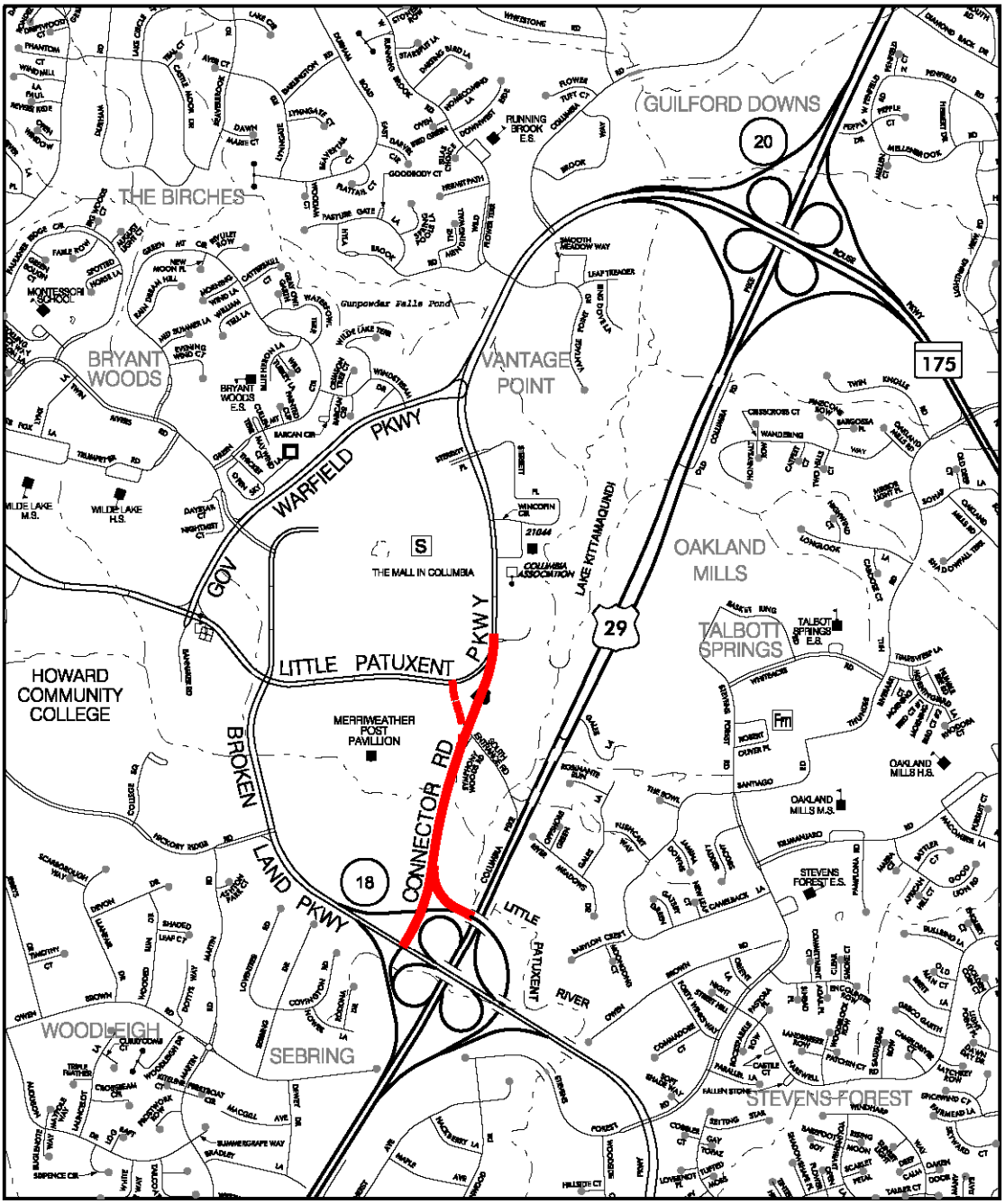
This Feasibility Study has been prepared for Howard County, Maryland in conjunction with The Howard Hughes Corporation (formerly General Growth Properties, Inc.). The purpose of the study is to investigate the feasibility of a new Broken Land Parkway / US Route 29 north/south collector road connection to Little Patuxent Parkway as presented in the DOWNTOWN COLUMBIA PLAN – A General Plan Amendment, adopted February 1, 2010 and as identified in the Downtown Community Enhancements, Programs and Public Amenities (CEPPAs) Implementation Chart, #5 under Howard County Council Bill No. 58-2009. The study also includes development of conceptual SWM requirements, potential environmental impacts, right-of-way needs, and preliminary cost estimates.

The Study Area extends along US Route 29 from south of the Broken Land Parkway interchange to north of the Maryland Route 175/Little Patuxent Parkway interchange and encompasses downtown Columbia including The Mall in Columbia and Merriweather Post Pavilion. US Route 29 serves as the east border of the study area and Little Patuxent Parkway, Governor Warfield Parkway, and Broken Land Parkway serve as the west border.

The Downtown Columbia Plan is an amendment to the Howard County General Plan and creates a 30-year master plan for the revitalization and redevelopment of Downtown Columbia. The Plan is a guide to Downtown Columbia's continued evolution as the County's economic and cultural center through increasing the number of people living downtown and by adding more residences, shops and recreational and cultural amenities in Downtown Columbia, while also making downtown more attractive and easier to navigate. The Downtown Columbia Plan includes approximately 5 million square feet (sq. ft.) of new office space, 1 million sq. ft. of new retail space, 5,500 new residential dwelling units, and 640 new hotel rooms. These new uses would displace approximately 618,000 sq. ft. of existing office space and 10,000 sq. ft. of existing retail space.

US Route 29 links Downtown Columbia to metropolitan Baltimore to the north and Washington D.C. to the south. Currently, Broken Land Parkway serves as the link from US Route 29 to the Little Patuxent Parkway and Downtown Columbia providing access and carrying most of the traffic for points south. With the projected revitalization and redevelopment of Downtown Columbia and only providing the current planned and programmed transportation system improvements to the existing Downtown Columbia roadway network and access links, the Broken Land Parkway intersections along the link from US 29 to Downtown Columbia will operate at a failing LOS "F" in the future Design Year 2035; and in particular the intersection of Broken Land Parkway and Little Patuxent Parkway will operate at a failing LOS "F" in both the morning and afternoon peaks hours.

The new Broken Land Parkway / US Route 29 north/south collector road connection to Little Patuxent Parkway (N/S Connector Rd) is needed to increase vehicular and pedestrian mobility, address safety concerns, and provide adequate capacity to meet the future growth and development as outlined in the Downtown Columbia Plan. The N/S Connector Road will address the future traffic demand along the Broken Land Parkway link from US 29 to Downtown Columbia by providing an additional access and new central link to Downtown Columbia for traffic from points southeast of Columbia and primarily for US Route 29 traffic to and from the south.



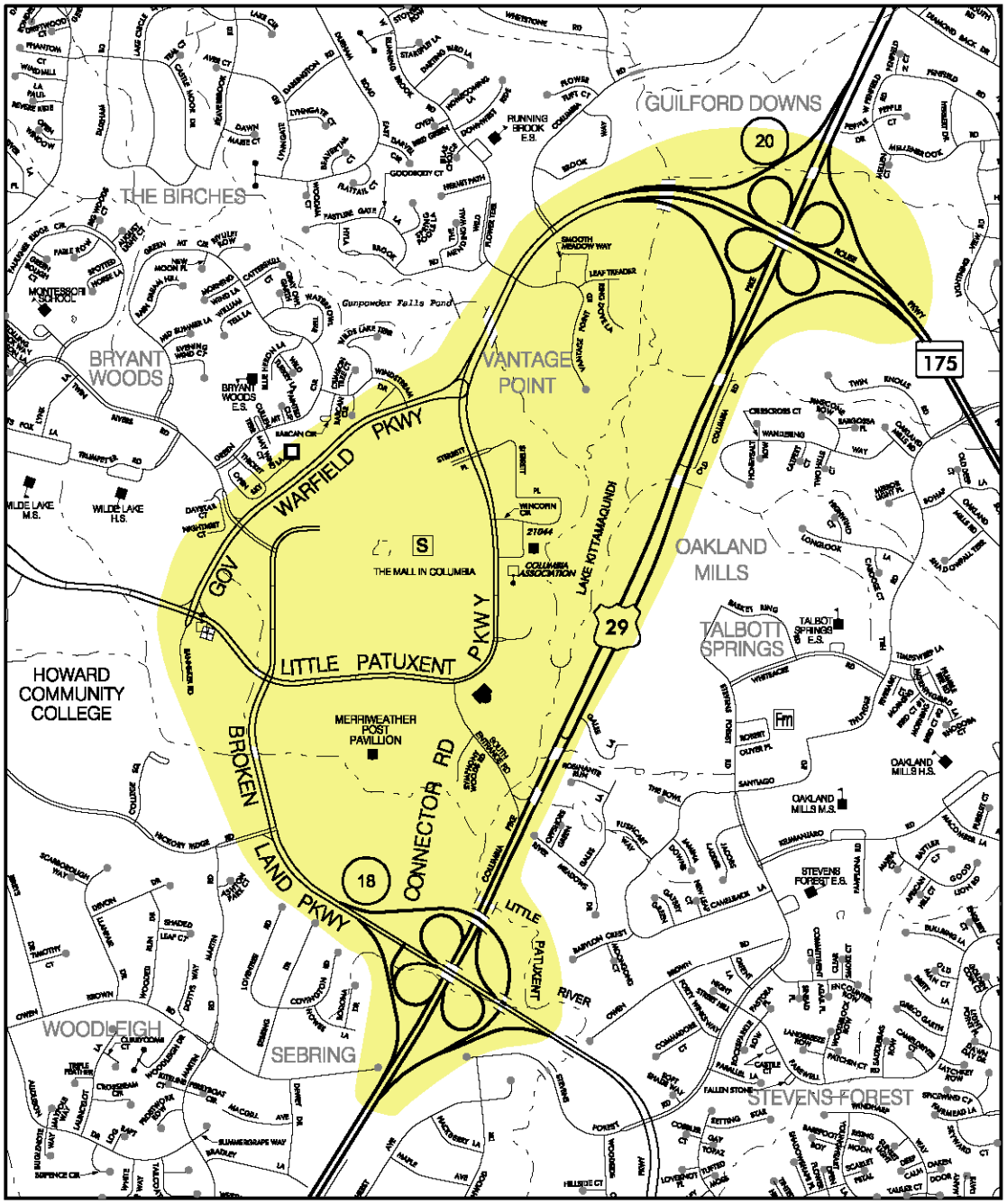
PROPOSED NORTH-SOUTH CONNECTOR ROAD

HOWARD COUNTY

2000' 0 2000' 4000'

SCALE: 1"=2000'

MAP No. 1 - LOCATION MAP



MAP No. 2 - STUDY AREA MAP

II. Existing Conditions

Existing Network. The Downtown Columbia street network relies on just a few, relatively large, high-speed arterial streets. US Route 29 links Downtown Columbia to metropolitan Baltimore to the north and Washington, D.C. to the south. Little Patuxent Parkway, Governor Warfield Parkway, and Broken Land Parkway carry most (approximately 70 percent) of the traffic that currently enters and leaves Downtown Columbia. Hickory Ridge Road and Twin Rivers Road carry a combined approximately 20 percent of traffic into and out of Downtown Columbia. Windstream Drive, Banneker Road, and South Entrance Road carry the remaining of Downtown Columbia traffic. There are few collector streets in Downtown Columbia. The Mall ring road and parking lot drive aisles function as private local streets.

Existing Bottlenecks. Two grade-separated interchanges control access to Route 29: (1) Little Patuxent Parkway (MD 175) to the north and (2) Broken Land Parkway to the south. South Entrance Road provides at-grade, right-in and right-out access to southbound US Route 29. Three bottleneck intersections control the volume of traffic that can enter and exit Downtown Columbia: (1) Little Patuxent Parkway/Governor Warfield Parkway (North), (2) Little Patuxent Parkway/Broken Land Parkway, and (3) Broken Land Parkway/Hickory Ridge Road.

Street Descriptions. The major streets in Downtown Columbia are described below:

US Route 29 (Columbia Pike) provides regional access to Columbia from Baltimore, Washington, and beyond. The Howard County General Plan classifies US Route 29 as a principal arterial roadway. The controlled-access, median-divided roadway provides two to three lanes in each direction. Grade-separated interchanges at MD Route 32, Seneca Drive, Broken Land Parkway, MD Route 175, and MD Route 108 serve greater Columbia. South Entrance Road provides right-in/right-out only access on southbound Route 29. Full Access is provided to Columbia from US 29 through the Broken Land Parkway Interchange. A semi-direct flyover ramp (Ramp D) provides access to Columbia (BLP WB) from southbound US 29. A cloverleaf ramp (Ramp H), located in the southwest quadrant of the interchange, with a spur connection (Ramp E) to a signalized intersection with Broken Land Parkway provides access to Columbia from northbound US 29. A directional ramp (Ramp G) located in the southwest quadrant from eastbound Broken Land Parkway provides return access to US 29 southbound. A cloverleaf ramp (Ramp B) located in the southeast quadrant provides return access to northbound US 29.

Little Patuxent Parkway is the "Main Street" of the Downtown Columbia Town Center. It is a four to six lane divided roadway with separate left and right turn lanes at major intersections. The section of Little Patuxent Parkway between the two intersections with Governor Warfield Parkway is classified by the Howard County General Plan as a minor arterial roadway. East and west of Governor Warfield Parkway, Little Patuxent Parkway is classified by the Howard County General Plan as an intermediate arterial.

Broken Land Parkway provides access to the Town Center from MD 32 and US Route 29 to the south and east. Broken Land Parkway is a four lane, divided roadway that is classified by the Howard County General Plan as an intermediate arterial.

Governor Warfield Parkway intersects Little Patuxent Parkway to the north and to the west of the Mall in Columbia, forming a loop around the Town Center. Governor Warfield

Parkway is a four lane, divided roadway in the Town Center and is classified by the Howard County General Plan as an intermediate arterial.

Planned and Programmed Improvements. The 2000 Howard County General Plan includes the extension of Hickory Ridge Road eastward from its present terminus at Broken Land Parkway to the Little Patuxent Parkway.

The Maryland Consolidated Transportation Program (CTP) includes a project, jointly funded by the Maryland State Highway Administration (SHA) and Howard County, to widen northbound Route 29 by one lane from MD 32 north to MD 175.

No other road improvements are known to be programmed in the study area.

III. Traffic Volumes/Conditions

To forecast traffic volumes on the road network in the Downtown Columbia area, a sub-area travel demand forecasting model was developed. The model was then applied to analyze the traffic demands on the study area road network in the future year (2035). The main purpose of the analysis was to evaluate the operational condition of the roadway network, identify road segments forecasted to be congested in future year, and also forecast the traffic volumes of potential road projects. The travel demand forecasting model and forecasting of traffic volumes of potential road projects, including the N/S Connector Road was presented in the Columbia Town Center Travel Demand Model and Traffic Forecast Report (WITH 7C UPDATE AND REVISED ALTERNATIVES), dated May 2011 prepared by Sabra Wang & Associates, Inc. and Vision Engineering & Planning for the Howard County Departments of Public Works and Planning and Zoning.

The model incorporated socio-economic characteristics (number of households, population, number of employees by type, etc.) of the proposed redevelopment of Downtown Columbia in accordance with the General Plan Amendment. The socio-economic characteristics data (Round 7C) was provided by the Howard County Department of Planning and Zoning Research Division. In addition, the model incorporated projected traffic data at each major external highway facility (stations) cutting through the boundary of the model area. The traffic demand at these external stations depends on the regional growth of the Baltimore-Washington Metropolitan Area, not just on the development within the study area at these external stations. The projected traffic data and growth rates were obtained from the Baltimore Metropolitan Council (BMC) Regional Model.

With the forecasted traffic volumes presented in Columbia Town Center Travel Demand Model and Traffic Forecast Report further traffic analysis post-processing was performed by Wells & Associates, LLC using Synchro, Version 7 and SIDRA traffic analysis software for determining intersection capacity (peak volumes, LOS, delays, queues) for the existing Downtown Columbia roadway network with current planned and programmed transportation system improvements in the future Design Year 2035 and then incorporating the Downtown Columbia Plan's proposed North-South Connector Road connecting with the existing Broken Land Parkway/US Route 29 intersection (Ramp E) and the US 29 northbound fly-over ramp to westbound Broken Land Parkway (Ramp D) and proceeding north to tie-in with the Little Patuxent Parkway in the vicinity of the Howard County Library. The results of the intersection capacity (peak volumes, LOS, delays, queues) traffic analysis performed by Wells & Associates for existing conditions, future Design Year 2035 without and with the N/S Connector Road are included in Appendix A of this report.

With the projected redevelopment of Downtown Columbia and only providing the current planned and programmed transportation system improvements, the existing Downtown Columbia roadway network intersections of 1) Hickory Ridge Road/Broken Land Parkway, 2) Little Patuxent Parkway/Broken Land Parkway, 3) Little Patuxent Parkway/South Entrance Road, and 4) Little Patuxent Parkway/East Mall Entrance will have at least one traffic movement operating at a failing LOS "F" in the future Design Year 2035. *Overall, the Hickory Ridge Rd/Broken Land Pkwy intersection will operate at a LOS E/F (AM/PM) and the Little Patuxent Pkwy/Broken Land Pkwy intersection will operate at a LOS F/F.*

In general, the proposed N/S Connector Rd from Broken Land Parkway & US Route 29 to Little Patuxent Parkway will remove traffic from the Broken Land Parkway link from US 29 to the Little Patuxent Parkway and Downtown Columbia by providing additional access and a new center link to Downtown Columbia for traffic from points southeast of Columbia and primarily for US Route 29 traffic to and from the south. The proposed N/S Connector Rd will disperse traffic over a wider network and provide more capacity and resulting in shorter, more direct trips with less delay and therefore eliminating the failing LOS "F" operations noted for the above intersections in the future Design Year 2035.

IV. Proposed North South Connector Road Configuration & Geometrics

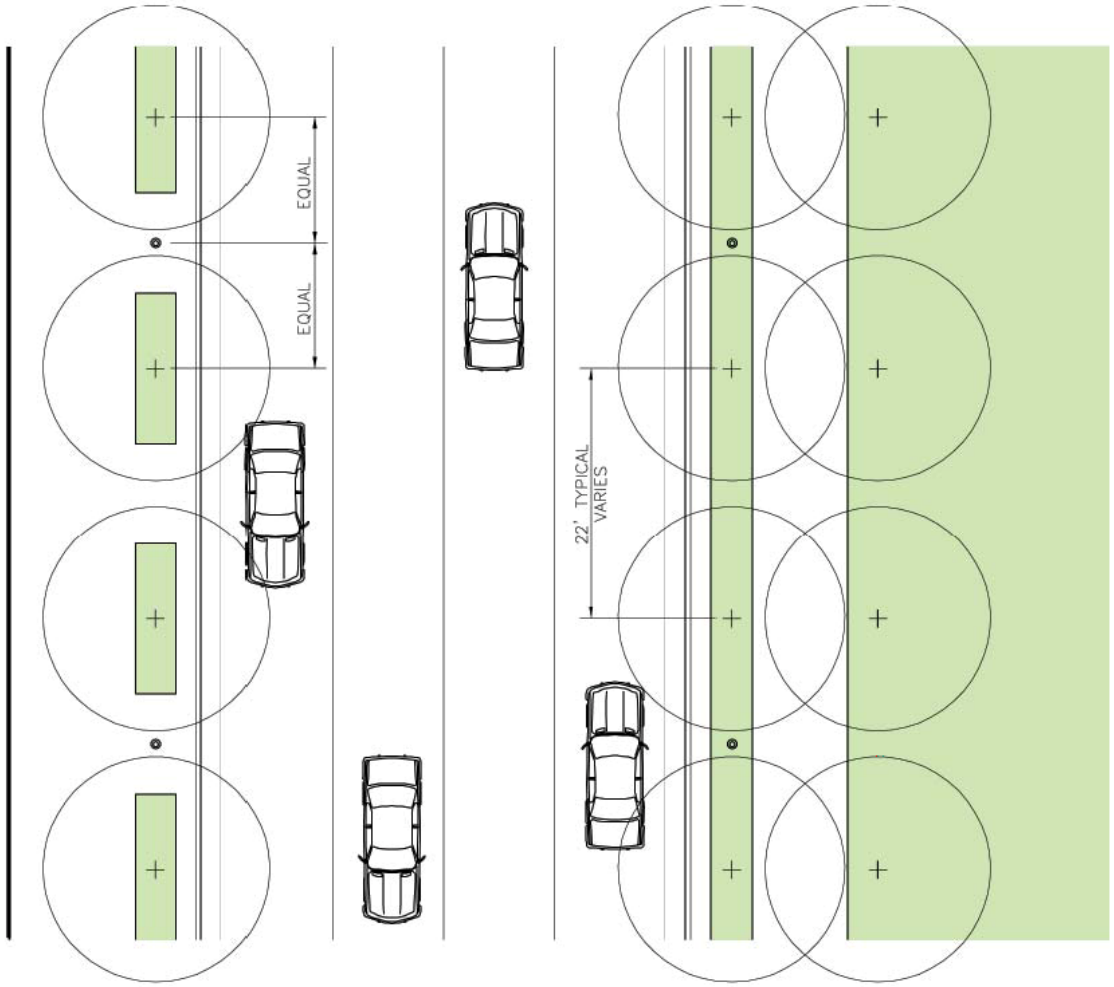
The proposed North-South (N/S) Connector Road provides a connection between Broken Land Pkwy and the US 29 Interchange to the Little Patuxent Pkwy in the vicinity of the Howard County Library providing a central access point to Downtown Columbia. The southern connection to the N/S Connector Road occurs at the existing Broken Land Pkwy/US 29 Interchange Ramp E intersection and with the NB US 29 Fly-over Ramp D to westbound Broken Land Pkwy. As part of this feasibility study efforts, a detailed typical section, preliminary horizontal and vertical alignments, and alternative intersection configurations were developed for the Connector Road.

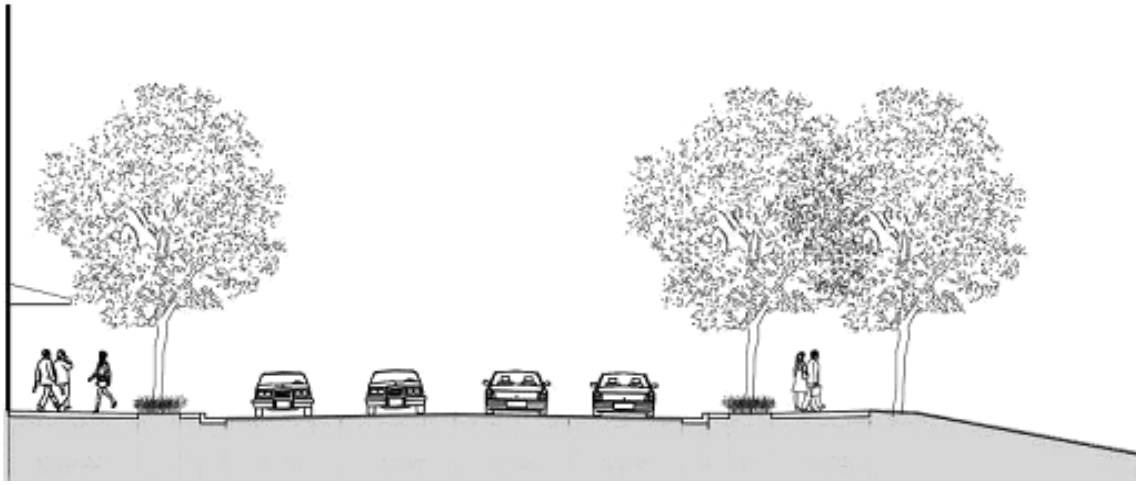
As part of the alignment effort, the future Crescent Road connection from the N/S Connector to the Hickory Ridge Road Extension (See Existing Conditions - Planned and Programmed Improvements) has been developed as well as the connections to the existing entrance roads and parking areas for the various existing properties along the alignment, including the VIP entrance to Merriweather Post Pavilion.

The N/S Connector Road in accordance with the Downtown Columbia Plan – A General Plan Amendment will be a major collector road. The N/S Connector Road geometrics were developed using highway design criteria for a 40 mph Design Speed in accordance with the Howard County Design Manual, Volume III, Roads and Bridges, dated October 2006 with Revisions February 2009 and the major collector road functional classification. In addition, in accordance with the Downtown Columbia Design Guidelines, Downtown-wide, dated November 2010, the N/S Connector Road's Planned Roadway Category will be an "Avenue Type 3" (See the diagram, plan and street section below) and is denoted as a primary bicycle route starting at the proposed Crescent Road connection northward into Downtown Columbia.

Avenue Type 3

- 4 lanes
- No parking
- Buildings on one side, adjacent to open space

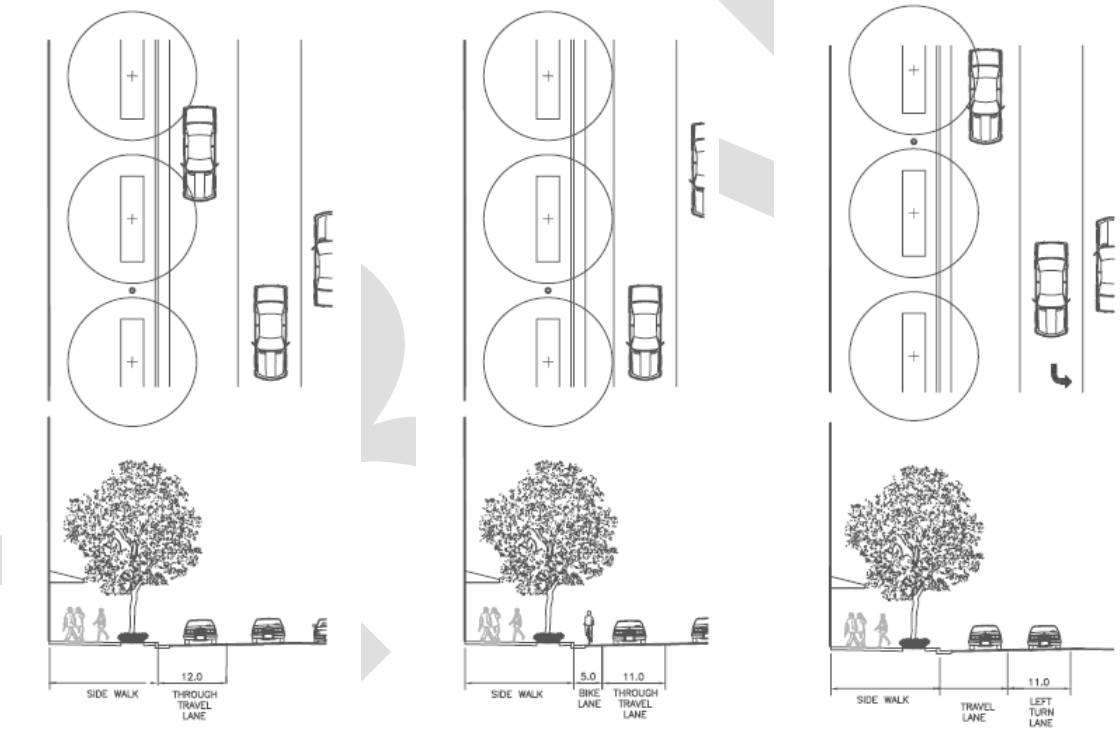




Note: Bicycle lanes or bike ways can be incorporated into the street typical cross sections.

The N/S Connector Road from the proposed Crescent Road connection northward to Downtown Columbia will consist of a closed section roadway with four (4) through travel lanes (two lanes in each direction) and pedestrian facilities (5 ft. sidewalks) offset 8 ft. from the edge of road along both sides. Bicycle lanes are incorporated within the roadway section (On-Street) adjacent to the outside through travel lane in both directions. To enhance roadway safety, maintain adequate traffic operations, and provide access to the N/S Connector Road's adjacent properties (Merriweather Post, Symphony Woods Office Center, Toby's Dinner Theatre) and intersecting roadways, single and dual left turn lanes were incorporated; effectively making the roadway at least a five (5) lane section from the proposed Crescent Road connection northward to Downtown Columbia. In accordance with Downtown Columbia Design Guidelines, the following lane widths were applied in developing the feasibility study roadway alignments/locations:

- Through Travel & Left Turn Lane Width: 11 ft.
- Through Travel & Left Turn Lane Width adjacent to curb: 12 ft.
- On-Street Bike Lane Width between outside lane and curb: 5 ft.

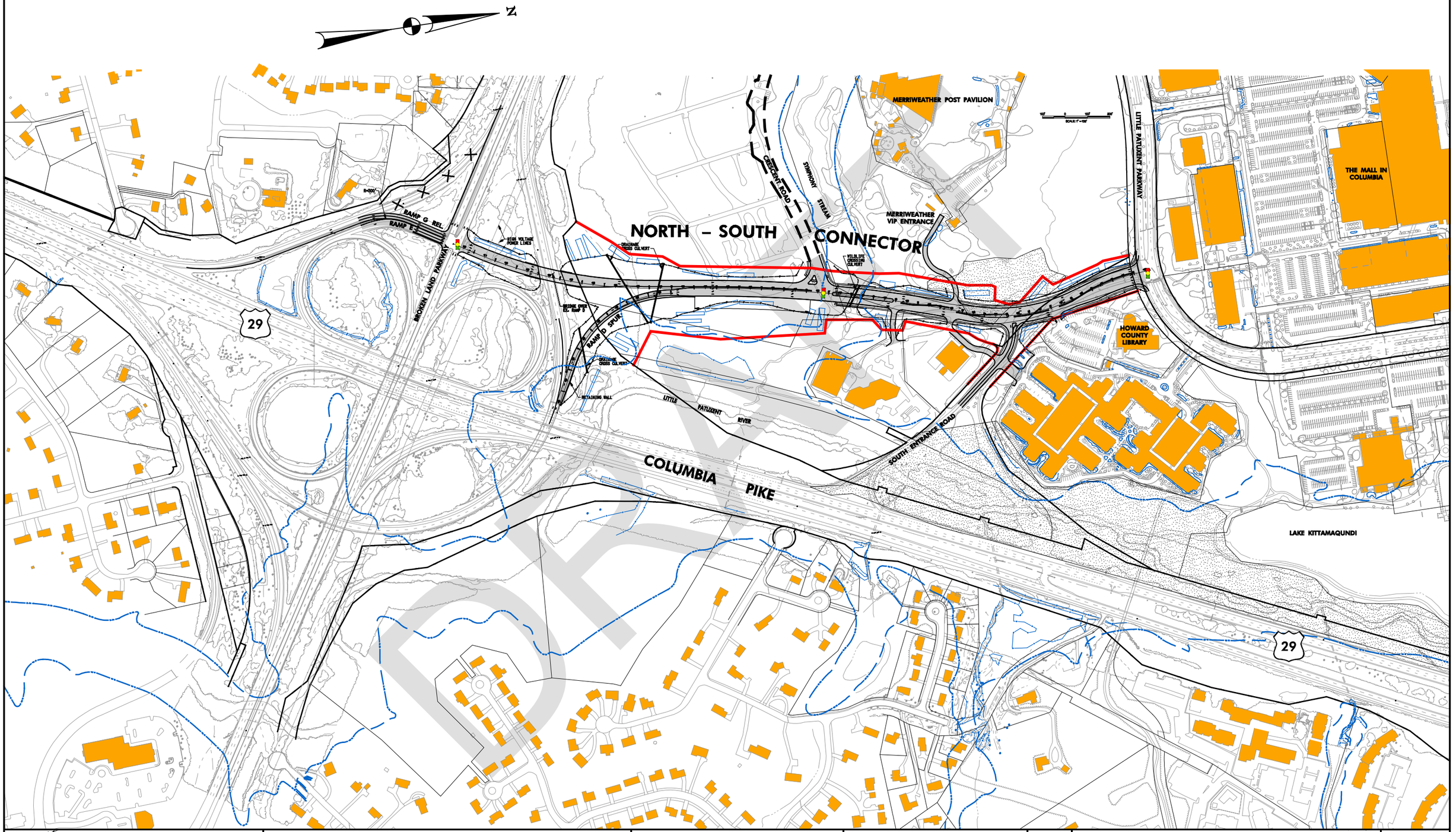


1 THROUGH TRAVEL LANE WIDTH (ADJACENT TO CURB): 12'-0"

3 THROUGH TRAVEL LANE WIDTH (ADJACENT TO BIKE LANE): 11'-0"

4 LEFT TURNING LANE WIDTH: 11'-0"

Two roadway alignments were developed for the N/S Connector Road from the Crescent Road connection northward to Little Patuxent Parkway: an "Interim" Phase One alignment/connection to Little Patuxent Parkway (Figure 1), and the "Ultimate" 30 year full redevelopment alignment/connection with Little Patuxent (Figure 2). In addition, three alternative concept connections for the N/S Connector to Broken Land Parkway, the US 29 NB fly-over ramp to WB Broken Land Parkway, and the proposed Crescent Road connection (Conventional T-Intersection, Roundabout, and Jug-Handle) have been developed. All three connections utilize the same N/S Connector Roadway alignments southward from the Crescent Road connection toward Broken Land Parkway and are fully compatible with



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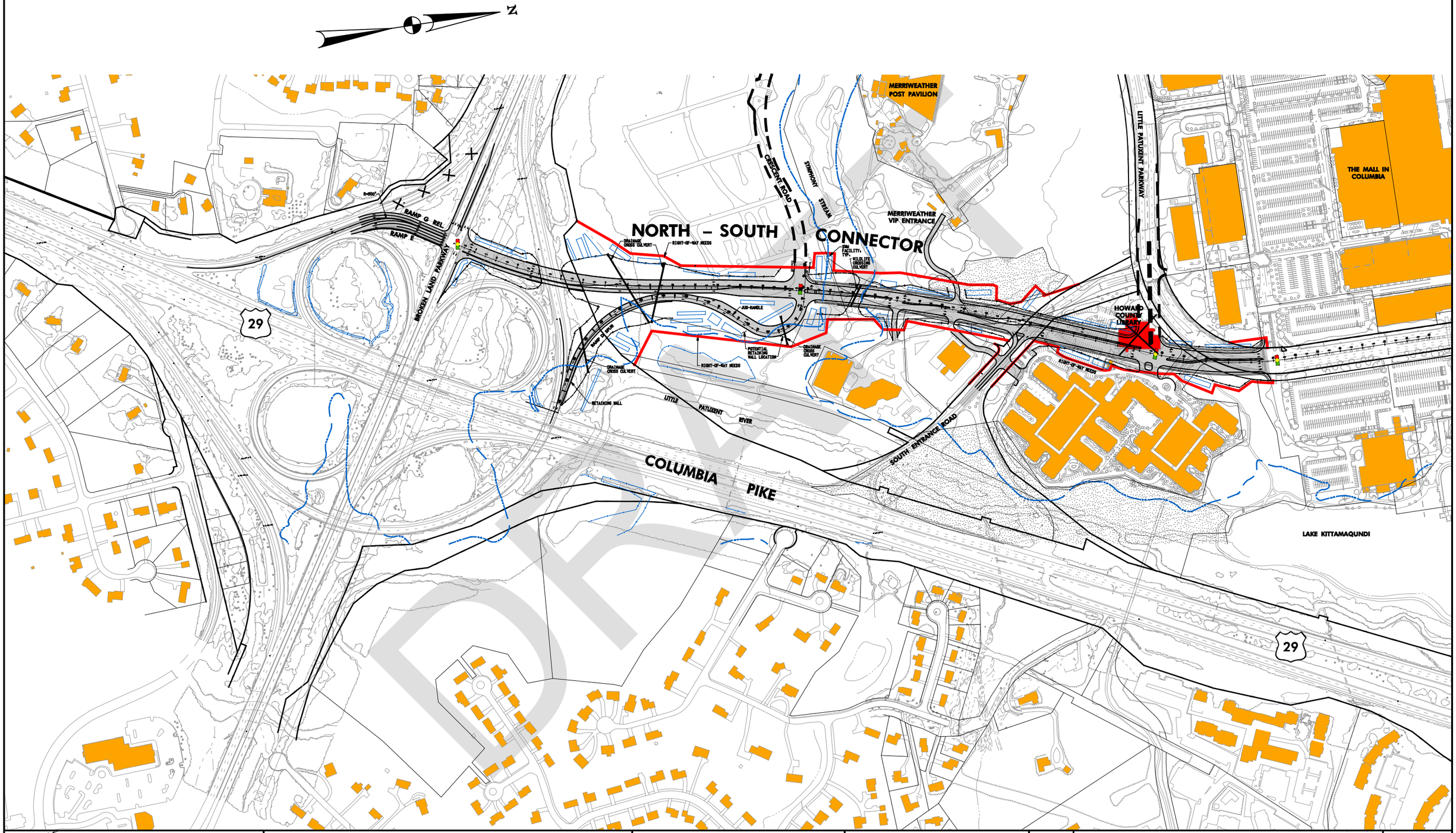
PRELIMINARY
Subject To Revision
Feasibility Study Only

DESIGN	JRK
DRAWN	RKG
CHECK	EPS
APPR	–

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS
NORTH-SOUTH CONNECTOR ROAD
INTERIM ALIGNMENT W/
T-INTERSECTION CONCEPT

DATE: DECEMBER 2011

FIGURE 1



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DESIGN	JRK
DRAWN	RKG
CHECK	EPS
APPR	–

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS
NORTH-SOUTH CONNECTOR ROAD
ULTIMATE ALIGNMENT W/
JUG HANDLE INTERSECTION CONCEPT

DATE: DECEMBER 2011

FIGURE 2

interim (Figure 1 – shown with the Conventional T-Intersection alternative) and ultimate (Figure 2 - shown with the Jug-Handle Alternative) alignments/connections with Little Patuxent Parkway. All three connection alternatives utilize an off-ramp (Ramp D Spur) to the N/S Connector Road from the 29 NB Fly-Over Ramp D to WB Broken Land Parkway; terminating at the proposed Crescent Road intersection with the N/S Connector.

Ramp D Spur. The Ramp D Spur geometrics were developed using highway design criteria for a 40 mph Design Speed in accordance with AASHTO's A Policy on Geometric Design of Highways and Streets, 4th Edition, dated 2001, which is currently the recognized Edition by SHA. The geometrics of the existing US 29/Broken Land Fly-Over Ramp D in which the proposed Ramp D diverges from meets the 45 mph Design Speed highway design criteria. The Ramp D Spur design speed of 40 mph is acceptable to AASHTO'S guide values for ramp design speed as related to the departing or entering highway design speed along with matching the proposed design speed for the N/S Connector Road. The proposed Ramp D Spur geometrics diverges from the existing Ramp D on a tangent alignment immediately after the Ramp D bridge structure (Bridge No. 13128) over US 29 to allow for the proper superelevation transition (runoff & runout) from the existing Ramp D Fly-over curvature (R=764'; SE rate=7.5%) to a reversing curve (R=465'; SE rate=8%) on the Ramp D Spur connecting to the N/S Connector. The roadway typical section for the Ramp D Spur will consist of combination open/closed section with a curb adjacent to the inside (left Side) of the 16 ft. width ramp travel lane and an open section 10 ft. shoulder along the outside (right side). Potentially a 250 ft. long, 15 ft. max. height retaining wall along the Ramp D Spur outside shoulder (right side) and adjacent to the Ramp D bridge structure (Bridge No. 13128) may be required to avoid impacts of US 29, minimize new embankment into the 10 year floodplain, and maintain existing drainage conveyance features.

N/S Connector – Ramp E – Broken Land Pkwy Intersection. The proposed N/S Connector Roadway connects to Broken Land Parkway at the location of the existing US 29 Interchange's Ramp E signalized intersection connecting SB US 29 to Broken Land WB. The N/S Connector's alignment departs from Broken Land northward to Downtown Columbia just to the west of the Broken Land westbound to US 29 southbound cloverleaf ramp, crossing under the BGE electric transmission overhead lines, then over the NB US 29 fly-over ramp to WB Broken Land, and then meeting the proposed Ramp D Spur from the east and the proposed Crescent Road from the west.

It was determined that the two southbound through travel lanes along the N/S Connector would need to carried to Broken Land Parkway and through unto the existing Ramp G to accommodate the returning traffic from Downtown Columbia to US 29 southbound. Therefore, the departure of Ramp G from eastbound Broken Land will be relocated (Ramp G Relocated) adjacent to existing Ramp E and the signalized intersection with the N/S Connector to accommodate the SB N/S Connector through movement and also to avoid a three lane merge/reduction to one lane along existing Ramp G and unto SB US 29. The Broken Land EB to SB US 29 movement will be accommodate as a right turn unto Ramp G Relocated at the N/S Connector, Ramp E, and Broken Land Pkwy Intersection.

N/S Connector – Crescent Road "Conventional-T" and Roundabout Intersections. Our initial analysis was in accordance with Downtown Columbia Plan providing northbound access along the N/S Connector Road from eastbound and westbound Broken Land Parkway and Ramp E along with the proposed Ramp D Spur to a conventional signalized "T-

Intersection" with the proposed connecting Crescent Road. In addition, a two-lane, 180 ft. inscribed radius roundabout was investigated for the N/S Connector – Crescent Road intersection with the combined northbound access from Broken Land and the Ramp D Spur. The N/S Connector – Crescent Road two-lane roundabout intersection with the combined traffic from Broken Land/Ramp E and the Ramp D Spur will operate at failing LOS F in the Future Design Year 2035 afternoon peak (Appendix A – Figure 8). In addition, although the traffic analysis/simulations indicate that the N/S Connector – Crescent Road signalized "T-Intersection" will operate at an acceptable LOS and that the N/S Connector northbound Broken Land – Crescent Road segment will functionally operate properly, there are inherent safety issues due to the short weave length between the N/S Connector Road and Ramp D Spur prior to the Crescent Road intersection. A total weave length of approximately 560 ft. is provided from the Ramp D Spur to the intersection. Given the 95th percentile queue of 300 ft. and approximately 120 ft. for the development of the left turn lane from NB N/S Connector to Crescent Road, this leaves approximately 140 ft. for Ramp D Spur traffic to weave over two lanes to access Crescent Road.

Additional analysis was performed with the northbound access removed along the N/S Connector Road from Broken Land and Ramp E to the conventional signalized "T" (Figure 3) and roundabout (Figure 4) intersections at Crescent Road. Both Crescent Road intersection alternatives operate at acceptable levels of service (Roundabout: LOS B/C – See Appendix A – Figure 6) and the Ramp D Spur weave conflict has been eliminated. However without the northbound N/S Connector movement from Broken Land, the Broken Land traffic gets significantly worse from the 29 Interchange to Little Patuxent Parkway due to the increased volume that must be carried on that segment of roadway. The Hickory Ridge Road – Broken Land intersection operates at an LOS C/C (Appendix A – Figure 8) with the N/S Connector northbound movement provided and a LOS D/E without (Appendix A – Figure 6).

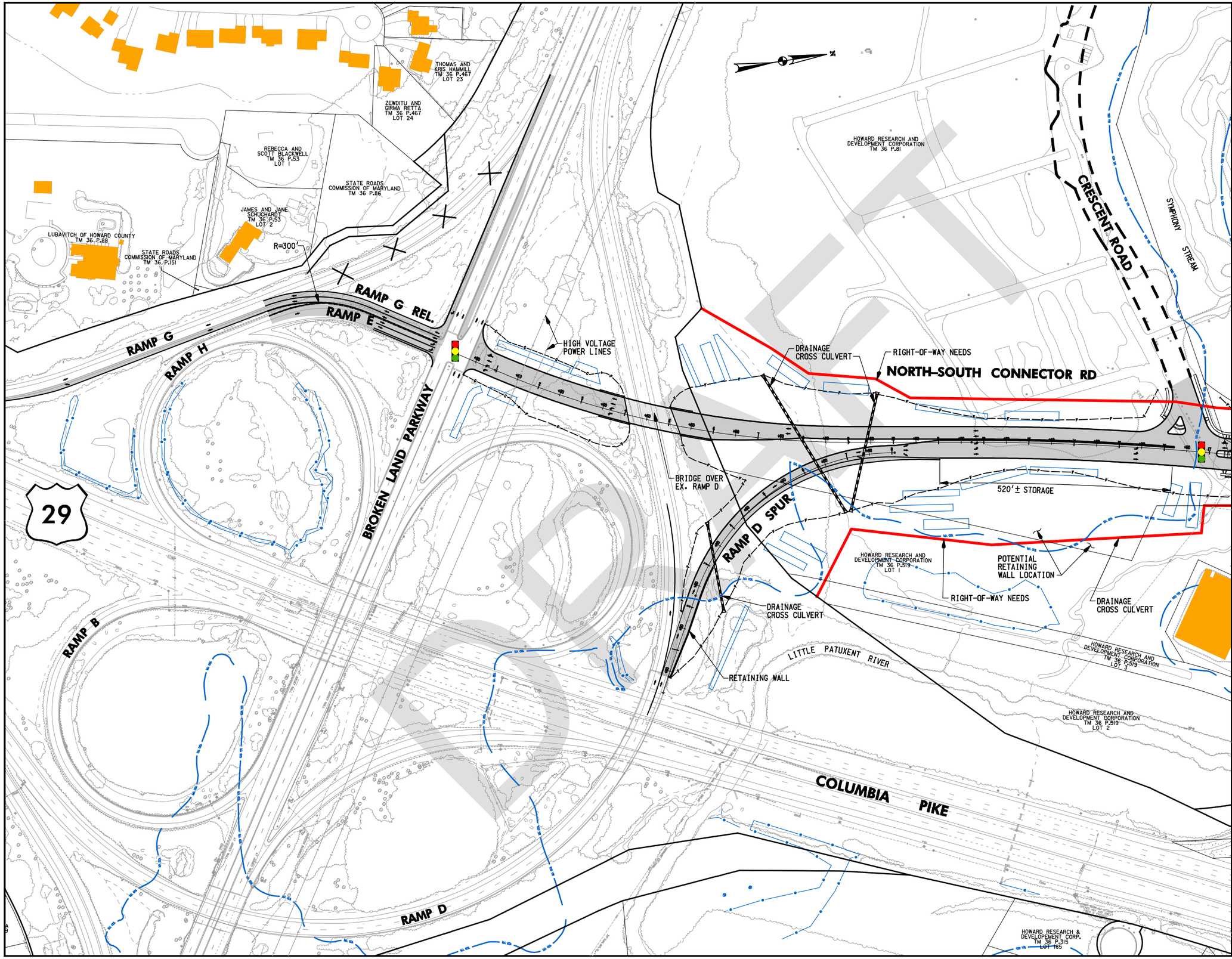
N/S Connector – Crescent Road "Jug-Handle" Intersection. To provide the northbound access along the N/S Connector Road from eastbound and westbound Broken Land Parkway and SB US 29 in accordance with the Downtown Columbia Plan and allow for the Ramp D Spur (NB US 29) traffic to safely access Crescent Road, an N/S Connector – Crescent Road "Jug-Handle" intersection alternative (Figure 5) was developed. Under this alternative, a fourth "Jug Handle" leg (east approach) is added with the termination of the Ramp D Spur at the N/S Connector (north-south approaches) and Crescent Road (west approach) intersection. The N/S Connector – Crescent Road "Jug-Handle" intersection alternative will operate at an LOS C/C (Appendix A – Figure 8) in the Future Design Year 2035 providing full access from the N/S Connector (both northbound & southbound directions) and to Crescent Road without the need for any weave movements between Ramp D Spur and the N/S Connector.

N/S Connector Road – Little Patuxent Intersection. As noted above an "Interim" Phase One alignment and the "Ultimate" 30 year full redevelopment alignment were developed for the N/S Connector Road from the Crescent Road connection northward to Little Patuxent Parkway. The Interim Alignment (Figure 6) utilizes the existing Symphony Woods Road (access road to Merriweather Post, Toby's from the South Entrance Road), a future Symphony Woods Road Right-of-Way Dedication (Howard County Plat Book 30 Plat Number 45), and the South Entrance Road intersection with Little Patuxent. The South Entrance Road will be realigned to create a "T-Intersection" with the N/S Connector. In the Future Design Year 2035, the southbound N/S Connector (left turn) movement to the South Entrance Road (SB US 29) and the entrance of the adjacent Howard County Library will

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS

NORTH-SOUTH CONNECTOR ROAD AT BROKEN LAND PARKWAY

CONVENTIONAL T-INTERSECTION CONCEPT CONNECTION



LEGEND

- PROPOSED RIGHT OF WAY LIMITS
- TOE OF FILL — F —
- PROPOSED N/S CONNECTOR RD — 2 — +50 — 3
- PROPOSED SWM ESD AREA
- TOE OF CUT — C —
- ROADWAY TO BE REMOVED
- PROPOSED ROAD BY OTHERS
- EX. BUILDING/ DWELLING
- DWELLING TO BE DISPLACED
- 100 YEAR FLOOD PLANE — 100 YR —
- WETLANDS
- HIGH QUALITY FOREST STAND

100' 0 100' 200'

SCALE: 1"=100'

PRELIMINARY

SUBJECT TO REVISION
FEASIBILITY STUDY ONLY

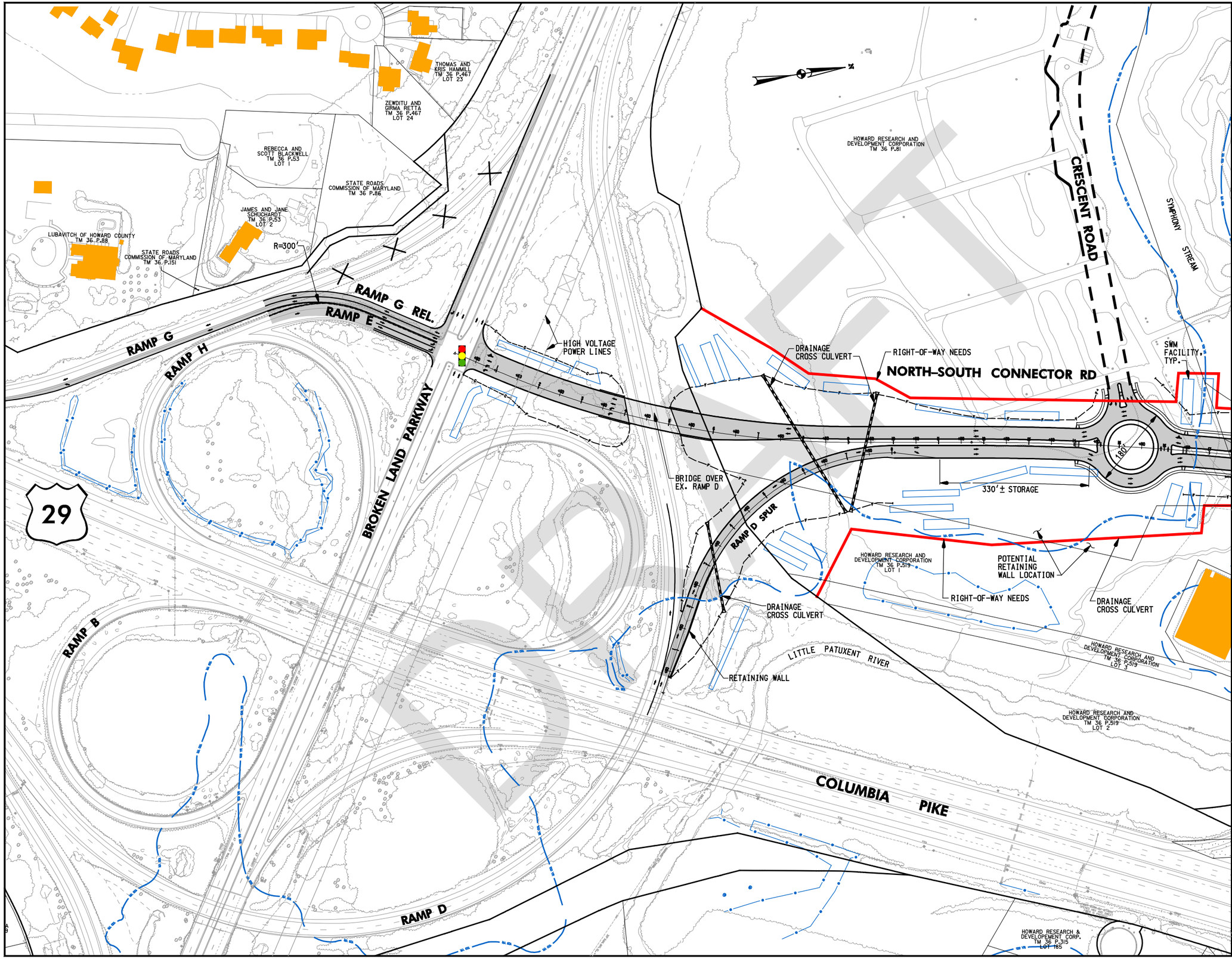
DATE: DECEMBER 2011

FIGURE 3

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS

NORTH-SOUTH CONNECTOR ROAD AT BROKEN LAND PARKWAY

ROUNDABOUT CONCEPT CONNECTION



LEGEND

- PROPOSED RIGHT OF WAY LIMITS
- TOE OF FILL — F —
- PROPOSED N/S CONNECTOR RD — 2 — +50 — 3
- PROPOSED SWM ESD AREA
- TOE OF CUT — C —
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- 100 YEAR FLOOD PLANE — 100 YR —
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- HIGH QUALITY FOREST STAND

100' 0 100' 200'

SCALE: 1"=100'

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DATE: DECEMBER 2011

FIGURE 4

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS

NORTH-SOUTH CONNECTOR ROAD AT BROKEN LAND PARKWAY

JUG HANDLE CONCEPT CONNECTION

THOMAS AND KRIS HAMMILL TM 36 P.467 LOT 23

ZEWDITU AND GIRMA RETTA TM 36 P.467 LOT 24

REBECCA AND SCOTT BLACKWELL TM 36 P.53 LOT 1

STATE ROADS COMMISSION OF MARYLAND TM 36 P.86

JAMES AND JANE SCHUCHARDT TM 36 P.53 LOT 2

LUBAVITCH OF HOWARD COUNTY TM 36 P.88

STATE ROADS COMMISSION OF MARYLAND TM 36 P.151

R=300'

HOWARD RESEARCH AND DEVELOPMENT CORPORATION TM 36 P.81

CRESCENT ROAD

SYMPHONY STREAM

RAMP G REL.

RAMP E

RAMP G

RAMP H

HIGH VOLTAGE POWER LINES

DRAINAGE CROSS CULVERT

RIGHT-OF-WAY NEEDS

NORTH-SOUTH CONNECTOR RD

SWM FACILITY, TYP.

BROKEN LAND PARKWAY

BRIDGE OVER EX. RAMP D

JUG-HANDLE

RAMP D SPUR

HOWARD RESEARCH AND DEVELOPMENT CORPORATION TM 36 P.519 LOT 1

POTENTIAL RETAINING WALL LOCATION

RIGHT-OF-WAY NEEDS

DRAINAGE CROSS CULVERT

DRAINAGE CROSS CULVERT

RETAINING WALL

LITTLE PATUXENT RIVER

HOWARD RESEARCH AND DEVELOPMENT CORPORATION TM 36 P.519 LOT 3

HOWARD RESEARCH AND DEVELOPMENT CORPORATION TM 36 P.519 LOT 2

29

RAMP B

RAMP D

COLUMBIA PIKE

HOWARD RESEARCH & DEVELOPEMENT CORP. TM 36 P.315 LOT 185

LEGEND

- PROPOSED RIGHT OF WAY LIMITS
- TOE OF FILL — F —
- PROPOSED N/S CONNECTOR RD — 2 — +50 — 3
- PROPOSED SWM ESD AREA
- TOE OF CUT — C —
- ROADWAY TO BE REMOVED
- PROPOSED ROAD BY OTHERS
- EX. BUILDING/ DWELLING
- DWELLING TO BE DISPLACED
- 100 YEAR FLOOD PLANE — 100 YR —
- WETLANDS
- HIGH QUALITY FOREST STAND

100' 0 100' 200'

SCALE: 1"=100'

PRELIMINARY

SUBJECT TO REVISION
FEASIBILITY STUDY ONLY

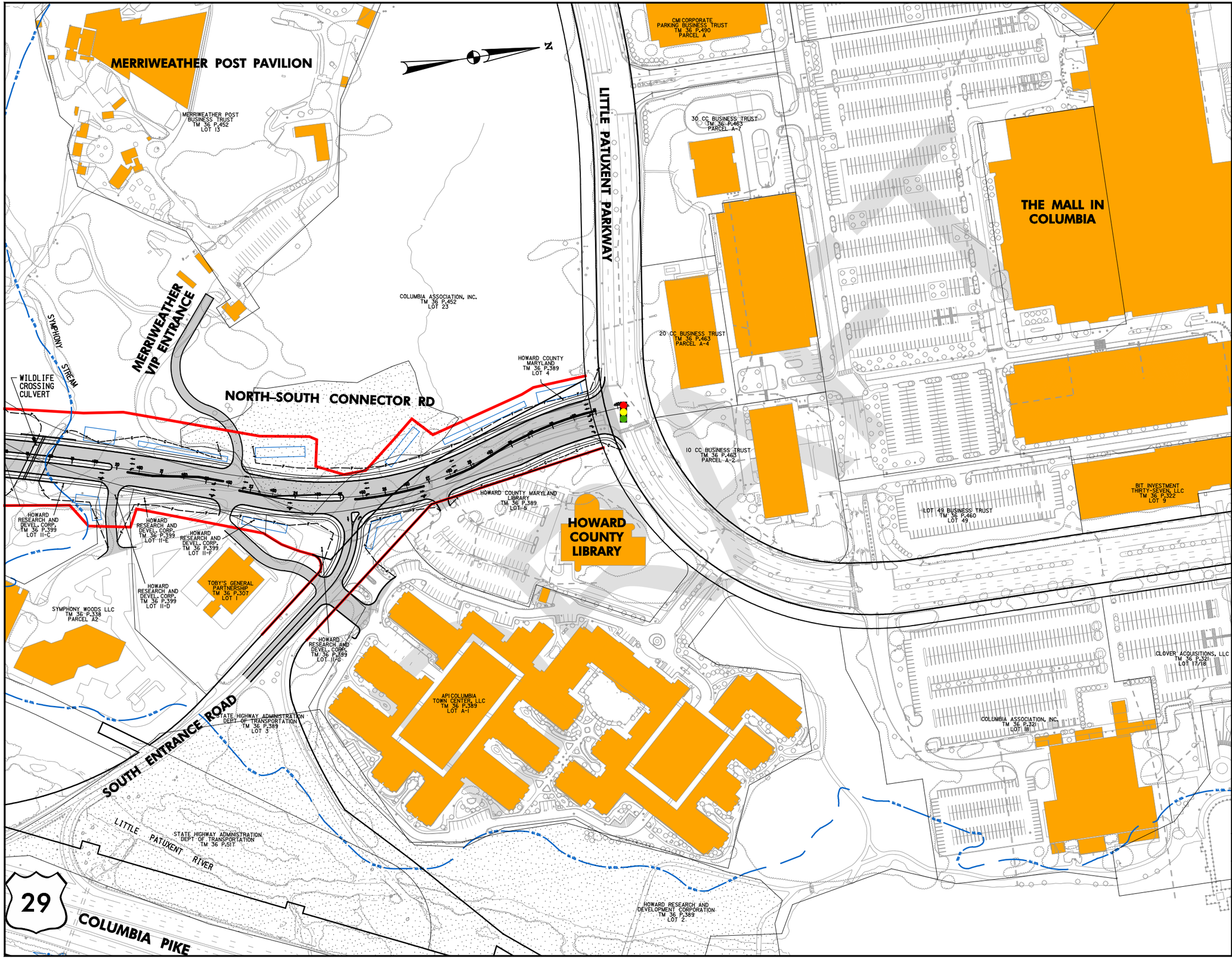
DATE: DECEMBER 2011

FIGURE 5

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS

NORTH-SOUTH CONNECTOR ROAD AT LITTLE PATUXENT PARKWAY

INTERIM ALIGNMENT



LEGEND

- PROPOSED RIGHT OF WAY LIMITS
- TOE OF FILL — F —
- PROPOSED N/S CONNECTOR RD — 2 — +50 — 3
- PROPOSED SWM ESD AREA
- TOE OF CUT — C —
- ROADWAY TO BE REMOVED
- PROPOSED ROAD BY OTHERS
- EX. BUILDING/ DWELLING
- DWELLING TO BE DISPLACED
- 100 YEAR FLOOD PLANE — 100 YR —
- WETLANDS
- HIGH QUALITY FOREST STAND

100′ 0 100′ 200′

SCALE: 1″=100′

PRELIMINARY

SUBJECT TO REVISION
FEASIBILITY STUDY ONLY

DATE: DECEMBER 2011

FIGURE 6

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS

NORTH-SOUTH CONNECTOR ROAD AT LITTLE PATUXENT PARKWAY

ULTIMATE ALIGNMENT

MERRIWEATHER POST PAVILION

MERRIWEATHER POST BUSINESS TRUST TM 36 P.452 LOT 13

COLUMBIA ASSOCIATION, INC. TM 36 P.452 LOT 23

MERRIWEATHER VIP ENTRANCE

SYMPHONY STREAM

WILDLIFE CROSSING CULVERT

NORTH-SOUTH CONNECTOR RD

LITTLE PATUXENT PARKWAY

HOWARD COUNTY MARYLAND TM 36 P.389 LOT 4

CMI CORPORATE PARKING BUSINESS TRUST TM 36 P.490 PARCEL A

30 CC BUSINESS TRUST TM 36 P.463 PARCEL A-7

THE MALL IN COLUMBIA

20 CC BUSINESS TRUST TM 36 P.463 PARCEL A-4

10 CC BUSINESS TRUST TM 36 P.463 PARCEL A-2

HOWARD COUNTY LIBRARY

HOWARD COUNTY MARYLAND LIBRARY TM 36 P.389 LOT 5

BIT INVESTMENT THIRTY-SEVEN, LLC TM 36 P.322 LOT 9

LOT 49 BUSINESS TRUST TM 36 P.460 LOT 49

HOWARD RESEARCH AND DEVEL. CORP. TM 36 P.399 LOT II-C

HOWARD RESEARCH AND DEVEL. CORP. TM 36 P.399 LOT II-E

HOWARD RESEARCH AND DEVEL. CORP. TM 36 P.399 LOT II-F

HOWARD RESEARCH AND DEVEL. CORP. TM 36 P.399 LOT II-D

TOBY'S GENERAL PARTNERSHIP TM 36 P.307 LOT I

SYMPHONY WOODS LLC TM 36 P.538 PARCEL A2

HOWARD RESEARCH AND DEVEL. CORP. TM 36 P.399 LOT II-G

RIGHT-OF-WAY NEEDS

API COLUMBIA TOWN CENTER, LLC TM 36 P.389 LOT A-I

CLOVER ACQUISITIONS, LLC TM 36 P.321 LOT 17/18

COLUMBIA ASSOCIATION, INC. TM 36 P.321 LOT 18

SOUTH ENTRANCE ROAD

STATE HIGHWAY ADMINISTRATION DEPT OF TRANSPORTATION TM 36 P.389 LOT 3

STATE HIGHWAY ADMINISTRATION DEPT OF TRANSPORTATION TM 36 P.517

LITTLE PATUXENT RIVER

HOWARD RESEARCH AND DEVELOPMENT CORPORATION TM 36 P.389 LOT 2

29

COLUMBIA PIKE

LEGEND

- PROPOSED RIGHT OF WAY LIMITS
- TOE OF FILL (F)
- PROPOSED N/S CONNECTOR RD (2 / +50 / 3)
- PROPOSED SWM ESD AREA
- TOE OF CUT (C)
- ROADWAY TO BE REMOVED
- PROPOSED ROAD BY OTHERS
- EX. BUILDING/ DWELLING
- DWELLING TO BE DISPLACED
- 100 YEAR FLOOD PLANE (100 YR)
- WETLANDS
- HIGH QUALITY FOREST STAND

100′ 0 100′ 200′

SCALE: 1"=100′

PRELIMINARY

SUBJECT TO REVISION
FEASIBILITY STUDY ONLY

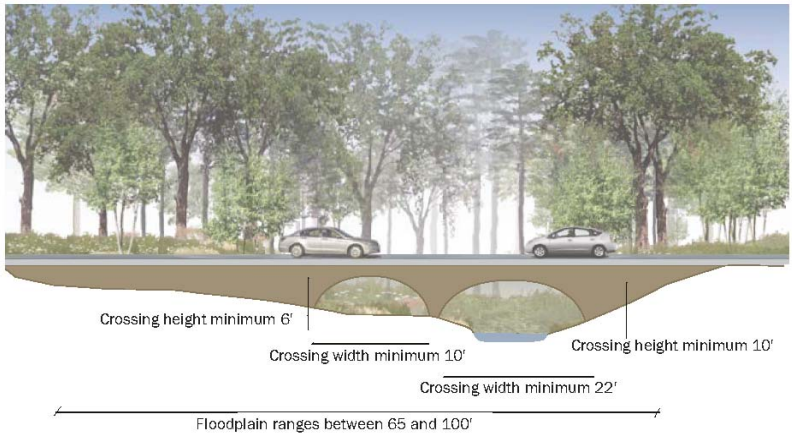
DATE: DECEMBER 2011

FIGURE 7

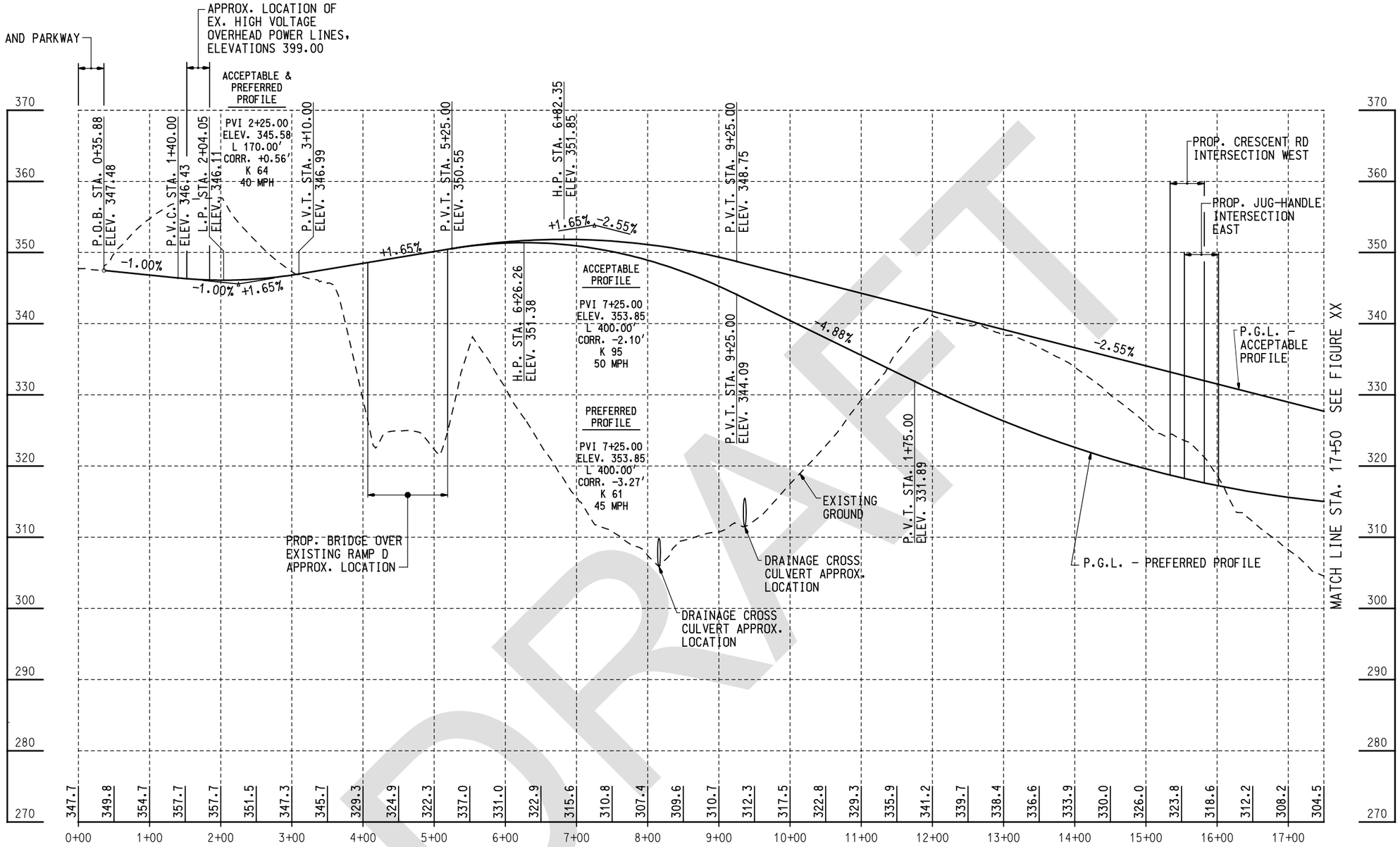
operate at a failing LOS F. The "ultimate" alignment (Figure 7) as identified in the adopted Downtown Columbia Plan utilizes the existing Symphony Woods Road corridor and future dedication but crosses over the South Entrance Road through the existing library property and creating a new intersection with the extension of the Little Patuxent Parkway eastward and then the existing Little Patuxent Parkway southward from the entrances to The Mall in Columbia's ring road and the former Rouse Co. Headquarters. The South Entrance Road will be realigned to create a right-in/right-out intersection" with the northbound N/S Connector.

N/S Connector Roadway Profile. Two alternative roadway profiles were developed for the N/S Connector "ultimate" alignment. The two alternative profile effectively provide the acceptable range of the roadway grades and elevations crossing Symphony Stream, which is a tributary to the Little Patxuent River running parallel and to the north of the proposed Crescent Road, and for providing acceptable tie-in connections to the existing entrance roads and parking areas for the various existing properties (Merriweather Post, Symphony Woods Office Center, Toby's Dinner Theatre) along the existing Symphony Woods Road corridor. The proposed profiles' grades are within the acceptable limits (1% min. and 6% max. desirable) and design controls for crest (K=44) and sag (K=64) vertical curves as outlined in the Howard County Design Manual for a major collector roadway and 40 mph design speed. The profiles are also compatible with the "Interim" Phase One alignment and tie-in grade of the South Entrance Road to its intersection with Little Patuxent.

As noted above the N/S Connector's alignment crosses under the BGE electric transmission overhead lines and then over the NB US 29 fly-over ramp to WB Broken Land. The proposed N/S Connector profile(s) (Figure 8) provides approximately 45 ft. clearance with the transmission lines based on actual field surveyed height measurements. Typically 25 ft. clearances are required between the road and overhead lines. In addition, the profile allows for the bridge structure crossing over the existing NB US 29 fly-over ramp providing 24 ft. grade separation between the N/S Connector Road and the existing ramp. The proposed bridge structure will be a single span of approximately 130 ft. In addition, the proposed N/S Connector profile(s) provides adequate clearances for a bridge structure crossing of Symphony Stream located between Crescent Road and the Merriweather Post entrance (Figure 9) as well as providing an adjoining wildlife passage structure as outlined in the Columbia Town Center Merriweather & Crescent Environment Enhancements Study dated September 2008; a supplemental document to the General Plan Amendment.



Wildlife Corridor Arch Culvert Elevation View



NORTH–SOUTH CONNECTOR ROAD

Howard County MARYLAND

WALLACE, MONTGOMERY & ASSOCIATES, LLP
110 West Road, Suite 300
Towson, Maryland 21204
(410) 494-9093 (410) 825-5714 fax
www.WallaceMontgomery.com

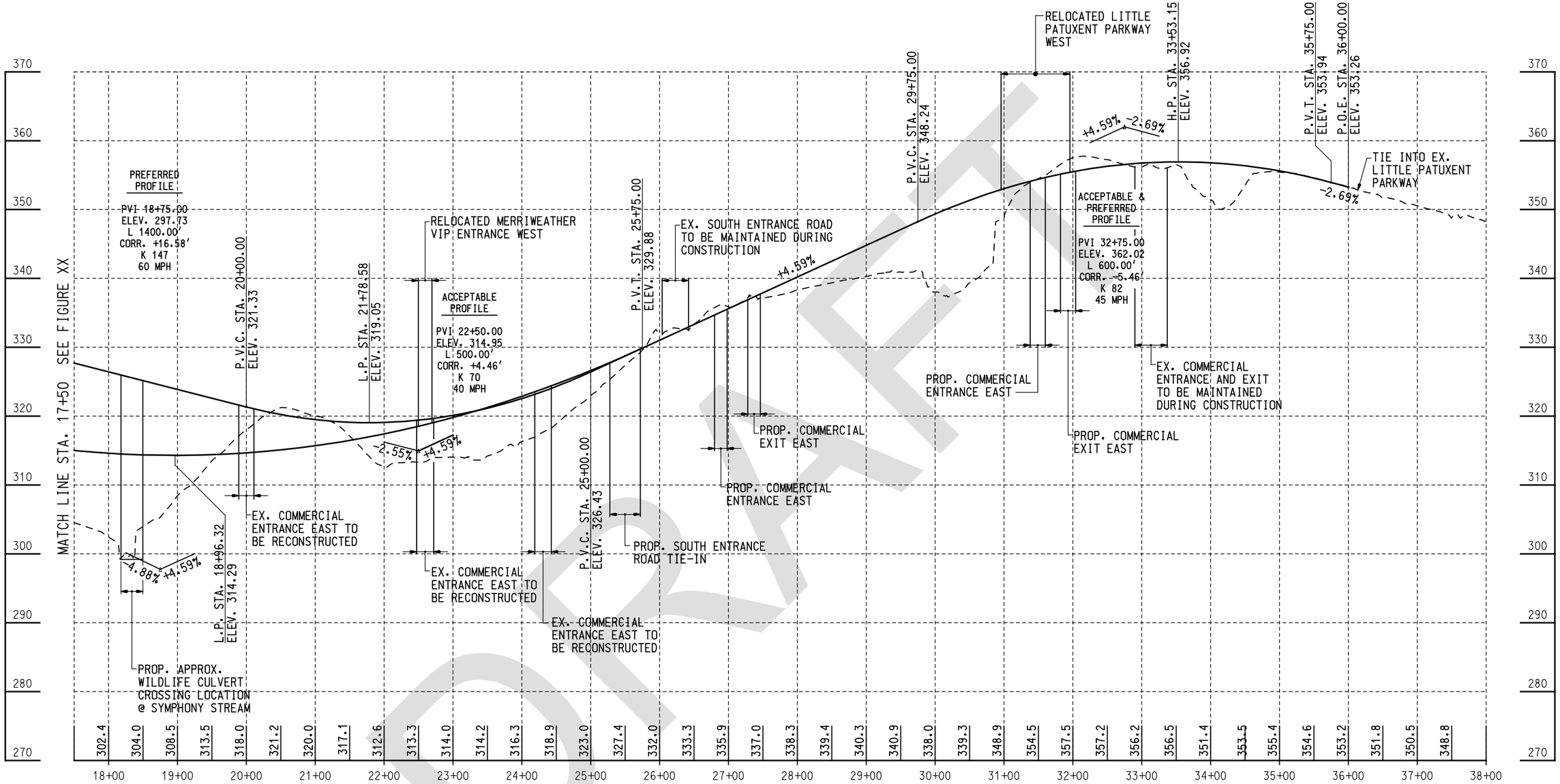
PRELIMINARY
Subject To Revision
Feasibility Study Only

DESGN	JRK
DRAWN	RKG
CHECK	EPS
APPR	–

DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS
NORTH–SOUTH CONNECTOR ROAD
ULTIMATE ALIGNMENT PROFILE

DATE: DECEMBER 2011

FIGURE 8



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DESIGN	JRK
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DOWNTOWN COLUMBIA TRANSPORTATION IMPROVEMENTS
NORTH–SOUTH CONNECTOR ROAD
ULTIMATE ALIGNMENT PROFILE

DATE: DECEMBER 2011

FIGURE 9

V. Proposed North South Connector Road Stormwater Management

The Downtown Columbia Transportation Improvements North-South Connector Road must meet the requirements of Maryland's "Stormwater Management Act of 2007" including utilizing Environmental Site Design (ESD) practices. ESD practices shall be used to the maximum extent practicable to address the additional impervious areas added by this potential roadway. A preliminary analysis was completed for this study to identify the potential ESD requirements for the identification of right-of-way, potential impacts and cost.

The biggest change in stormwater management (SWM) with the new regulations is that the focus of treatment is no longer in large ponds to treat the runoff but rather utilizing smaller ESD micro-scale practices facilities throughout the project. These smaller scale stormwater management practices will mimic natural hydrologic conditions and help slow down the runoff to maintain discharge timing and increase infiltration and evapotranspiration.

SWM was analyzed for the proposed ultimate alignment with the Jug-Handle alternative configuration, which has the greatest impact to the existing conditions. Ultimate Alignment – Jug Handle Alternative contains more than 8 acres of impervious area, including over 6 acres of net additional impervious area created. Since the majority of this project would be constructing new impervious area on an existing site with less than 40% impervious area, the analysis cannot be considered redevelopment and stormwater management would be required for all 8 acres of impervious area in the project site.

Target Stormwater Management Sizing. The project was evaluated and divided into major drainage areas over the length of the new roadway. The 18 acres of disturbance this project impacts crosses through nine drainage areas. These nine drainage areas were evaluated for ESD requirements. After the drainage areas were established, the required volume of runoff to be stored in each drainage area was determined. The storage volume required (ESDv) is based on the drainage area, percent impervious area, and the hydrologic type of the soil. This project would require an ESD_V of over 50,000 ft^3. This value does not account for the removal of impervious area that would be encountered, which would lower the required ESD_V.

ESD Practices Provided. Micro-Bioretention practices are the most suitable ESD practices for roadway projects; therefore, they were implemented in developing this feasibility study. Micro-Bioretention systems are capable of treating half acre drainage areas and can have slopes up to 5% which is conducive to the roadway slopes and grading.

Micro-Bioretention systems treat runoff by passing it through a filter bed mixture of sand, soil, and organic material. From the surface, the micro-bioretention practice will appear to be a depressed area with vegetation growing in the bottom of the depression. The first foot of the depression will allow for ponding and a second foot will be provided for freeboard. The vegetation in the practice is crucial to the function of the micro-bioretention system, which is to filter the runoff. The filtered runoff is either infiltrated into the soil or returned to the conveyance system through an underdrain system that is constructed at the bottom of the micro-bioretention practice. These ESD practices will provide quality treatment and quantity control for the 1-year storm.

Since these micro-bioretention facilities can only treat half acre drainage areas, the nine drainage areas needed to be further subdivided. In developing these sub-drainage areas, many factors were considered. First the natural features needed to be considered, including examining where the crests and valleys of the proposed roadway are proposed, where the

culvert crossings are, where the 100-year floodplain is located, and where the ESD practices will tie back into the existing grading. The nine drainage areas were subdivided into 44 sub-drainage areas for the ESD practices.

Sizing ESD Practices. A separate ESD practice is proposed for each of the 44 sub-drainage areas. The average footprint of each facility for the project is over 2,200 sq. ft., resulting in ESD practice sizes ranging from 200 ft. long by 11 ft. wide to a more square 50 feet long by 45 feet wide. In general, these ESD practices will be 24 inches deep with 3:1 side slopes.

Locating Potential ESD Practices. While examining the feasibility of this project, there were general guidelines taken for the placement of the ESD practices. The main general guidelines are as follows:

- No facility was to be constructed in a fill area. If the area was in fill, the ESD practice would be installed at the toe of the fill slope.
- In an area where cut is occurring, the facility will be placed outside of an area designated for proposed or future sidewalks.
- All facilities should be located outside of the 100-year floodplain.
- Impacts to the streams and wetlands are to be avoided.
- Impacts to property that is owned by others than Howard Research and Development are to be avoided if possible, especially in the areas where existing development is located.
- ESD practices are to be located to minimize the overall size of the SWM footprint.

Ideally, the ESD practices are proposed to appear as roadside ditches, oriented parallel to the roadway. However, in some areas, especially along the toe of fill, excess slopes prevented this orientation and pushed the facility out to be along the existing contours. In the area of jug handle, space was limited in the interior of the jug handle. Outside of the jug handle was also used for ESD practices; however, due to the 100-year floodplain and the existing grading, the ESD practices were grouped together southeast of the jug handle.

Limitations. While these guidelines were used in the development of the ESD practices, there were some sub-areas where stormwater management facilities could not be adequately located due to the restraints that made it difficult to place an ESD practice. For example, in one area, the fill slope ends next to a stream, the ESD practices were confined by the 100-year floodplain. In another area, the grading was too steep to make an appropriate attempt to placing an ESD practice. In some areas curb may be required specifically for SWM purposes to ensure the runoff can reach the ESD practices. In addition, since the SWM analysis was for feasibility purposes only, it should be noted that it does not address the 10-year peak discharge control, nor was grading done for the ESD practices. Below is a table which summarizes the SWM requirements of the project:

Drainage Area	18.2 Acres
Impervious Area	8.0 Acres
New Impervious Area	6.1 Acres
ESD_V Required	50,650 Cubic Feet
Number of ESD Practices	44
Average Size of ESD Practice	2,200 Square Feet
ESD_V Provided (Based on rough calculations and assumptions)	50,650 Cubic Feet

Table No. 1 – SWM Requirements

VI. Environmental Resources Impacts

An environmental inventory was compiled for this study based on previously prepared inventories compiled for the Downtown Columbia Plan - General Plan Amendment and the currently in final design SHA/Howard County Northbound US 29 Widening Project from MD 32 north to MD 175. The environmental inventories compiled for the Downtown Columbia General Plan Amendment were prepared by Biohabitats, Inc. with their findings documented under the Columbia Town Center Merriweather & Crescent Environment Enhancements Study dated September 2008 and the Best Management Practices for Symphony Stream and Lake Kittamaqundi Watersheds dated September 2008. In addition, FEMA Flood Map data was used to review and supplement the General Plan Amendment and SHA Northbound US 29 Widening Project floodplain delineations.

The three main environmental resources within the proposed N/S Connector Road site area consist of the Symphony Stream and Little Patuxent River corridors and forest community habitats. The proposed N/S Connector Road impacts these environmental resources including physical impacts to Symphony Stream and nine (9) forest stands along with encroaching into the Little Patuxent River / Symphony Stream floodplain. No known or delineated wetlands will be impacted by the N/S Connector Road.

Symphony Stream & Little Patuxent River Corridors. Symphony Stream originates southwest of Downtown Columbia and flows easterly between the Merriweather Post Pavilion and the Merriweather Post parking area until its confluence with the Little Patuxent River. The Little Patuxent River is located east of Downtown Columbia. Lake Kittamaqundi is tributary to the Little Patuxent River which flows in a southerly direction towards Broken Land Parkway before turning easterly and crossing US 29 just north of Broken Land.

3,500 linear feet of Symphony Stream flows through the Merriweather Post/Symphony Woods area from the Little Patuxent Parkway to the Little Patuxent River. The existing Symphony Stream will be crossed perpendicular by the N/S Connector Road approximately 220 ft. south of the proposed N/S Connector Road - Crescent Road intersection and 150 ft. to the north of the Symphony Woods Office Center entrance with the N/S Connector. The proposed N/S Connector Road crossing will impact approximately 200 linear feet and 44,700 sq. ft. (1.0 acre) of the Little Patuxent River/Symphony Stream floodplain. The Symphony Stream cross sectional floodplain width is approximately 210 ft. at the N/S Connector Road crossing.

The Little Patuxent River flows from Lake Kittamaqundi to US 29 adjacent to and approximately 600 ft. east of the N/S Connector Road for a distance of 3015 linear feet. The proposed Ramp D Spur roadway & embankment and adjacent SWM ESD facilities will encroach 65,500 sq. ft. (1.5 acres) into the Little Patuxent River floodplain. The proposed N/S Connector – Crescent Road "Jug Handle" intersection configuration roadway and embankment will encroach an additional 12,300 sq. ft. (0.3 acre) into the Little Patuxent River floodplain.

It is anticipated that the waterway opening of the proposed N/S Connector crossing of Symphony Stream can be sized along with the presented variance of the N/S Connector Roadway profile to mitigate any potential upstream or downstream effects on the Symphony Stream and Little Patuxent River floodplain impacts from the N/S Connector Road.

Forest Community Habitats. As noted in Merriweather and Crescent Environment Enhancements Study, within the Merriweather Post/Symphony Woods and the Little Patuxent River Corridor areas, there are four primary forest community habitats: Mixed Hardwood Park, Mixed Hardwood Riparian Wetland Forest, Mixed Hardwood Upland-Early Succession, and Mixed Hardwood Upland-Mature. The Enhancement Study inventoried samplings of trees within the areas' forest stands and estimated 49% of the forest stands' trees are between 18" and 23.0 inch DBH, 36% of trees are between 24 and 29 inch DBH, and 15% of the trees 30 inch DBH or greater. Also, 2% of the trees are dead, 11% of the trees are in poor condition, 22% of the trees are in fair condition, and 65% of the trees are in good condition. Furthermore, the Study noted that the areas contain some healthy natural features; however the ecosystem is negatively affected by the encroachment of non-native invasive species. The forest community habitats have many areas that have been compromised and degraded by the influence of non-native invasive species. The Study identifies two forest stands of higher condition quality within the proposed N/S Connector Road corridor with the highest quality (2.4 acres) stand located at the northwest quadrant of the Symphony Woods Road and South Entrance Road.

The proposed N/S Connector Road from Broken Land Parkway to Little Patuxent Parkway for both Interim and Ultimate alignments will impact approximately 16.1 acres of forest lands including 1.0 acre of impacts to the highest quality forest stand as note above by the "Interim" Phase One alignment. The Ultimate alignment would not impact the highest quality forest stand. Forest land impacts created by the Ultimate N/S Connector alignment beyond those of the Interim alignment, is 88,200 sq. ft. (2.0 acres).

Below is a table which summarizes the environmental resources impacts of the project:

Resource	Potential Impact
Stream Impacts	200 Feet
Wetland Impacts	None Identified
Floodplain Impacts	2.8 Acres
Forest Stands Impacted	9
Forest Land Impacted	16.1 Acres
Highest Quality Forest Land Impacted	1.0 Acre

Table No. 2 – Environmental Resources Impacts

The Merriweather and Crescent Environment Enhancements Study recommends enhancement and restoration measures for the environmental resources impacted by the N/S Connector Road and the redevelopment of Downtown Columbia as outlined in the General Plan Amendment along with identifying areas of potential stream & forest restoration and reforestation. Based on the enhancement measures/areas proposed for Downtown Columbia Redevelopment plan, the Enhancements Study quantified overall improvements to streams and forest resources that would benefit both Downtown Columbia and the region. The Enhancements Study notes that based on Howard County and State reforestation and stream/wetland impacts mitigation requirements, focusing on the removal of invasive plant species while regenerating native plant species, planting native tree and wetland species, and grading to improve stream hydrology will more than offset State and County requirements, resulting in more diverse and healthy forest systems, stabilization of streams, and areas of additional wetland creation.

As noted the above impacts to the environmental features were based on previously compiled environmental inventories and available project engineering data. No formal jurisdictional delineations of environment resources or hydrology and hydraulic analysis were performed as part of this feasibility study. Formal jurisdictional delineations of the environmental resources and in particular hydrology and hydraulic analysis of the proposed N/S Connector crossing of Symphony Stream will be needed during the engineering design phase to fully confirm the actual environmental impacts of the proposed N/S Connector Road.

VII. Right-of-Way Impacts (Needs)

The N/S Connector Road "Interim" Phase One alignment from Broken Land Parkway to Little Patuxent Parkway regardless of the Broken Land and Crescent Road intersection configurations selected will require Fee Simple Right-of-Way Total-Takes from six (6) properties. The six total take properties are undeveloped with five (5) owned by The Howard Research and Development Corporation (HRD), a wholly owned subsidiary of The Howard Hughes Company, and the other is owned by Howard County. The "Interim" alignment will also require Fee Simple Right-of-Way Partial-Takes from an additional seven (7) properties; of which three (3) are owned by HRD, one (1) by SHA, and the other three are along the private properties frontage adjacent to the existing Symphony Woods Road corridor. No dwellings, building, or permanent parking lot impacts are anticipated. Of the total anticipate required Fee Simple Right-of-Way area, approximately 88% will be from HRD (64%), Howard County (16%), and SHA (8%) properties.

For the "Ultimate" 30 year full redevelopment alignment, six (6) additional properties will require Fee Simple Right-of-Way takes; one of which as noted previously is the Total Take of the existing Howard County Library. For the remaining five (5) properties, one which is owned by HRD, property frontage partial takes will be required to accommodate the "Ultimate" alignment's tie-in with the extension of the Little Patuxent Parkway eastward and the existing Little Patuxent Parkway southward from the entrances to The Mall in Columbia's ring road and the former Rouse Co. Headquarters.

As noted previously, the N/S Connector alignments will utilize the future Symphony Woods Road Right-of-Way Dedication to Howard County. Detailed property by property right-of-way requirement estimates for each of the N/S Connector Road and Crescent Road intersection alternatives with the Interim and Ultimate alignments to the Little Patuxent Parkway are included in Appendix B of this study.

VIII. Construction Estimate

Preliminary construction cost estimates were developed for the N/S Connector Road segment from the Crescent Road connection southward to Broken Land Parkway for each of the above presented N/S Connector & Crescent Road intersection alternatives – the "Conventional-T" and Roundabout Intersections without the N/S Connector northbound access provided along the N/S Connector Road from Broken Land Parkway and the "Jug-Handle" configuration with the northbound access provided. In addition, preliminary construction cost estimates were developed for the "Interim" Phase One alignment and the "Ultimate" 30 year full redevelopment alignment connections with the Little Patuxent Parkway.

The estimates were developed in accordance with the preferred profile alignment. These estimates were prepared using major quantity item (earthwork, structures, paving, etc.)

takeoffs and the latest CTP SHA Cost Estimating Program criteria. A contingency factor of 40% was applied as appropriate for feasibility study level engineering in developing the total construction estimate.

The construction cost estimates for the N/S Connector Road segment from the Crescent Road connection southward to Broken Land Parkway varies from $12.7 Million to $15.6 Million between the three Crescent Road intersection alternatives with the Jug Handle Alternative being the most costly due primarily to the additional N/S Connector roadway and structure costs with the providing the northbound access from Broken Land Parkway. The construction costs for the Interim and Ultimate alignment concepts from the Crescent Road connection to the Little Patuxent Parkway are estimated to be $7.4 and $9.6 Million, respectively.

Therefore, the total estimated construction cost to build the N/S Connector Road from Broken Land Parkway to the Little Patuxent Parkway on the Ultimate alignment and with the "Jug-Handle" intersection configuration is $25.2 Million. The concept construction cost estimates are included in Appendix C of the study. Construction costs do not include estimates for engineering, right-of-way, or environmental mitigation costs.

IX. Summary

As indicated at the beginning of this report the purpose of the study is to investigate the feasibility of a new Broken Land Parkway / US Route 29 north/south collector road connection to Little Patuxent Parkway as presented in the DOWNTOWN COLUMBIA PLAN – A General Plan Amendment adopted February 1, 2010 and as identified in the Downtown Community Enhancements, Programs and Public Amenities (CEPPAs) Implementation Chart, #5 under Howard County Council Bill No. 58-2009. The General Plan Amendment identified the need of improvements to the transportation network in the Downtown Columbia area to increase vehicular and pedestrian mobility, address safety concerns, and provide adequate capacity to meet the future growth and development planned for the area. The Plan further identified the benefits of providing a new north-south roadway connection between Little Patuxent Parkway and Broken Land Parkway - US Route 29 Interchange. This connection will be part of the expanded grid network proposed as part of the Downtown Columbia Plan adopted by Howard County.

In conjunction with this study, a sub-area travel demand forecasting model was developed for Downtown Columbia for the future full redevelopment year of 2035. The model incorporated socio-economic characteristics of the proposed redevelopment of Downtown Columbia in accordance with the General Plan Amendment and projected traffic data (growth rates), obtained from the Baltimore Metropolitan Council (BMC) Regional Model. With the forecasted traffic volumes further traffic analysis post-processing was performed for determining intersection capacity in the future Design Year 2035 for the existing Downtown Columbia roadway network with only current planned and programmed transportation system improvements and then incorporating the Downtown Columbia Plan's proposed North-South Connector Road connecting Broken Land Parkway and the US 29 northbound fly-over ramp to the Little Patuxent Parkway in the vicinity of the Howard County Library.

In future Design Year 2035 with the projected redevelopment of Downtown Columbia and only providing the current planned and programmed transportation system improvements, the existing Downtown Columbia roadway network intersections will operate at failing LOS "F" including the Hickory Ridge Rd/Broken Land Pkwy and the Little Patuxent Pkwy/Broken

Land Pkwy intersections, which will operate at a LOS E/F (AM/PM) and LOS F/F, respectively. However, the proposed N/S Connector Road from Broken Land Parkway & US Route 29 to Little Patuxent Parkway will remove traffic from the Broken Land Parkway entering the western portion of Downtown Columbia and provide an additional access and a new center link to Downtown Columbia for traffic from points southeast of Columbia and US 29 traffic to and from the south. With the proposed N/S Connector Road, the Design Year 2035 Downtown Columbia traffic will disperse traffic over a wider network and provide more capacity and therefore eliminating the failing LOS "F" operations of the existing Downtown Columbia roadway network intersections.

As part of this feasibility study efforts, a detailed typical section, preliminary horizontal and vertical alignments, and alternative intersection configurations were developed for the N/S Connector Road as well as the connections of entrance roads/parking areas for the existing properties along the proposed roadway to ensure that the full intent of the General Plan Amendment with respect to the proposed roadway was met and to see if there were any "Fatal Flaws" that would make the proposed roadway's location not feasible.

N/S Connector – Broken Land Parkway Intersection. At the proposed intersection of the N/S Connector with existing Broken Land Parkway and the southwest quadrant ramps of the Broken Land and US 29 Interchange, it was determined that the two southbound through travel lanes along the N/S Connector would need to carried to Broken Land Parkway and through unto the existing eastbound Broken Land to southbound US 29 ramp (Ramp G). Therefore, the departure of Ramp G from eastbound Broken Land will be relocated to the signalized intersection with the N/S Connector.

N/S Connector – Crescent Road Intersection. At the proposed intersection of the N/S Connector with the proposed Crescent Road, conventional signalized "T" and Roundabout intersection configurations were initially investigated. However, these intersection configurations would not operate properly and/or safely with the combined traffic along the northbound N/S Connector from Broken Land Parkway and exiting traffic from the US 29 northbound fly-over ramp (Ramp D Spur). These intersection configurations would operate acceptable without the N/S Connector northbound movement from Broken Land. However, without the northbound N/S Connector movement from Broken Land, the Broken Land traffic gets significantly worse due to the increased volume that is not traveling the N/S Connector Road. In addition, it was the intent of the General Plan Amendment to provide the N/S Connector northbound movement from Broken Land. To provide the northbound movement, a N/S Connector – Crescent Road "Jug-Handle" intersection configuration was developed and analyzed. With the "Jug-Handle" configuration, the N/S Connector – Crescent Road intersection was found to operate acceptable and safely with the combined N/S Connector northbound and Ramp D Spur traffic.

N/S Connector – Little Patuxent Intersection. Two roadway alignments were developed for the N/S Connector Road connection with the Little Patuxent Parkway: an "Interim" Phase One alignment, and the "Ultimate" 30 year full redevelopment alignment. The Interim alignment will utilizes and expand the existing the South Entrance Road intersection with Little Patuxent. However, the "ultimate" alignment as identified in the General Amendment Plan will cross over the South Entrance Road through the existing library property and create a new intersection with the extension of the Little Patuxent Parkway eastward and then the existing Little Patuxent Parkway southward from the entrances to The Mall in Columbia's

ring road and the former Rouse Co. Headquarters. With both alignments, the South Entrance Road will be realigned to create a "T-Intersection" with the N/S Connector.

N/S Connector Roadway Profile. Two alternative roadway profiles were developed for the N/S Connector "ultimate" alignment. The profiles provide acceptable ranges of the roadway grades and vertical curves and connections to the entrance roads/parking areas for the existing properties along the proposed roadway. The profiles also meet necessary roadway clearances under the overhead electric transmission lines adjacent to Broken Land Parkway and bridge structure clearances over the existing NB US 29 fly-over ramp and Symphony Stream.

SWM Requirements. The preliminary analysis indicates that stormwater management requirements for the N/S Connector Road can be reasonable met in accordance with Stormwater Management Act of 2007 and utilizing Environmental Site Design (ESD) practices, which are micro-scale type practices. These smaller micro-scale SWM practices will mimic natural hydrologic conditions and help slow down the runoff to maintain discharge timing and increase infiltration and evapotranspiration.

Environmental Resources. The preliminary environmental analysis document impacts to stream, floodplain, and forest lane impacts based on previously prepared inventories. Formal jurisdictional delineations of the environmental resources and hydrology and hydraulic analysis will be needed during the engineering design phase to fully confirm the actual impacts of the proposed N/S Connector Road. However, the preliminary environmental analysis along with supplemental environmental documents prepared for the Downtown Columbia Plan – General Plan Amendment indicates that there are no environmental resources impacts that cannot be reasonably mitigated through coordination with the appropriate review and regulatory agencies.

Right-of-Way Requirements. The preliminary right-of-way impacts analysis indicates the N/S Connector Road will require Fee Simple Right-of-Way Total-Takes from seven (7) properties. The six of the seven total take properties are undeveloped with five (5) owned by The Howard Research and Development Corporation and the other is owned by Howard County. The seventh total take property is the existing Howard County Library. The N/S Connector will also require Fee Simple Right-of-Way Partial-Takes from an additional 12 properties; of which four (4) are owned by HRD, one (1) by SHA, and the other seven are along the private properties frontage areas adjacent to the proposed roadway corridor. No dwellings, building, or permanent parking lot impacts are anticipated for the private properties. Of the total anticipate required Fee Simple Right-of-Way, approximately 90% will be from HRD, Howard County, and SHA properties.

Construction Costs. The total estimated preliminary construction cost for the proposed N/S Connector Road, "Ultimate" alignment and the "Jug-Handle" intersection configuration is $25.2 Million. This estimate does not include design, right-of-way or environmental mitigation costs.

X. References

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APPENDIX A

Design Year 2035 Intersection Capacity Traffic Analysis

Table 1
US29 Interchange Study
2035 Total Future Intersection Levels of Service (1) (2) (3) (4)

			Existing		2035 without NS Connector		2035 with NS Connector Interim Condition		2035 with NS Connector Ultimate Condition	
Intersection	Control	Approach	AM	PM	AM	PM	AM	PM	AM	PM
East Mall Entrance/	Signal	EBL	D (42.8)	D (45.3)	D (40.3)	D (48.5)	NA	NA	NA	NA
Little Patuxent Parkway		EBLT	D (42.7)	D (45.3)	D (40.2)	D (48.5)	NA	NA	NA	NA
		EBR	D (41.3)	C (33.7)	D (36.8)	C (33.4)	NA	NA	NA	NA
		WBLTR	D (47.6)	D (44.4)	D (47.6)	D (44.4)	NA	NA	NA	NA
		NBL	D (49.9)	E (55.0)	D (40.4)	D (50.4)	NA	NA	NA	NA
		NBTR	A (1.0)	A (8.3)	A (7.8)	B (13.0)	NA	NA	NA	NA
		SBL	E (63.4)	E (60.6)	D (53.1)	D (54.1)	NA	NA	NA	NA
		SBTR	A (4.4)	A (8.9)	F (160.4)	D (37.0)	NA	NA	NA	NA
		Overall	**A (9.4)**	**C (20.7)**	**E (72.7)**	**C (29.6)**	**NA**	**NA**	**NA**	**NA**
New Arterial/	Signal	EBL	NA	NA	NA	NA	C (24.0)	B (17.7)	C (24.0)	C (24.6)
Little Patuxent Parkway		EBR	NA	NA	NA	NA	C (22.7)	B (15.8)	C (22.7)	C (21.5)
		NBL	NA	NA	NA	NA	C (20.7)	C (23.1)	D (50.4)	C (23.6)
		NBT	NA	NA	NA	NA	A (4.8)	A (8.5)	A (5.0)	A (8.2)
		SBT	NA	NA	NA	NA	B (14.3)	B (12.9)	B (14.3)	B (18.6)
		SBR	NA	NA	NA	NA	B (15.9)	B (11.6)	D (15.9)	B (16.5)
		Overall	**NA**	**NA**	**NA**	**NA**	**B (13.0)**	**B (12.7)**	**B (17.4)**	**B (15.4)**
Little Patuxent Parkway/	Signal	EBTR	C (28.9)	B (13.6)	C (27.6)	F (81.2)	NA	NA	NA	NA
South Entrance Road		WBL	C (31.4)	D (38.6)	C (31.7)	D (43.2)	NA	NA	NA	NA
		WBT	C (27.3)	B (16.3)	B (17.2)	B (16.3)	NA	NA	NA	NA
		NBL	B (11.0)	B (19.3)	C (25.1)	C (24.4)	NA	NA	NA	NA
		NBR	B (10.6)	B (19.1)	C (25.9)	C (25.6)	NA	NA	NA	NA
		Overall	**C (25.1)**	**B (18.0)**	**C (24.4)**	**D (49.6)**	**NA**	**NA**	**NA**	**NA**
Little Patuxent Parkway/	Signal	EBTR	NA	NA	NA	NA	D (37.4)	D (53.7)	C (23.5)	D (49.9)
NS Connector interim condition		WBL	NA	NA	NA	NA	C (26.2)	D (53.7)	D (47.7)	D (50.4)
		WBT	NA	NA	NA	NA	A (4.4)	A (4.0)	A (8.5)	A (8.1)
		NBL	NA	NA	NA	NA	C (28.4)	E (63.0)	D (36.0)	D (51.8)
		NBR	NA	NA	NA	NA	B (15.4)	B (10.3)	C (27.6)	B (12.0)
		Overall	**NA**	**NA**	**NA**	**NA**	**C (26.5)**	**D (42.3)**	**C (26.1)**	**D (35.5)**
Little Patuxent Parkway realignment	Signal	EBL	NA	NA	NA	NA	NA	NA	C (21.0)	C (23.2)
with NS Connector		EBR	NA	NA	NA	NA	NA	NA	C (34.6)	C (21.6)
		NBL	NA	NA	NA	NA	NA	NA	B (14.6)	C (24.2)
		NBT	NA	NA	NA	NA	NA	NA	A (4.8)	A (4.1)
		SBTR	NA	NA	NA	NA	NA	NA	B (16.5)	C (22.0)
		Overall	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**B (16.8)**	**B (17.0)**
South Entrance Road/	Stop	WBR	NA	NA	NA	NA	C [20.2]	B [14.5]	B [11.4]	B [13.6]
NS Connector		SBL	NA	NA	NA	NA	B [12.4]	C [19.7]	C [22.5]	F [100.8]
South Entrance Road/	Stop	WBR	NA	NA	NA	NA	NA	NA	B [11.4]	B [13.6]
NS Connector										
Crescent Road/	Signal	EBL	NA	NA	NA	NA	C (27.8)	C (33.4)	C (26.5)	C (27.2)
NS Connector		EBR	NA	NA	NA	NA	B (14.9)	B (17.1)	C (22.0)	B (18.7)
		NBL	NA	NA	NA	NA	C (24.1)	C (22.1)	C (33.3)	C (34.8)
		NBT	NA	NA	NA	NA	A (7.5)	B (11.1)	A (8.1)	B (13.0)
		SBTR	NA	NA	NA	NA	C (29.6)	C (26.2)	D (42.1)	C (29.1)
		Overall	**NA**	**NA**	**NA**	**NA**	**C (22.3)**	**C (21.5)**	**C (24.1)**	**C (21.5)**
with roundabout	Roundabout	EBL	NA	NA	NA	NA	B [18.2]	B [18.9]	B [16.1]	B [17.8]
		EBR	NA	NA	NA	NA	B [13.5]	B [12.2]	B [10.9]	B [11.8]
		NBL	NA	NA	NA	NA	B [15.3]	B [18.1]	B [15.2]	B [19.3]
		NBT	NA	NA	NA	NA	A [9.0]	D [41.0]	F [105.0]	F [263.0]
		SBT	NA	NA	NA	NA	A [8.0]	A [6.9]	B [13.2]	B [10.1]
		SBR	NA	NA	NA	NA	A [9.3]	A [8.2]	B [14.5]	B [11.4]
		Overall	**NA**	**NA**	**NA**	**NA**	**B [11.3]**	**C [22.0]**	**D [54.0]**	**F [130.5]**
with jug-handle configuration	Signal	EBL	NA	NA	NA	NA	D (43.7)	D (44.2)	B (17.3)	B (15.3)
		EBR	NA	NA	NA	NA	C (20.1)	B (18.3)	B (15.1)	B (12.7)
		WBLTR	NA	NA	NA	NA	D (36.0)	C (29.0)	C (22.8)	B (18.5)
		WBR	NA	NA	NA	NA	C (24.4)	C (27.2)	C (21.7)	C (32.7)
		NBL	NA	NA	NA	NA	NA	NA	A (7.9)	B (11.5)
		NBT	NA	NA	NA	NA	NA	NA	A (8.6)	B (10.6)
		SBTR	NA	NA	NA	NA	D (35.9)	C (31.1)	B (15.4)	C (21.1)
		Overall	**NA**	**NA**	**NA**	**NA**	**D (35.2)**	**C (31.4)**	**B (15.6)**	**B (18.4)**

Broken Land Parkway/	Signal	EBT	A (6.6)	A (2.1)	A (1.5)	A (3.4)	NA	NA	NA	NA
US29 Off-Ramp		WBT	B (10.8)	A (5.4)	B (13.4)	A (5.3)	NA	NA	NA	NA
		NBL	C (25.0)	D (36.6)	C (26.2)	D (42.7)	NA	NA	NA	NA
		Overall	**B (10.1)**	**A (6.6)**	**B (11.1)**	**A (9.4)**	**NA**	**NA**	**NA**	**NA**
with North/South Connector	Signal	EBT	NA	NA	NA	NA	B (17.1)	C (30.0)	NA	NA
without NB access via		EBR	NA	NA	NA	NA	B (18.7)	C (22.1)	NA	NA
Broken Land Parkway		WBT	NA	NA	NA	NA	C (27.9)	C (20.9)	NA	NA
		NBL	NA	NA	NA	NA	D (37.2)	D (53.3)	NA	NA
		SBL	NA	NA	NA	NA	B (14.5)	B (17.9)	NA	NA
		SBTR	NA	NA	NA	NA	D (35.6)	D (37.4)	NA	NA
		Overall	**NA**	**NA**	**NA**	**NA**	**C (26.1)**	**C (29.3)**	**NA**	**NA**
with North/South Connector	Signal	EBL	NA	NA	NA	NA	NA	NA	D (35.2)	C (30.1)
with NB access via		EBT	NA	NA	NA	NA	NA	NA	B (16.0)	D (38.4)
Broken Land Parkway		EBR	NA	NA	NA	NA	NA	NA	B (18.4)	C (29.2)
		WBT	NA	NA	NA	NA	NA	NA	B (16.7)	C (21.0)
		WBR	NA	NA	NA	NA	NA	NA	B (18.1)	C (22.7)
		NBL	NA	NA	NA	NA	NA	NA	D (46.5)	D (52.6)
		NBT	NA	NA	NA	NA	NA	NA	D (45.3)	D (45.0)
		SBL	NA	NA	NA	NA	NA	NA	D (44.6)	D (47.4)
		SBTR	NA	NA	NA	NA	NA	NA	D (42.3)	C (34.9)
		Overall	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**C (27.9)**	**D (35.4)**
Little Patuxent Parkway/	Signal	EBL	NA	NA	NA	NA	B (17.1)	C (24.0)	B (18.9)	B (18.6)
Crescent Road		EBT	NA	NA	NA	NA	D (49.4)	E (61.0)	C (31.5)	C (32.7)
		EBR	NA	NA	NA	NA	C (22.7)	C (26.4)	C (23.6)	D (36.2)
		WBL	NA	NA	NA	NA	E (60.6)	C (28.5)	C (31.8)	C (23.3)
		WBT	NA	NA	NA	NA	C (27.1)	C (29.9)	C (26.7)	C (33.1)
		WBR	NA	NA	NA	NA	C (21.6)	C (20.1)	C (20.0)	B (18.9)
		NBLT	NA	NA	NA	NA	C (36.2)	D (41.3)	C (33.0)	D (41.6)
		NBR	NA	NA	NA	NA	D (41.5)	B (17.1)	D (52.5)	B (16.6)
		SBLTR	NA	NA	NA	NA	D (45.9)	E (55.1)	D (44.3)	D (48.9)
		Overall	**NA**	**NA**	**NA**	**NA**	**D (39.9)**	**D (43.2)**	**C (34.5)**	**C (35.2)**
Hickory Ridge Road/	Stop	EBL	NA	NA	NA	NA	F [547.3]	F [537.4]	F [628.6]	F [*]
Crescent Road		EBR	NA	NA	NA	NA	C [15.2]	C [15.4]	B [11.3]	B [11.8]
		NBLT	NA	NA	NA	NA	A [5.6]	A [9.3]	A [5.1]	B [11.2]
Little Patuxent Parkway	Signal	EBL	D (46.0)	F (152.9)	E (55.4)	F (319.3)	E (62.5)	D (36.7)	D (47.6)	D (36.7)
Broken Land Parkway		EBT	C (27.1)	C (29.4)	D (44.9)	D (37.2)	F (83.7)	D (50.1)	D (44.6)	D (47.7)
		EBR	F (89.4)	F (208.6)	E (72.6)	F (355.6)	A (0.3)	A (0.6)	A (0.3)	A (0.6)
		WBL	A (9.0)	C (28.0)	E (65.8)	F (343.7)	C (30.4)	C (26.1)	D (47.6)	C (26.8)
		WBTR	B (14.6)	B (18.5)	B (17.6)	B (18.8)	C (20.4)	C (20.7)	D (38.8)	C (27.1)
		NBL	D (44.0)	E (58.3)	D (41.1)	D (40.3)	F (97.8)	D (48.2)	D (54.7)	D (39.3)
		NBT	C (31.1)	D (38.7)	F (234.2)	F (434.9)	E (56.6)	C (31.4)	D (38.7)	C (25.7)
		NBR	F (89.2)	F (109.6)	F (187.3)	F (327.5)	F (88.7)	C (34.7)	C (26.1)	B (12.9)
		SBL	C (34.6)	C (34.0)	C (33.9)	C (33.2)	E (74.8)	F (108.4)	D (54.8)	D (42.7)
		SBT	D (38.2)	D (40.2)	D (45.1)	F (185.4)	E (56.6)	D (39.2)	D (48.3)	D (37.7)
		SBR	C (34.4)	C (32.7)	C (32.1)	C (31.9)	D (49.7)	C (29.5)	D (44.1)	C (28.9)
		Overall	**D (52.5)**	**E (78.0)**	**F (110.3)**	**F (280.1)**	**E (63.4)**	**C (34.1)**	**D (39.1)**	**C (28.2)**
Hickory Ridge Road	Signal	EBL	D (45.3)	D (45.3)	F (216.0)	F (323.7)	NA	NA	NA	NA
Broken Land Parkway		EBLT	D (45.3)	D (45.3)	F (217.6)	F (323.7)	NA	NA	NA	NA
		EBR	A (0.8)	A (0.7)	A (0.4)	A (0.4)	NA	NA	NA	NA
		WBL	A (0.0)	A (0.0)	A (0.0)	A (0.0)	NA	NA	NA	NA
		WBT	A (0.0)	A (0.0)	A (0.0)	A (0.0)	NA	NA	NA	NA
		WBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	NA	NA	NA	NA
		NBL	D (40.6)	C (35.0)	D (42.6)	F (87.5)	NA	NA	NA	NA
		NBT	A (2.1)	A (3.0)	A (7.1)	A (9.0)	NA	NA	NA	NA
		NBR	A (0.0)	A (0.0)	A (0.0)	A (0.0)	NA	NA	NA	NA
		SBT	C (21.6)	C (31.0)	F (109.8)	F (289.0)	NA	NA	NA	NA
		SBR	C (21.2)	C (28.5)	D (51.4)	C (30.9)	NA	NA	NA	NA
		Overall	**B (15.1)**	**B (18.7)**	**E (61.3)**	**F (151.0)**	**NA**	**NA**	**NA**	**NA**
Hickory Ridge Road Extended	Signal	EBL	NA	NA	NA	NA	D (39.3)	D (35.8)	C (29.2)	D (35.8)
Broken Land Parkway		EBLT	NA	NA	NA	NA	F (101.3)	C (25.0)	D (45.9)	B (17.5)
		EBR	NA	NA	NA	NA	C (23.6)	B (18.6)	B (18.5)	C (25.3)
		WBL	NA	NA	NA	NA	E (66.2)	C (34.7)	D (35.6)	C (34.7)
		WBT	NA	NA	NA	NA	E (61.5)	C (23.5)	C (33.7)	C (25.1)
		WBR	NA	NA	NA	NA	E (61.2)	C (23.7)	C (33.9)	C (23.7)
		NBL	NA	NA	NA	NA	E (67.6)	D (47.3)	D (35.6)	D (47.3)
		NBT	NA	NA	NA	NA	E (76.1)	F (83.6)	C (33.5)	C (25.5)
		NBR	NA	NA	NA	NA	C (35.7)	C (20.7)	C (25.5)	C (20.7)
		SBL	NA	NA	NA	NA	F (104.9)	D (46.5)	D (39.6)	D (46.5)
		SBT	NA	NA	NA	NA	D (41.0)	D (46.9)	C (31.6)	D (46.9)
		SBR	NA	NA	NA	NA	D (36.1)	C (25.1)	C (26.8)	C (25.1)
		Overall	**NA**	**NA**	**NA**	**NA**	**E (66.1)**	**D (49.5)**	**C (32.4)**	**C (33.0)**

Notes:

(1) Analysis performed using Synchro software, version 7

(2) Values in brackets, [ ], represent unsignalized delay in seconds

(3) Values in parenthesis, ( ), represent signalized delay in seconds

(4) Roundabout analysis performed using SIDRA Intersection

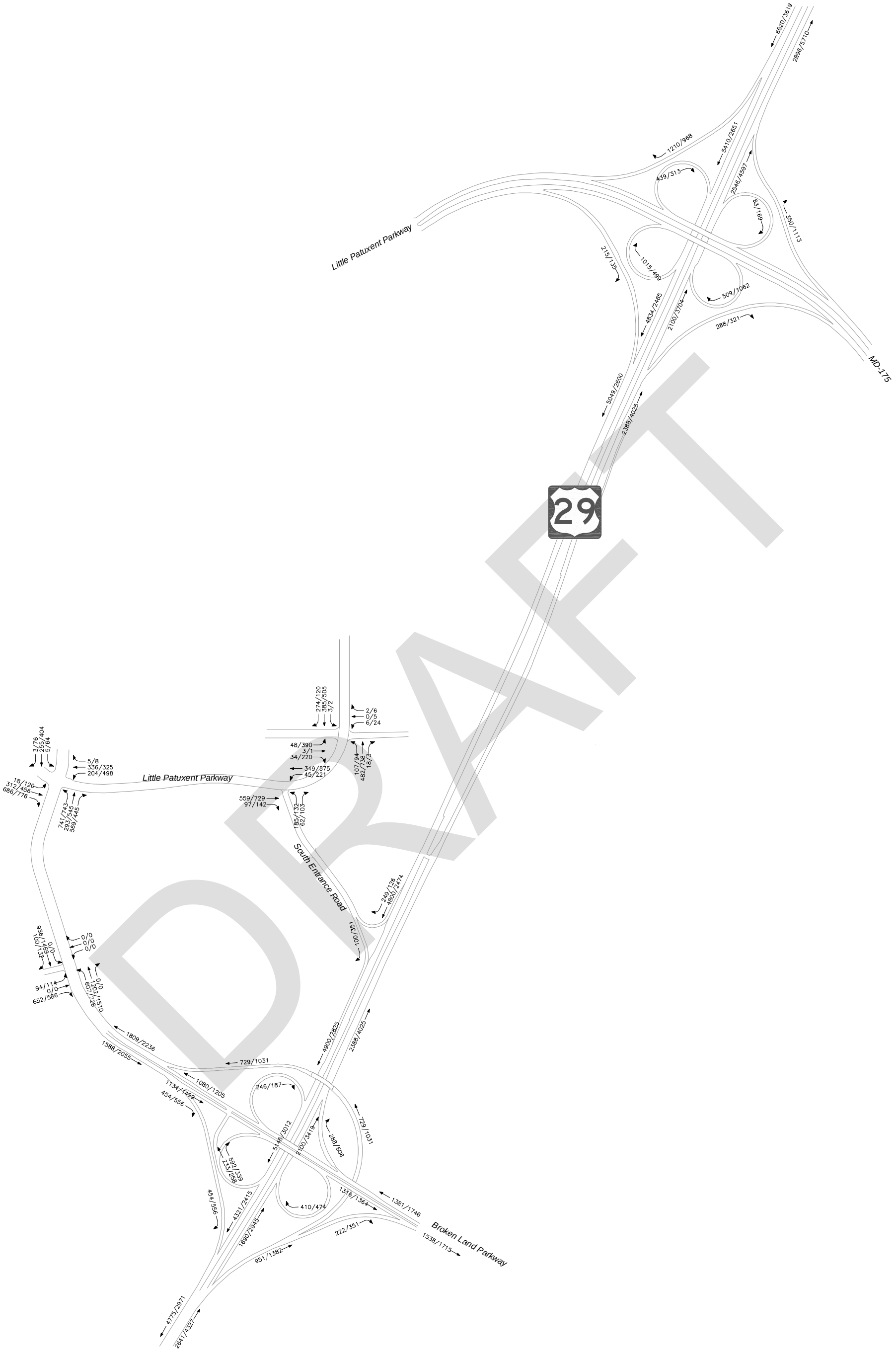

Figure 1
Existing 2010 Traffic Volumes

AM PEAK HOUR
PM PEAK HOUR
000/000

North

US 29 Interchange Feasibility Study
Howard County, Maryland

Wells + Associates, Inc.

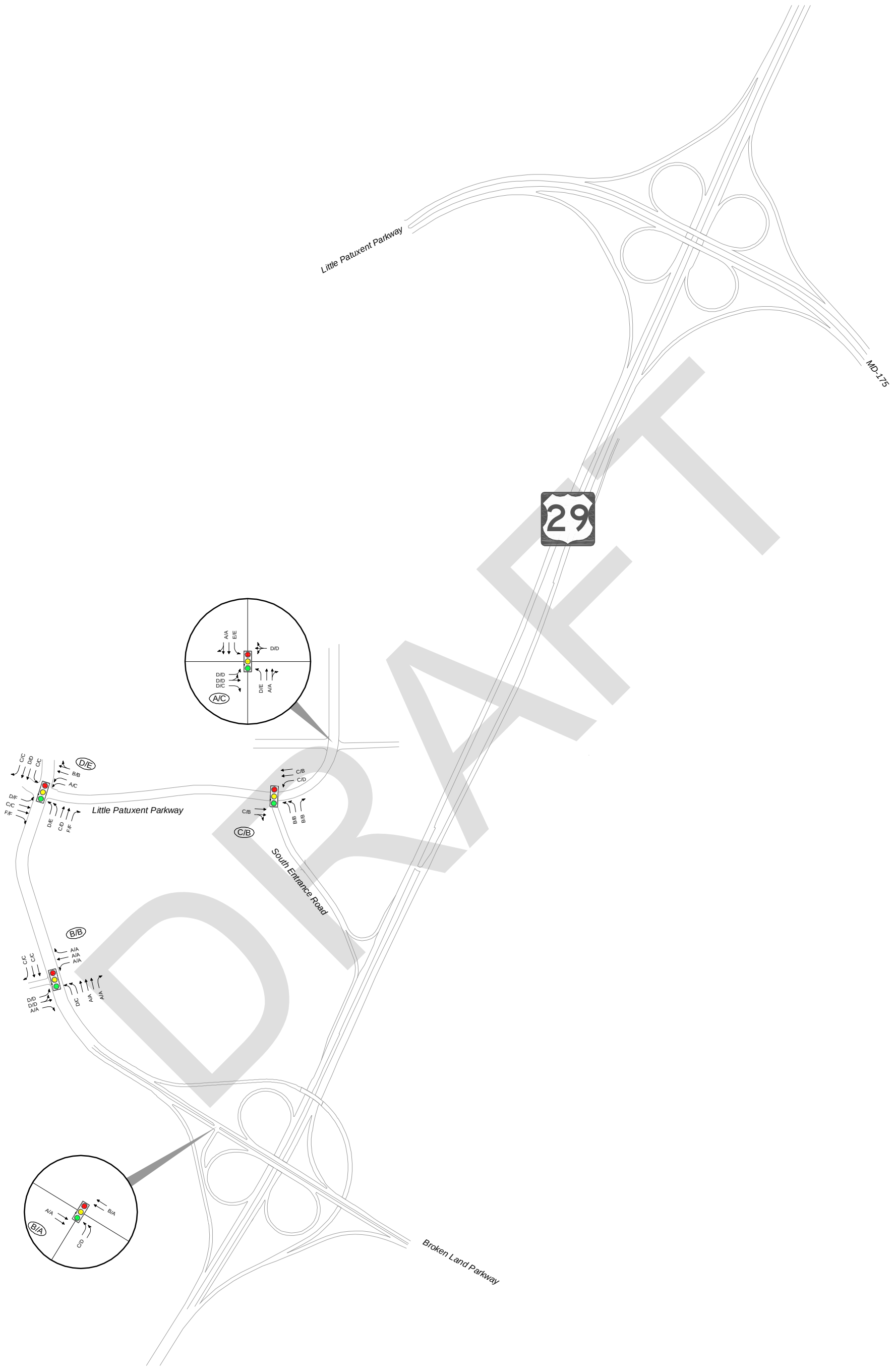

Figure 2
Existing 2010 Levels of Service

Represents One Travel Lane
Signalized Intersection
Stop Sign

North

US 29 Interchange Feasibility Study
Howard County, Maryland

Wells + Associates, Inc.

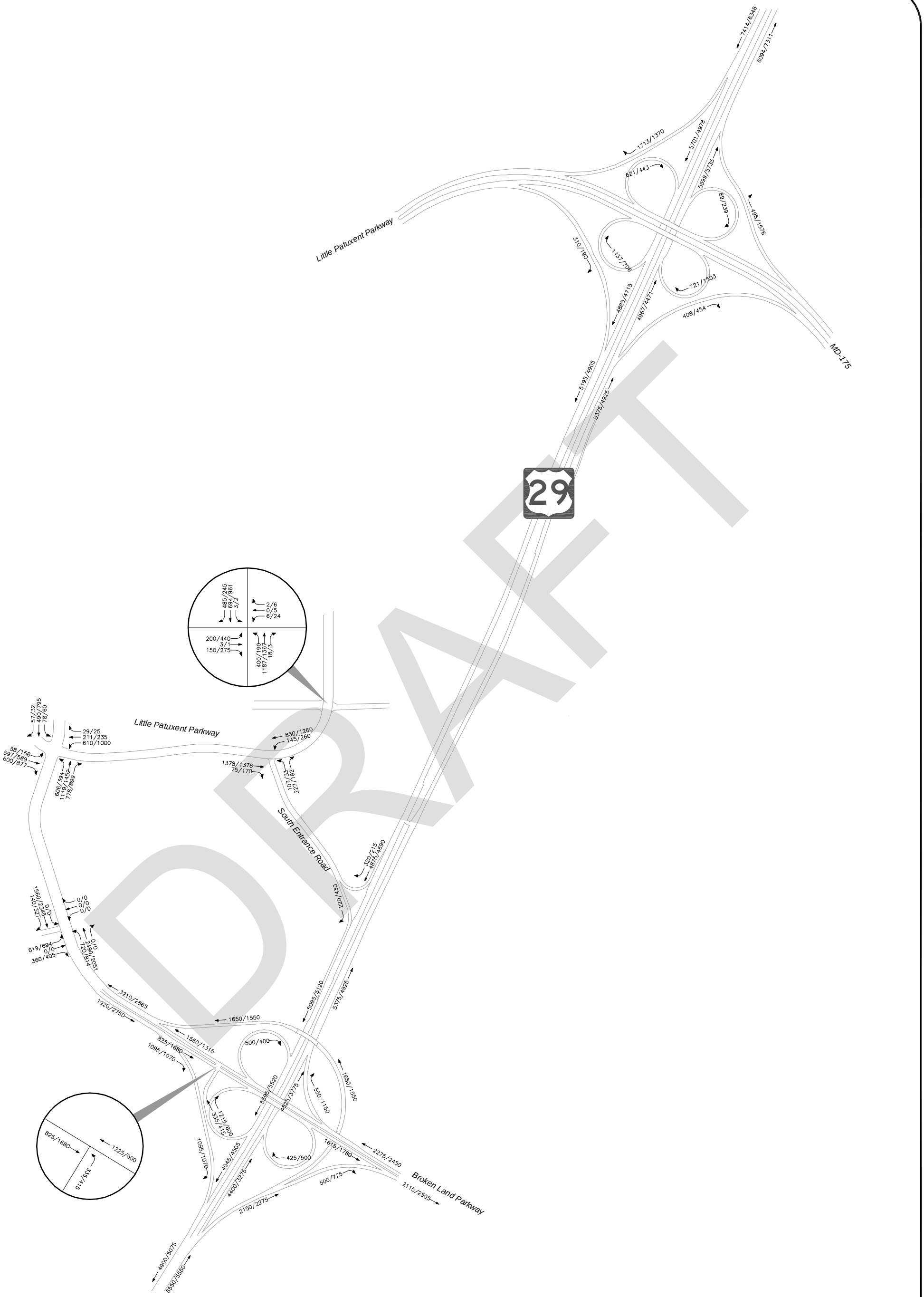

Figure 3
2035 Traffic Volumes with SHA Improvements
Without North/South Connector

AM PEAK HOUR
PM PEAK HOUR
000/000

North

US 29 Interchange Feasibility Study
Howard County, Maryland

Wells + Associates, Inc.

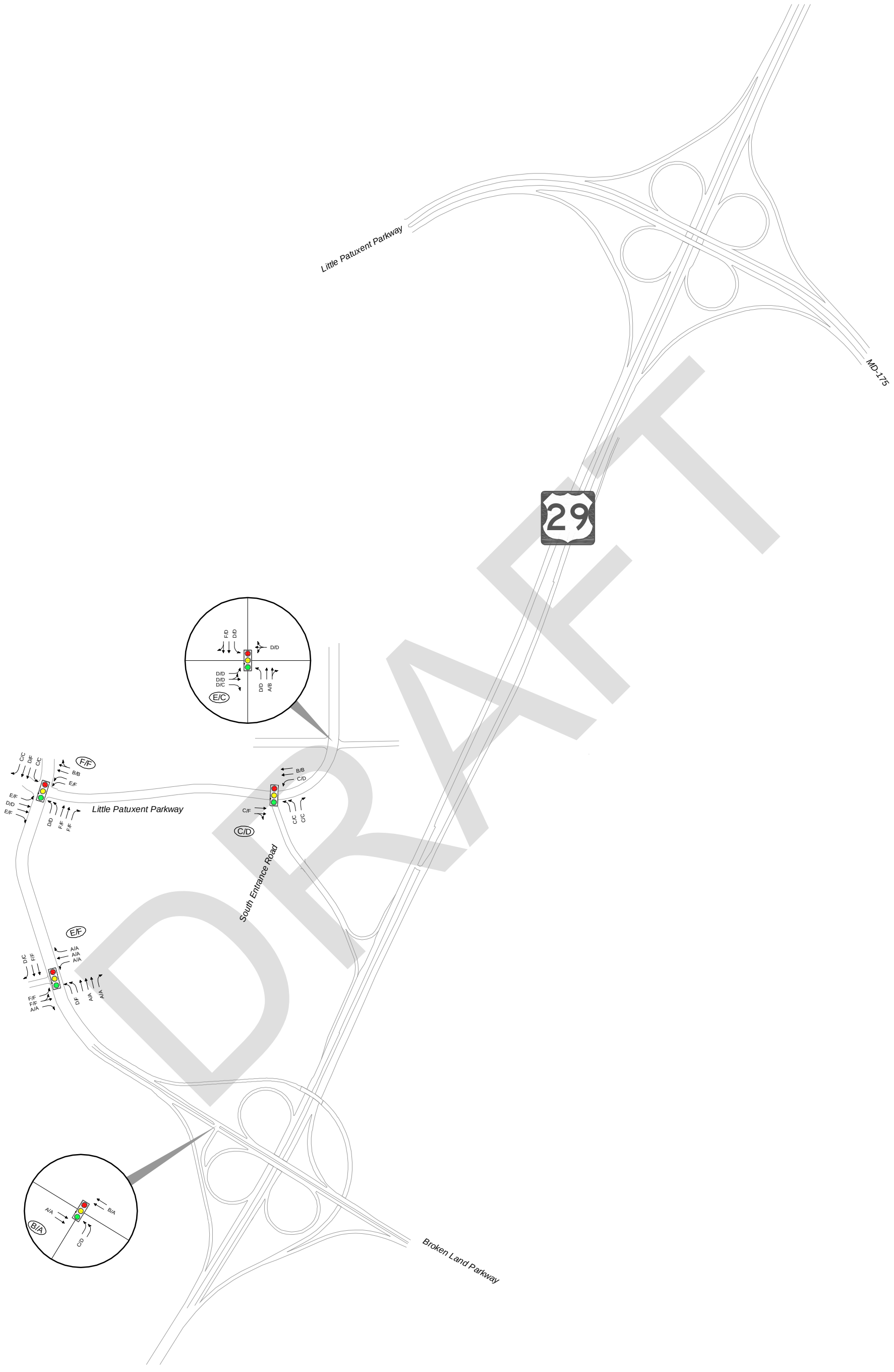

Figure 4
2035 Levels of Service with SHA Improvements
Without North/South Connector

← Represents One Travel Lane
Signalized Intersection
STOP Stop Sign

North

Wells + Associates, Inc.

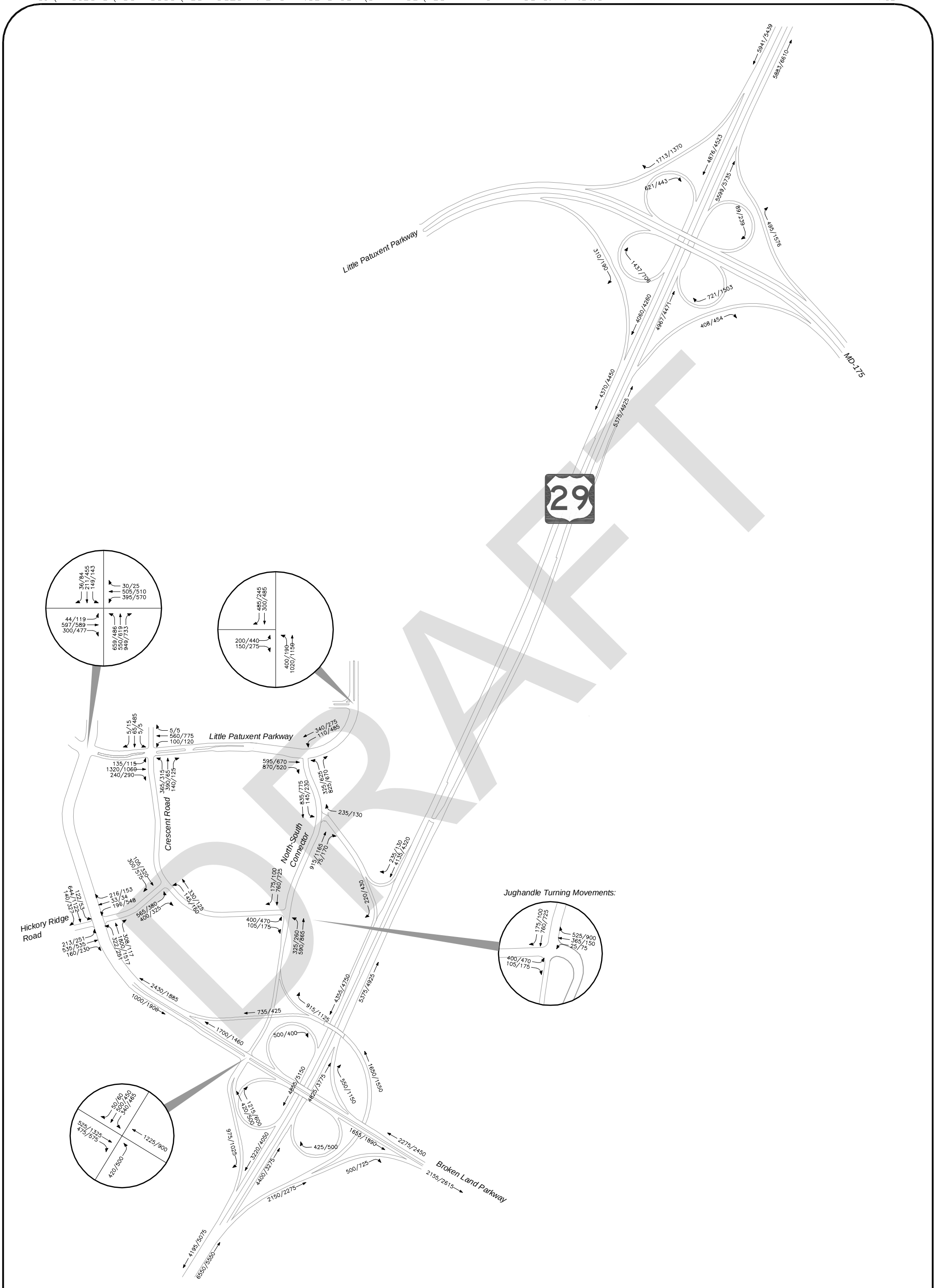

Figure 5
2035 Traffic Volumes with SHA Improvements
And North/South Connector (Interim Condition)

AM PEAK HOUR
PM PEAK HOUR
000/000

North

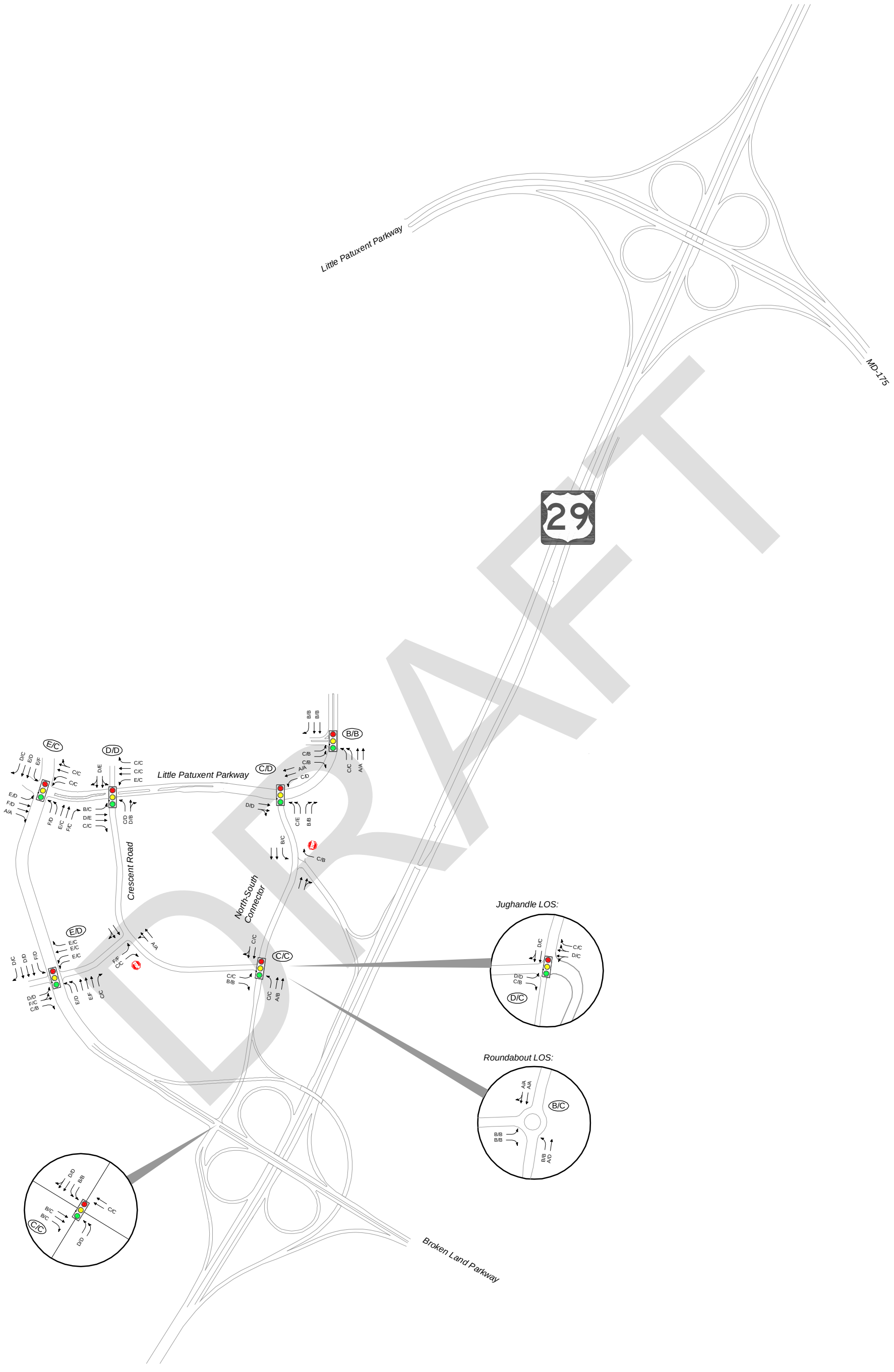

Figure 6
2035 Levels of Service with SHA Improvements
and North/South Connector (Interim Condition)

← Represents One Travel Lane
Signalized Intersection
Stop Sign

North

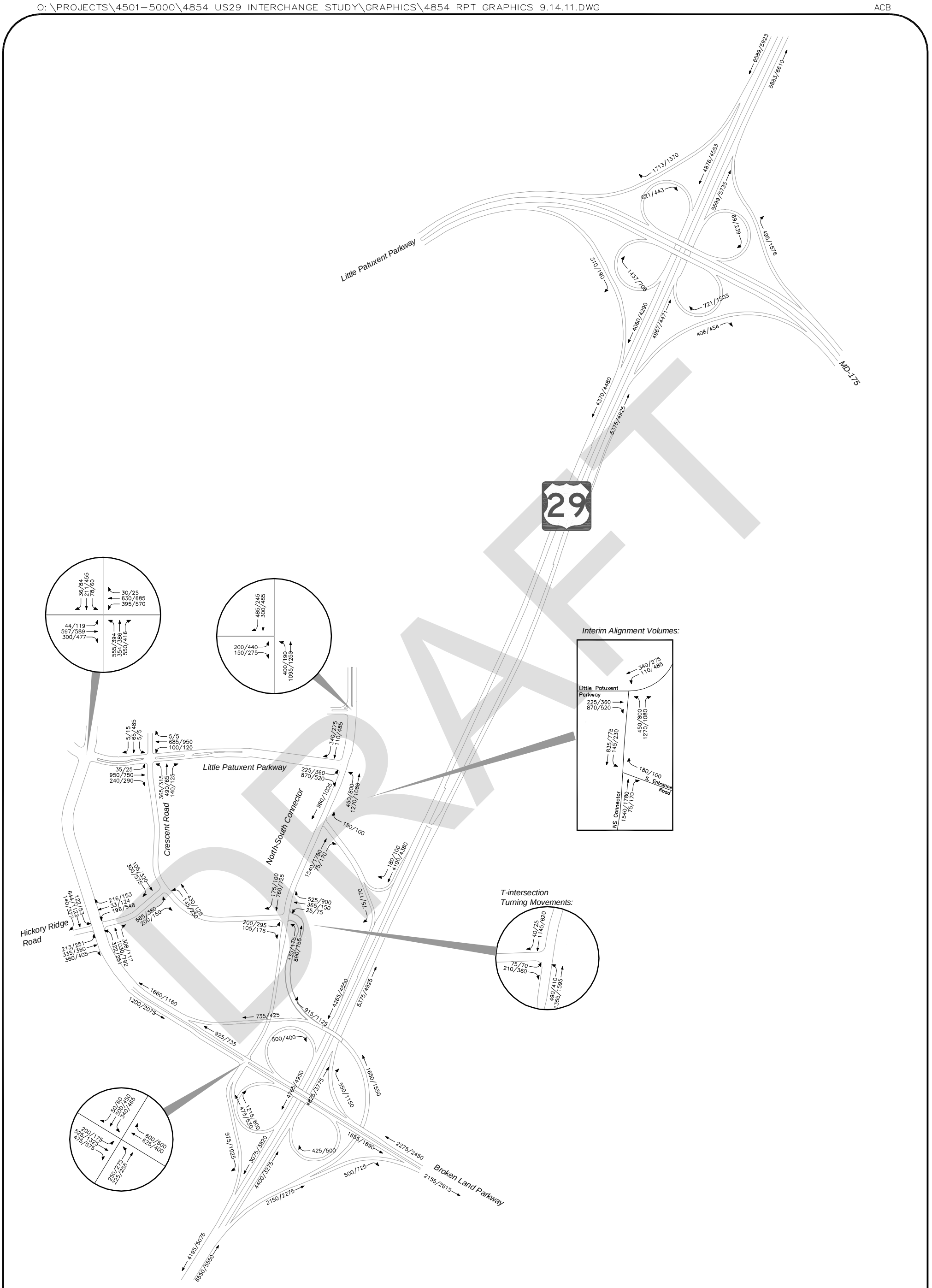

Figure 7
2035 Traffic Volumes with SHA Improvements
And North/South Connector (Ultimate Condition)

AM PEAK HOUR
PM PEAK HOUR
000/000

North

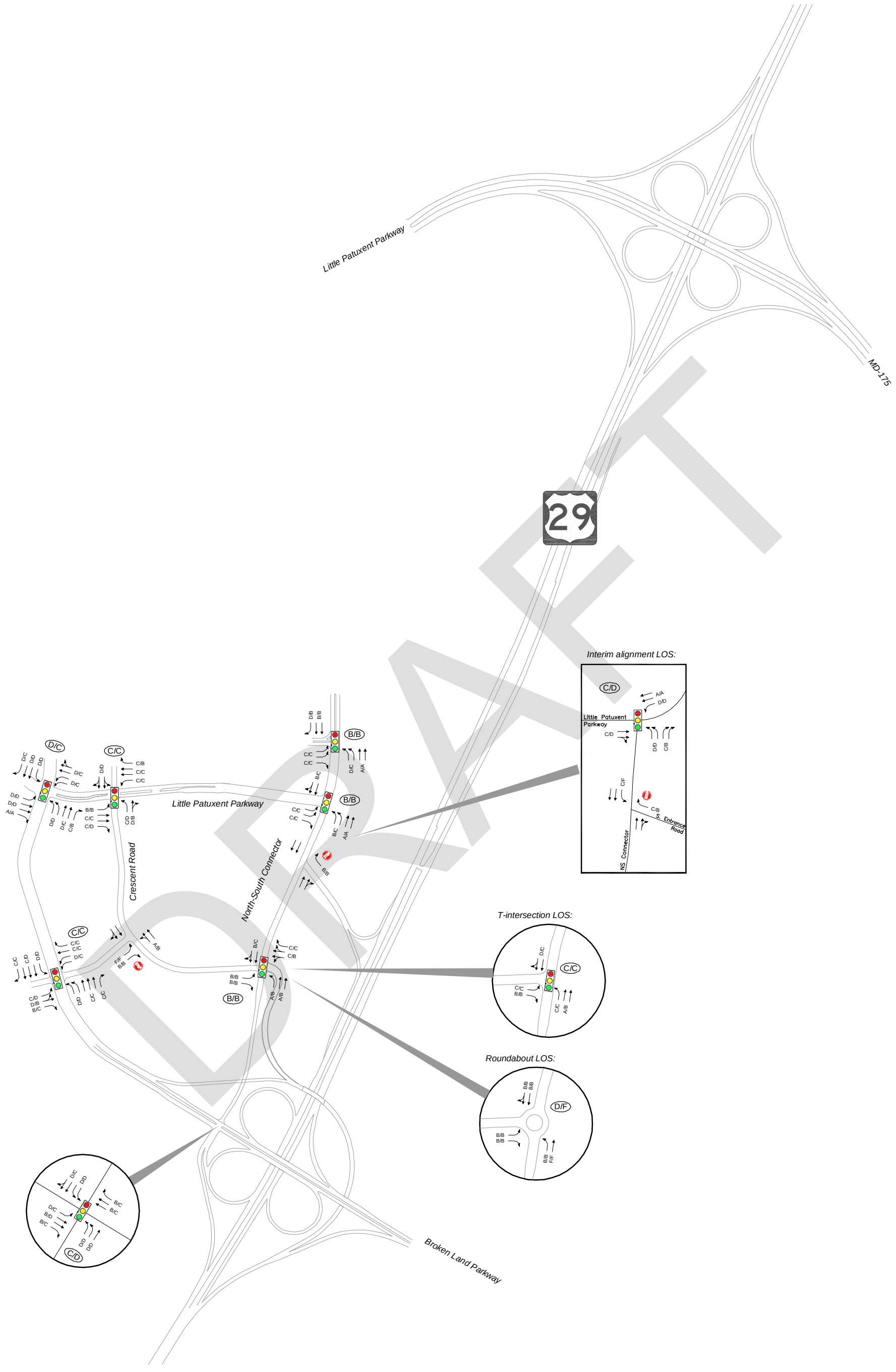

Figure 8
2035 Levels of Service with SHA Improvements and North/South Connector (Ultimate Condition)

← Represents One Travel Lane
Signalized Intersection
STOP Stop Sign

North

APPENDIX B

Right-of-Way Requirement Estimates

Downtown Columbia Transportation Improvements
North-South Connector Road
Nov-11
"Conventional T" Intersection Alternative w/o Northbound Access

								Interim Condition			Ultimate Condition		
Owners (west side of US 29)	**Tax Map**	**Parcel**	**Lot**	**Liber**	**Folio**			**R/W SF**	**Revertible SF**	**Temporary SF**	**R/W SF**	**Revertible SF**	**Temporary SF**
Howard Research and Development Corporation	36	81		2234	240	5289	330	331675	0	0			
Howard Research and Development Corporation	36	519	1	4118	16	5289	330	67840	0	0			
Howard Research and Development Corporation	36	519	3	4118	16	5289	330	1752	0	0			
Howard Research and Development Corporation	36	399	11-C	2683	538	5289	330	**18097**	0	0			
Symphony Woods, LLC	36	338	P.A2	11354	641			3561	5500	0			
Howard Research and Development Corporation	36	399	11-D	2683	538	5289	330	**3374**	0	0			
Howard Research and Development Corporation	36	399	11-E	2683	538	5289	330	**2209**	0	0			
Toby's General Partnership	36	307	1	1530	379			6966	13900	0			
Howard Research and Development Corporation	36	399	11-F	2683	538	5289	330	**2095**	0	0			
Columbia Association, Inc.	36	452	23	3324	191			70432	19000	1600			
Howard Research and Development Corporation	36	399	11-G	2683	538	5289	330	**17025**	0	0			
State Highway Administration, Dept. of Transportation	36	389	3	4094	636			59448	0	0			
Howard County Maryland	36	389	4	3245	2514	3999	138	**5575**	0	0			
Howard County Maryland Library	36	389	5	1879	257			0	1700	3600	**140139**	0	0
API Columbia Town Center, LLP	36	389	A-1	6132	200			0	10500	0	16980	10500	13600
Howard Research and Development Corporation	36	389	2	3245	2514	5289	330	0	4900	0	19274	0	0
Columbia Association, Inc.	36	321	18	3324	191			0	0	0	692	0	0
10 CC Business Trust	36	463	P.A-2	7793	673			0	0	0	3354	0	0
Lot 49 Business Trust	36	460	49	7801	354	7945	534	0	0	0	1353	0	0
Howard County Dedicated R/W - Symphony Woods Road								110526	0	0			
						TOTALS		**700575**	**55500**	**5200**	**181792**	**10500**	**13600**

* **BOLD** Indicates Complete Property Take

HRD Properties	444067	4900	0	19274	0	0
	63.39%			10.60%		
Howard Co. Properties	116101	1700	3600	140139	0	0
	16.57%			77.09%		
SHA Properties	59448	0	0	0	0	0
	8.49%			0.00%		
All Other Properties	80959	48900	1600	22379	10500	13600
	11.56%			12.31%		

Downtown Columbia Transportation Improvements
North-South Connector Road
Nov-11
Roundabout Intersection Alternative w/o Northbound Access

								Interim Condition			Ultimate Condition		
Owners (west side of US 29)	**Tax Map**	**Parcel**	**Lot**	**Liber**	**Folio**			**R/W SF**	**Revertible SF**	**Temporary SF**	**R/W SF**	**Revertible SF**	**Temporary SF**
Howard Research and Development Corporation	36	81		2234	240	5289	330	336239	0	0			
Howard Research and Development Corporation	36	519	1	4118	16	5289	330	67840	0	0			
Howard Research and Development Corporation	36	519	3	4118	16	5289	330	1752	0	0			
Howard Research and Development Corporation	36	399	11-C	2683	538	5289	330	**18097**	0	0			
Symphony Woods, LLC	36	338	P.A2	11354	641			3561	5500	0			
Howard Research and Development Corporation	36	399	11-D	2683	538	5289	330	**3374**	0	0			
Howard Research and Development Corporation	36	399	11-E	2683	538	5289	330	**2209**	0	0			
Toby's General Partnership	36	307	1	1530	379			6966	13900	0			
Howard Research and Development Corporation	36	399	11-F	2683	538	5289	330	**2095**	0	0			
Columbia Association, Inc.	36	452	23	3324	191			71375	19000	1600			
Howard Research and Development Corporation	36	399	11-G	2683	538	5289	330	**17025**	0	0			
State Highway Administration, Dept. of Transportation	36	389	3	4094	636			59448	0	0			
Howard County Maryland	36	389	4	3245	2514	3999	138	**5575**	0	0			
Howard County Maryland Library	36	389	5	1879	257			0	1700	3600	**140139**	0	0
API Columbia Town Center, LLP	36	389	A-1	6132	200			0	10500	0	16980	10500	13600
Howard Research and Development Corporation	36	389	2	3245	2514	5289	330	0	4900	0	19274	0	0
Columbia Association, Inc.	36	321	18	3324	191			0	0	0	692	0	0
10 CC Business Trust	36	463	P.A-2	7793	673			0	0	0	3354	0	0
Lot 49 Business Trust	36	460	49	7801	354	7945	534	0	0	0	1353	0	0
Howard County Dedicated R/W - Symphony Woods Road								110526	0	0			
						TOTALS		**706082**	**55500**	**5200**	**181792**	**10500**	**13600**

* **BOLD** Indicates Complete Property Take

HRD Properties	448631	4900	0	19274	0	0
	63.54%			10.60%		
Howard Co. Properties	116101	1700	3600	140139	0	0
	16.44%			77.09%		
SHA Properties	59448	0	0	0	0	0
	8.42%			0.00%		
All Other Properties	81902	48900	1600	22379	10500	13600
	11.60%			12.31%		

Downtown Columbia Transportation Improvements
North-South Connector Road
Nov-11
"Jug-Handle" Intersection Alternative w/ Northbound Access

								Interim Condition			Ultimate Condition		
Owners (west side of US 29)	**Tax Map**	**Parcel**	**Lot**	**Liber**	**Folio**			**R/W SF**	**Revertible SF**	**Temporary SF**	**R/W SF**	**Revertible SF**	**Temporary SF**
Howard Research and Development Corporation	36	81		2234	240	5289	330	341861	0	0			
Howard Research and Development Corporation	36	519	1	4118	16	5289	330	74479	0	0			
Howard Research and Development Corporation	36	519	3	4118	16	5289	330	1731	0	0			
Howard Research and Development Corporation	36	399	11-C	2683	538	5289	330	**18097**	0	0			
Symphony Woods, LLC	36	338	P.A2	11354	641			3561	5500	0			
Howard Research and Development Corporation	36	399	11-D	2683	538	5289	330	**3374**	0	0			
Howard Research and Development Corporation	36	399	11-E	2683	538	5289	330	**2209**	0	0			
Toby's General Partnership	36	307	1	1530	379			6966	13900	0			
Howard Research and Development Corporation	36	399	11-F	2683	538	5289	330	**2095**	0	0			
Columbia Association, Inc.	36	452	23	3324	191			71412	19000	1600			
Howard Research and Development Corporation	36	399	11-G	2683	538	5289	330	**17025**	0	0			
State Highway Administration, Dept. of Transportation	36	389	3	4094	636			59448	0	0			
Howard County Maryland	36	389	4	3245	2514	3999	138	**5575**	0	0			
Howard County Maryland Library	36	389	5	1879	257			0	1700	3600	**140139**	0	0
API Columbia Town Center, LLP	36	389	A-1	6132	200			0	10500	0	16980	10500	13600
Howard Research and Development Corporation	36	389	2	3245	2514	5289	330	0	4900	0	19274	0	0
Columbia Association, Inc.	36	321	18	3324	191			0	0	0	692	0	0
10 CC Business Trust	36	463	P.A-2	7793	673			0	0	0	3354	0	0
Lot 49 Business Trust	36	460	49	7801	354	7945	534	0	0	0	1353	0	0
Howard County Dedicated R/W - Symphony Woods Road								110526	0	0			
						TOTALS		**718359**	**55500**	**5200**	**181792**	**10500**	**13600**

* **BOLD** Indicates Complete Property Take

HRD Properties	460871	4900	0	19274	0	0
	64.16%			10.60%		
Howard Co. Properties	116101	1700	3600	140139	0	0
	16.16%			77.09%		
SHA Properties	59448	0	0	0	0	0
	8.28%			0.00%		
All Other Properties	81939	48900	1600	22379	10500	13600
	11.41%			12.31%		

APPENDIX C

Concept Construction Cost Estimates

WALLACE MONTGOMERY & ASSOCIATES
110 WEST ROAD SUITE 300
TOWSON, MARYLAND 21204

DOWNTOWN COLUMBIA
TRANSPORTATION IMPROVEMENTS
NORTH-SOUTH CONNECTOR
HOWARD COUNTY - GGP
WM&A NO. 210008.01

CONCEPT CONSTRUCTION COST ESTIMATE

"CONVENTIONAL-T" INTERSECTION ALTERNATIVE W/O NORTHBOUND ACCESS (SOUTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 1 - PRELIMINARY				
1001	110100	CLEARING & GRUBBING	LS	1	$50,000	$50,000
1002	120500	MAINTENANCE OF TRAFFIC (2% CAT 2-8)	LS	1	$162,000	$162,000
1003	130840	CONSTRUCTION STAKEOUT (1.5% CAT 1-8)	LS	1	$122,000	$122,000
1004	130850	MOBILIZATION (8% CAT 1-8)	LS	1	$650,000	$650,000
		SUB-TOTAL CATEGORY 1				$984,000
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	CY	48000	$15	$720,000
2002	201031	CLASS 1-A EXCAVATION	CY	4000	$25	$100,000
2003	201040	GEOSYNTHETIC STABILIZED SUBGRADE USING GRADED AGGREGATE BASE	CY	4000	$50	$200,000
2004	202065	COMMON BORROW	CY	155000	$10	$1,550,000
2005	203030	TEST PIT EXCAVATION	CY	10	$100	$1,000
		SUB-TOTAL CATEGORY 2				$2,571,000
		CATEGORY 3 - DRAINAGE				
3001	300000	DRAINAGE & SWM ITEMS (11% CAT 2,4,5,6)	LS	1	$648,651	$648,651
3002	300000	EROSION AND SEDIMENT CONTROL (4% CAT 2,4,5,6)	LS	1	$235,873	$235,873
		SUB-TOTAL CATEGORY 3				$884,524
		CATEGORY 4 - STRUCTURES				
4001	400000	BRIDGE OVER RAMP W/ 4 WINGWALLS	SF	6000	$180	$1,080,000
4002	400000	RETAINING WALL	SF	4125	$125	$515,625
		SUB-TOTAL CATEGORY 4				$1,595,625
		CATEGORY 5 - PAVING				
5001	500000	HOT MIX ASPHALT	TON	12000	$90	$1,080,000
5002	520113	6" GRADED AGGREGATE BASE COURSE	SY	34000	$10	$340,000
		SUB-TOTAL CATEGORY 5				$1,420,000
		CATEGORY 6 - SHOULDERS				
6001	634300	STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH DEPTH	LF	5500	$25	$137,500
6002	660482	TRAFFIC BARRIER W BEAM USING 6 FOOT POST	LF	3900	$25	$97,500
6003	600000	TRAFFIC BARRIER END TREATMENTS	EA	10	$2,000	$20,000
6004	600000	TRAFFIC BARRIER ANCHORAGE TO BRIDGE	EA	4	$2,000	$8,000
6005	600000	MONOLITHIC CONCRETE MEDIAN 2 FEET WIDE	LF	520	$60	$31,200
6006	655105	5 INCH CONCRETE SIDEWALK	SF	1600	$10	$16,000
		SUB-TOTAL CATEGORY 6				$310,200

WALLACE MONTGOMERY & ASSOCIATES
110 WEST ROAD SUITE 300
TOWSON, MARYLAND 21204

DOWNTOWN COLUMBIA
TRANSPORTATION IMPROVEMENTS
NORTH-SOUTH CONNECTOR
HOWARD COUNTY - GGP
WM&A NO. 210008.01

CONCEPT CONSTRUCTION COST ESTIMATE

"CONVENTIONAL-T" INTERSECTION ALTERNATIVE W/O NORTHBOUND ACCESS (SOUTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 7 - LANDSCAPING				
7001	704325	PLACING FURNISHED TOPSOIL 2 INCH DEPTH	SY	43000	$4	$172,000
7002	705412	TEMPORARY MULCH	SY	43000	$1	$43,000
7003	705500	TURFGRASS ESTABLISHMENT	SY	43000	$2	$86,000
7004	709100	TYPE A SOIL STABILIZATION MATTING	SY	43000	$4	$172,000
7005	700000	LANDSCAPING (5% CAT 2,4,5,6)	LS	1	$294,841	$294,841
		SUB-TOTAL CATEGORY 7				$767,841
		CATEGORY 8 - TRAFFIC				
8001	800000	ROADWAY SIGNING/MARKINGS (1% CAT 2,4,6,8)	LS	1	$58,968	$58,968
8002	800000	ROADWAY LIGHTING (2% CAT 2,4,6,8)	LS	1	$117,937	$117,937
8003	800000	SIGNAL UPGRADE @ BROKEN LAND PARKWAY	LS	1	$100,000	$100,000
8004	800000	NEW SIGNAL AT INTERSECTION	LS	1	$200,000	$200,000
8005	800000	OVERHEAD SIGNING AT INTERCHANGE	LS	1	$50,000	$50,000
		SUB-TOTAL CATEGORY 8				$526,905
		SUB-TOTAL CATEGORY 1				$984,000
		SUB-TOTAL CATEGORY 2				$2,571,000
		SUB-TOTAL CATEGORY 3				$884,524
		SUB-TOTAL CATEGORY 4				$1,595,625
		SUB-TOTAL CATEGORY 5				$1,420,000
		SUB-TOTAL CATEGORY 6				$310,200
		SUB-TOTAL CATEGORY 7				$767,841
		SUB-TOTAL CATEGORY 8				$526,905
		TOTAL CATEGORY (1-8)				$9,060,095
		40% CONTINGENCY FOR CONCEPT DESIGN				$3,624,038
		ENGINEER'S ESTIMATE				$12,684,133

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DOWNTOWN COLUMBIA
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NORTH-SOUTH CONNECTOR
HOWARD COUNTY - GGP
WM&A NO. 210008.01

CONCEPT CONSTRUCTION COST ESTIMATE

ROUNDABOUT INTERSECTION ALTERNATIVE W/O NORTHBOUND ACCESS (SOUTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 1 - PRELIMINARY				
1001	110100	CLEARING & GRUBBING	LS	1	$50,000	$50,000
1002	120500	MAINTENANCE OF TRAFFIC (2% CAT 2-8)	LS	1	$164,000	$164,000
1003	130840	CONSTRUCTION STAKEOUT (1.5% CAT 1-8)	LS	1	$123,000	$123,000
1004	130850	MOBILIZATION (8% CAT 1-8)	LS	1	$657,000	$657,000
		SUB-TOTAL CATEGORY 1				$994,000
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	CY	57000	$15	$855,000
2002	201031	CLASS 1-A EXCAVATION	CY	4900	$25	$122,500
2003	201040	GEOSYNTHETIC STABILIZED SUBGRADE USING GRADED AGGREGATE BASE	CY	4900	$50	$245,000
2004	202065	COMMON BORROW	CY	147000	$10	$1,470,000
2005	203030	TEST PIT EXCAVATION	CY	10	$100	$1,000
		SUB-TOTAL CATEGORY 2				$2,693,500
		CATEGORY 3 - DRAINAGE				
3001	300000	DRAINAGE & SWM ITEMS (11% CAT 2,4,5,6)	LS	1	$654,239	$654,239
3002	300000	EROSION AND SEDIMENT CONTROL (4% CAT 2,4,5,6)	LS	1	$237,905	$237,905
		SUB-TOTAL CATEGORY 3				$892,144
		CATEGORY 4 - STRUCTURES				
4001	400000	BRIDGE OVER RAMP W/ 4 WINGWALLS	SF	6000	$180	$1,080,000
4002	400000	RETAINING WALL	SF	4125	$125	$515,625
		SUB-TOTAL CATEGORY 4				$1,595,625
		CATEGORY 5 - PAVING				
5001	500000	HOT MIX ASPHALT	TON	11000	$90	$990,000
5002	520113	6" GRADED AGGREGATE BASE COURSE	SY	32000	$10	$320,000
		SUB-TOTAL CATEGORY 5				$1,310,000
		CATEGORY 6 - SHOULDERS				
6001	634300	STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH DEPTH	LF	7000	$25	$175,000
6002	660482	TRAFFIC BARRIER W BEAM USING 6 FOOT POST	LF	4100	$25	$102,500
6003	600000	TRAFFIC BARRIER END TREATMENTS	EA	11	$2,000	$22,000
6004	600000	TRAFFIC BARRIER ANCHORAGE TO BRIDGE	EA	4	$2,000	$8,000
6005	600000	MONOLITHIC CONCRETE MEDIAN 2 FEET WIDE	LF	0	$60	$0
6006	655105	5 INCH CONCRETE SIDEWALK	SF	4100	$10	$41,000
		SUB-TOTAL CATEGORY 6				$348,500

WALLACE MONTGOMERY & ASSOCIATES
110 WEST ROAD SUITE 300
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TRANSPORTATION IMPROVEMENTS
NORTH-SOUTH CONNECTOR
HOWARD COUNTY - GGP
WM&A NO. 210008.01

CONCEPT CONSTRUCTION COST ESTIMATE

ROUNDABOUT INTERSECTION ALTERNATIVE W/O NORTHBOUND ACCESS (SOUTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 7 - LANDSCAPING				
7001	704325	PLACING FURNISHED TOPSOIL 2 INCH DEPTH	SY	45000	$4	$180,000
7002	705412	TEMPORARY MULCH	SY	45000	$1	$45,000
7003	705500	TURFGRASS ESTABLISHMENT	SY	45000	$2	$90,000
7004	709100	TYPE A SOIL STABILIZATION MATTING	SY	45000	$4	$180,000
7005	700000	LANDSCAPING (5% CAT 2,4,5,6)	LS	1	$297,381	$297,381
		SUB-TOTAL CATEGORY 7				$792,381
		CATEGORY 8 - TRAFFIC				
8001	800000	ROADWAY SIGNING/MARKINGS (1% CAT 2,4,6,8)	LS	1	$59,476	$59,476
8002	800000	ROADWAY LIGHTING (2% CAT 2,4,6,8)	LS	1	$118,953	$118,953
8003	800000	SIGNAL UPGRADE @ BROKEN LAND PARKWAY	LS	1	$100,000	$100,000
8004	800000	NEW SIGNAL AT INTERSECTION	LS	1	$200,000	$200,000
8005	800000	OVERHEAD SIGNING AT INTERCHANGE	LS	1	$50,000	$50,000
		SUB-TOTAL CATEGORY 8				$528,429
		SUB-TOTAL CATEGORY 1				$994,000
		SUB-TOTAL CATEGORY 2				$2,693,500
		SUB-TOTAL CATEGORY 3				$892,144
		SUB-TOTAL CATEGORY 4				$1,595,625
		SUB-TOTAL CATEGORY 5				$1,310,000
		SUB-TOTAL CATEGORY 6				$348,500
		SUB-TOTAL CATEGORY 7				$792,381
		SUB-TOTAL CATEGORY 8				$528,429
		TOTAL CATEGORY (1-8)				$9,154,579
		40% CONTINGENCY FOR CONCEPT DESIGN				$3,661,832
		ENGINEER'S ESTIMATE				$12,816,410

WALLACE MONTGOMERY & ASSOCIATES
110 WEST ROAD SUITE 300
TOWSON, MARYLAND 21204

DOWNTOWN COLUMBIA
TRANSPORTATION IMPROVEMENTS
NORTH-SOUTH CONNECTOR
HOWARD COUNTY - GGP
WM&A NO. 210008.01

CONCEPT CONSTRUCTION COST ESTIMATE

JUG-HANDLE INTERSECTION ALTERNATIVE W/ NORTHBOUND ACCESS (SOUTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 1 - PRELIMINARY				
1001	110100	CLEARING & GRUBBING	LS	1	$50,000	$50,000
1002	120500	MAINTENANCE OF TRAFFIC (2% CAT 2-8)	LS	1	$198,000	$198,000
1003	130840	CONSTRUCTION STAKEOUT (1.5% CAT 1-8)	LS	1	$149,000	$149,000
1004	130850	MOBILIZATION (8% CAT 1-8)	LS	1	$796,000	$796,000
		SUB-TOTAL CATEGORY 1				$1,193,000
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	CY	55000	$15	$825,000
2002	201031	CLASS 1-A EXCAVATION	CY	4700	$25	$117,500
2003	201040	GEOSYNTHETIC STABILIZED SUBGRADE USING GRADED AGGREGATE BASE	CY	4700	$50	$235,000
2004	202065	COMMON BORROW	CY	188000	$10	$1,880,000
2005	203030	TEST PIT EXCAVATION	CY	10	$100	$1,000
		SUB-TOTAL CATEGORY 2				$3,058,500
		CATEGORY 3 - DRAINAGE				
3001	300000	DRAINAGE & SWM ITEMS (11% CAT 2,4,5,6)	LS	1	$808,514	$808,514
3002	300000	EROSION AND SEDIMENT CONTROL (4% CAT 2,4,5,6)	LS	1	$294,005	$294,005
		SUB-TOTAL CATEGORY 3				$1,102,519
		CATEGORY 4 - STRUCTURES				
4001	400000	BRIDGE OVER RAMP W/ 4 WINGWALLS	SF	8000	$180	$1,440,000
4002	400000	RETAINING WALL	SF	4125	$125	$515,625
		SUB-TOTAL CATEGORY 4				$1,955,625
		CATEGORY 5 - PAVING				
5001	500000	HOT MIX ASPHALT	TON	16000	$90	$1,440,000
5002	520113	6" GRADED AGGREGATE BASE COURSE	SY	47000	$10	$470,000
		SUB-TOTAL CATEGORY 5				$1,910,000
		CATEGORY 6 - SHOULDERS				
6001	634300	STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH DEPTH	LF	8500	$25	$212,500
6002	660482	TRAFFIC BARRIER W BEAM USING 6 FOOT POST	LF	4900	$25	$122,500
6003	600000	TRAFFIC BARRIER END TREATMENTS	EA	11	$2,000	$22,000
6004	600000	TRAFFIC BARRIER ANCHORAGE TO BRIDGE	EA	4	$2,000	$8,000
6005	600000	MONOLITHIC CONCRETE MEDIAN 2 FEET WIDE	LF	750	$60	$45,000
6006	655105	5 INCH CONCRETE SIDEWALK	SF	1600	$10	$16,000
		SUB-TOTAL CATEGORY 6				$426,000

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DOWNTOWN COLUMBIA
TRANSPORTATION IMPROVEMENTS
NORTH-SOUTH CONNECTOR
HOWARD COUNTY - GGP
WM&A NO. 210008.01

CONCEPT CONSTRUCTION COST ESTIMATE

JUG-HANDLE INTERSECTION ALTERNATIVE W/ NORTHBOUND ACCESS (SOUTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 7 - LANDSCAPING				
7001	704325	PLACING FURNISHED TOPSOIL 2 INCH DEPTH	SY	46000	$4	$184,000
7002	705412	TEMPORARY MULCH	SY	46000	$1	$46,000
7003	705500	TURFGRASS ESTABLISHMENT	SY	46000	$2	$92,000
7004	709100	TYPE A SOIL STABILIZATION MATTING	SY	46000	$4	$184,000
7005	700000	LANDSCAPING (5% CAT 2,4,5,6)	LS	1	$367,506	$367,506
		SUB-TOTAL CATEGORY 7				$873,506
		CATEGORY 8 - TRAFFIC				
8001	800000	ROADWAY SIGNING/MARKINGS (1% CAT 2,4,6,8)	LS	1	$73,501	$73,501
8002	800000	ROADWAY LIGHTING (2% CAT 2,4,6,8)	LS	1	$147,003	$147,003
8003	800000	SIGNAL UPGRADE @ BROKEN LAND PARKWAY	LS	1	$100,000	$100,000
8004	800000	NEW SIGNAL AT INTERSECTION	LS	1	$200,000	$200,000
8005	800000	OVERHEAD SIGNING AT INTERCHANGE	LS	1	$50,000	$50,000
		SUB-TOTAL CATEGORY 8				$570,504
		SUB-TOTAL CATEGORY 1				$1,193,000
		SUB-TOTAL CATEGORY 2				$3,058,500
		SUB-TOTAL CATEGORY 3				$1,102,519
		SUB-TOTAL CATEGORY 4				$1,955,625
		SUB-TOTAL CATEGORY 5				$1,910,000
		SUB-TOTAL CATEGORY 6				$426,000
		SUB-TOTAL CATEGORY 7				$873,506
		SUB-TOTAL CATEGORY 8				$570,504
		TOTAL CATEGORY (1-8)				$11,089,654
		40% CONTINGENCY FOR CONCEPT DESIGN				$4,435,862
		ENGINEER'S ESTIMATE				$15,525,515

WALLACE MONTGOMERY & ASSOCIATES
110 WEST ROAD SUITE 300
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HOWARD COUNTY - GGP
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CONCEPT CONSTRUCTION COST ESTIMATE

"INTERIM" PHASE ONE ALIGNMENT (NORTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 1 - PRELIMINARY				
1001	110100	CLEARING & GRUBBING	LS	1	$50,000	$50,000
1002	120500	MAINTENANCE OF TRAFFIC (4% CAT 2-8)	LS	1	$183,000	$183,000
1003	130840	CONSTRUCTION STAKEOUT (1.5% CAT 1-8)	LS	1	$69,000	$69,000
1004	130850	MOBILIZATION (8% CAT 1-8)	LS	1	$370,000	$370,000
		SUB-TOTAL CATEGORY 1				$672,000
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	CY	21000	$15	$315,000
2002	201031	CLASS 1-A EXCAVATION	CY	1500	$25	$37,500
2003	201040	GEOSYNTHETIC STABILIZED SUBGRADE USING GRADED AGGREGATE BASE	CY	1500	$50	$75,000
2004	202065	COMMON BORROW	CY	21000	$10	$210,000
2005	203030	TEST PIT EXCAVATION	CY	10	$100	$1,000
		SUB-TOTAL CATEGORY 2				$638,500
		CATEGORY 3 - DRAINAGE				
3001	300000	DRAINAGE & SWM ITEMS (11% CAT 2,4,5,6)	LS	1	$374,495	$374,495
3002	300000	EROSION AND SEDIMENT CONTROL (4% CAT 2,4,5,6)	LS	1	$136,180	$136,180
		SUB-TOTAL CATEGORY 3				$510,675
		CATEGORY 4 - STRUCTURES				
4001	400000	BOX CULVERT W/4 WINGWALLS	SF	4700	$200.00	$940,000
4002	400000	MAINTENANCE OF STREAM FLOW	LS	1	$100,000.00	$100,000
		SUB-TOTAL CATEGORY 4				$1,040,000
		CATEGORY 5 - PAVING				
5001	500000	HOT MIX ASPHALT	TON	11000	$90	$990,000
5002	520113	6" GRADED AGGREGATE BASE COURSE	SY	35000	$10	$350,000
		SUB-TOTAL CATEGORY 5				$1,340,000
		CATEGORY 6 - SHOULDERS				
6001	634300	STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH DEPTH	LF	4500	$25	$112,500
6002	660482	TRAFFIC BARRIER W BEAM USING 6 FOOT POST	LF	1500	$25	$37,500
6003	600000	TRAFFIC BARRIER END TREATMENTS	EA	4	$2,000	$8,000
6004	600000	TRAFFIC BARRIER ANCHORAGE TO BRIDGE	EA	4	$2,000	$8,000
6005	600000	MONOLITHIC CONCRETE MEDIAN 2 FEET WIDE	LF	1000	$60	$60,000
6006	655105	5 INCH CONCRETE SIDEWALK	SF	16000	$10	$160,000
		SUB-TOTAL CATEGORY 6				$386,000

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HOWARD COUNTY - GGP
WM&A NO. 210008.01

CONCEPT CONSTRUCTION COST ESTIMATE

"INTERIM" PHASE ONE ALIGNMENT (NORTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 7 - LANDSCAPING				
7001	704325	PLACING FURNISHED TOPSOIL 2 INCH DEPTH	SY	14000	$4	$56,000
7002	704345	PLACING FURNISHED TOPSOIL 4 INCH DEPTH	SY	3000	$7	$21,000
7003	705412	TEMPORARY MULCH	SY	17000	$1	$17,000
7004	705500	TURFGRASS ESTABLISHMENT	SY	17000	$2	$34,000
7005	709100	TYPE A SOIL STABILIZATION MATTING	SY	14000	$4	$56,000
7006	700000	LANDSCAPING (5% CAT 2,4,5,6)	LS	1	$170,225	$170,225
		SUB-TOTAL CATEGORY 7				$354,225
		CATEGORY 8 - TRAFFIC				
8001	800000	ROADWAY SIGNING/MARKINGS (1% CAT 2,4,6,8)	LS	1	$34,045	$34,045
8002	800000	ROADWAY LIGHTING (2% CAT 2,4,6,8)	LS	1	$68,090	$68,090
8003	800000	NEW SIGNAL AT LITTLE PATUXENT PARKWAY	LS	1	$200,000	$200,000
		SUB-TOTAL CATEGORY 8				$302,135
		SUB-TOTAL CATEGORY 1				$672,000
		SUB-TOTAL CATEGORY 2				$638,500
		SUB-TOTAL CATEGORY 3				$510,675
		SUB-TOTAL CATEGORY 4				$1,040,000
		SUB-TOTAL CATEGORY 5				$1,340,000
		SUB-TOTAL CATEGORY 6				$386,000
		SUB-TOTAL CATEGORY 7				$354,225
		SUB-TOTAL CATEGORY 8				$302,135
		TOTAL CATEGORY (1-8)				$5,243,535
		40% CONTINGENCY FOR CONCEPT DESIGN				$2,097,414
		ENGINEER'S ESTIMATE				$7,340,949

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CONCEPT CONSTRUCTION COST ESTIMATE

"ULTIMATE" 30 YEAR FULL REDEVELOPMENT ALIGNMENT (NORTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 1 - PRELIMINARY				
1001	110100	CLEARING & GRUBBING	LS	1	$50,000	$50,000
1002	120500	MAINTENANCE OF TRAFFIC (4% CAT 2-8)	LS	1	$238,000	$238,000
1003	130840	CONSTRUCTION STAKEOUT (1.5% CAT 1-8)	LS	1	$90,000	$90,000
1004	130850	MOBILIZATION (8% CAT 1-8)	LS	1	$480,000	$480,000
		SUB-TOTAL CATEGORY 1				$858,000
		CATEGORY 2 - GRADING				
2001	201030	CLASS 1 EXCAVATION	CY	30000	$15	$450,000
2002	201031	CLASS 1-A EXCAVATION	CY	2400	$25	$60,000
2003	201040	GEOSYNTHETIC STABILIZED SUBGRADE USING GRADED AGGREGATE BASE	CY	2400	$50	$120,000
2004	202065	COMMON BORROW	CY	37000	$10	$370,000
2005	203030	TEST PIT EXCAVATION	CY	10	$100	$1,000
		SUB-TOTAL CATEGORY 2				$1,001,000
		CATEGORY 3 - DRAINAGE				
3001	300000	DRAINAGE & SWM ITEMS (11% CAT 2,4,5,6)	LS	1	$475,283	$475,283
3002	300000	EROSION AND SEDIMENT CONTROL (4% CAT 2,4,5,6)	LS	1	$172,830	$172,830
		SUB-TOTAL CATEGORY 3				$648,113
		CATEGORY 4 - STRUCTURES				
4001	400000	BOX CULVERT W/4 WINGWALLS	SF	4700	$200.00	$940,000
4002	400000	MAINTENANCE OF STREAM FLOW	LS	1	$100,000.00	$100,000
		SUB-TOTAL CATEGORY 4				$1,040,000
		CATEGORY 5 - PAVING				
5001	500000	HOT MIX ASPHALT	TON	15000	$90	$1,350,000
5002	520113	6" GRADED AGGREGATE BASE COURSE	SY	45000	$10	$450,000
		SUB-TOTAL CATEGORY 5				$1,800,000
		CATEGORY 6 - SHOULDERS				
6001	634300	STANDARD TYPE A COMBINATION CURB AND GUTTER 12 INCH GUTTER PAN 8 INCH DEPTH	LF	7700	$25	$192,500
6002	660482	TRAFFIC BARRIER W BEAM USING 6 FOOT POST	LF	1850	$25	$46,250
6003	600000	TRAFFIC BARRIER END TREATMENTS	EA	6	$2,000	$12,000
6004	600000	TRAFFIC BARRIER ANCHORAGE TO BRIDGE	EA	4	$2,000	$8,000
6005	600000	MONOLITHIC CONCRETE MEDIAN 2 FEET WIDE	LF	350	$60	$21,000
6006	655105	5 INCH CONCRETE SIDEWALK	SF	20000	$10	$200,000
		SUB-TOTAL CATEGORY 6				$479,750

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CONCEPT CONSTRUCTION COST ESTIMATE

"ULTIMATE" 30 YEAR FULL REDEVELOPMENT ALIGNMENT (NORTH OF STA. 17+00)

Nov-11

ITEM NO.	CATEGORY CODE NO.	ITEM DESCRIPTION	UNIT	QUANT	UNIT PRICE	TOTAL AMOUNT
		CATEGORY 7 - LANDSCAPING				
7001	704325	PLACING FURNISHED TOPSOIL 2 INCH DEPTH	SY	18000	$4	$72,000
7002	704345	PLACING FURNISHED TOPSOIL 4 INCH DEPTH	SY	3500	$7	$24,500
7003	705412	TEMPORARY MULCH	SY	20500	$1	$20,500
7004	705500	TURFGRASS ESTABLISHMENT	SY	20500	$2	$41,000
7005	709100	TYPE A SOIL STABILIZATION MATTING	SY	18000	$4	$72,000
7006	700000	LANDSCAPING (5% CAT 2,4,5,6)	LS	1	$216,038	$216,038
		SUB-TOTAL CATEGORY 7				$446,038
		CATEGORY 8 - TRAFFIC				
8001	800000	ROADWAY SIGNING/MARKINGS (1% CAT 2,4,6,8)	LS	1	$43,208	$43,208
8002	800000	ROADWAY LIGHTING (2% CAT 2,4,6,8)	LS	1	$86,415	$86,415
8003	800000	NEW SIGNAL AT LITTLE PATUXENT PARKWAY	LS	2	$200,000	$400,000
		SUB-TOTAL CATEGORY 8				$529,623
		SUB-TOTAL CATEGORY 1				$858,000
		SUB-TOTAL CATEGORY 2				$1,001,000
		SUB-TOTAL CATEGORY 3				$648,113
		SUB-TOTAL CATEGORY 4				$1,040,000
		SUB-TOTAL CATEGORY 5				$1,800,000
		SUB-TOTAL CATEGORY 6				$479,750
		SUB-TOTAL CATEGORY 7				$446,038
		SUB-TOTAL CATEGORY 8				$529,623
		TOTAL CATEGORY (1-8)				$6,802,523
		40% CONTINGENCY FOR CONCEPT DESIGN				$2,721,009
		ENGINEER'S ESTIMATE				$9,523,532