Feasibility and Scoping Study
Pleasant Hill Road at Satellite Boulevard

Prepared for the
Gwinnett Place Community Improvement District

September 2016

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1.0 INTRODUCTION

In July 2015 Pond & Company completed the Activate Gwinnett Place Multi-Modal Green Corridor Master Plan for Gwinnett Place Community Improvement District (GPCID) and Gwinnett County. The Activate Gwinnett Place Master Plan further refined the vision for the Gwinnett Place area from the 2012 Livable Centers Initiative (LCI) study. Both study goals were to help further implement a grand public space; safe, fun walkable connections; vibrant mix of uses through the creation of new major public amenities and catalysts that would allow development opportunities within the Gwinnett Place area. The Activate Gwinnett Place Master Plan generated many ideas and solutions aimed at improving both pedestrian and vehicular traffic and supporting redevelopment within GPCID. One of those alternatives is a circular roadway or traffic circle at the intersection of Pleasant Hill Road and Satellite Boulevard. The traffic circle would also be large enough for the interior area to be utilized for elements that would foster a “sense of place,” e.g. public park and/or recreation center, trails, amphitheater, gathering area and/or transit stations.

In November 2015, AECOM was contracted to further evaluate the opportunity for a traffic circle at the intersection of Pleasant Hill Road and Satellite Boulevard. This Feasibility and Scoping Study report provides an overview of the activities undertaken by AECOM to evaluate the intersection, including a summary of the initial scope of the project and the final revised scope. The report also describes the existing conditions at the intersection and the proposed alternatives evaluated. Finally, in addition to the traffic circle concept, AECOM evaluated other potential traffic operational solutions which are also described in this report.

The goal of this study is to identify potential alternatives that best accommodate future traffic demand at the intersection of Pleasant Hill Road and Satellite Boulevard while creating a sense of place for the GP CID area.

Figure 1-1: Proposed Traffic Circle as Presented by Activate Gwinnett Place Study

2.0 PROJECT SCOPE

2.1 Original Scope

The original work plan for AECOM consisted of the following six tasks:

Task 1: Data Collection and Traffic Demand

Task 2: Traffic Analysis and Simulation

Task 3: Bicycle and Pedestrian Planning

Task 4: Identification of Potential Project Impacts

Task 5: Community Engagement

Task 6: Recommendations and Refined Concept

AECOM originally began Task 1 and Task 2. In early coordination meetings with Gwinnett County Department of Transportation (DOT), GPCID, AECOM and its subconsultants, the group decided that the focus of the Feasibility and Scoping Study should be on the existing conditions, the proposed alternatives and the potential "sense of place" making opportunities at and around the intersection. In addition, the AECOM Team would need to evaluate several more traffic operational opportunities at the intersection to provide a more comprehensive alternative analysis.

2.2 Revised Scope

The following is the revised scope provided by AECOM for the development of this report, including synopses explaining how AECOM addressed each item:

Task 1: Data Collection and Traffic Demand

The data collection process pulled together information from the 2012 LCI study; the 2015 Activate Gwinnett Study; the 2013 Pleasant Hill Road, Steve Reynolds Boulevard, Satellite Boulevard Traffic Study; Historical traffic counts including weekday AM, weekday PM, and weekend peak period turning movement counts at intersections within the study area; signal timing parameters; and 24-Hour classification counts, AM weekday, PM weekday, and weekend peak period travel time runs on Pleasant Hill Road and Satellite Boulevard.

AECOM developed a calibrated microsimulation model in VISSIM of the existing conditions which serves as the basis for accurate future analysis to determine appropriate recommendations regarding size, lane configuration, traffic control, and signal timing.

Task 2: Traffic Analysis and Simulation

AECOM analyzed the existing traffic data through a variety of analyses including:

1. Capacity analysis based on the methodologies provided in the Highway Capacity Manual 2010 (HCM) for three peak hours (AM peak hour, PM peak hour, and weekend peak hour) to determine the following measures of effectiveness:
   - intersection LOS
   - control delay

- 95th percentile queue
- Planning level segment LOS and available capacity.

2. Traffic Projection Analysis

Using the U.S. Department of Transportation Federal Highway Administration (FHWA) Capacity Analysis for Planning of Junctions (CAP-X) tool, AECOM analyzed potential intersection alternatives and compared their expected operational performances at a high level.

3. AECOM prepared a future year forecast for the year 2035 including:
    - Development and application of historical traffic growth rates
    - Application of ARC model output to determine growth rates, changes in travel distribution, and/or origin/destination patterns per National Highway Cooperative Research Program (NCHRP) Report 255 methodologies
    - Use of trip generation and distribution procedures per the Institute of Transportation Engineers

4. AECOM analyzed the projected traffic data to prepare a variety of analyses to compare with the existing conditions analysis. Following analysis of a No-Build condition and determination of future needs, AECOM developed and tested multiple alternatives in coordination with Gwinnett Place CID. These scenario alternatives included:
    - Unsignalized Traffic Circle
    - Signalized Traffic Circle
    - Bypass Unsignalized Traffic Circle
    - Bypass Signalized Traffic Circle
    - Quadrant Intersection
    - Continuous Flow Intersection

5. AECOM developed and calibrated a VISSIM microsimulation model to accurately capture the overall corridor effects of the proposed Satellite Circle concept.

Task 3: Identification of Potential Project Impacts

AECOM used aerial imagery and GIS property lines from Gwinnett County DOT to develop five potential alternative layouts for the traffic circle. In addition, AECOM analyzed conceptual impacts to property, including access to property, to estimate the anticipated amount of land required to construct the Satellite Circle project for each alternative. Finally, AECOM developed a conceptual construction cost estimate of each alternative.

Task 4: Recommendations and Refined Concept

The study process and results are documented within this feasibility and scoping report.

3.0 EXISTING CONDITIONS

Throughout the length of the study corridors, Pleasant Hill Road is a six-lane divided principal arterial, and Satellite Boulevard is a six-lane divided major collector. Pleasant Hill Road runs in the north-south direction while Satellite Boulevard runs in the east-west direction. The limits of the project were set from Old Norcross Road to Venture Parkway on Pleasant Hill Road and from Steve Reynolds Boulevard to Old Norcross Road on Satellite Boulevard.

AECOM has completed a desktop environmental screening in order to identify any significant environmental constraints that might arise should federal or state money be used for the construction of the envisioned traffic circle. Some constraints that often arise in urban environments involve historic resources and recreational facilities, which are protected by Section 4(f) of the USDOT Act, and disproportionate impacts to disadvantaged communities, which are covered under Executive Order 12898 (Environmental Justice). Based on a review of tax records for the properties in the vicinity of the proposed traffic circle, there are no potential historic resources or recreational facilities in the project area. Furthermore, properties in the project area are commercial in nature; therefore, disproportionate impacts to disadvantaged communities are unlikely. The screening also revealed that there are no jurisdictional or state waters within the project area and no habitat suitable for protected species; therefore, permitting through USACE, GADNR, or USFWS will not be required.

Traffic volumes were compiled using Synchro models obtained from Wolverton & Associates. The traffic volumes were dated from 2013 for the morning, midday, afternoon, and weekend peak. In order to assess the relevancy of this volume data, 24 hour tube counts and turning movement counts were taken on February 11, 2016 on all approaches of the intersection at Pleasant Hill Road and Satellite Boulevard. Comparing the 2013 volume data to the collected counts showed that there was little growth and only minor differences in hourly flows. Based on this analysis, it was decided to use the 2013 volume data but grow them by 1% compounded to 2016 in order to use them as existing counts. The PM peak hour was analyzed for existing and future conditions, as that time period has the highest cumulative traffic volumes.

In addition, travel time runs were taken on the study corridors on February 11, 2016. Travel time runs on Pleasant Hill Road were gathered in the northbound and southbound directions from Steve Reynolds Boulevard to Venture Parkway. Travel time runs on Satellite Boulevard were gathered in the eastbound and westbound directions from Steve Reynolds Boulevard to Old Norcross Road. Five travel time runs were made in each direction for the morning, midday, afternoon peak hours. These travel time runs were used in order to properly calibrate the Existing VISSIM models.

Current traffic signal timings were obtained from Wolverton & Associates in order to properly time the Existing models. In nearly all cases, the traffic signal timing plans did not change from 2013 and were used for the Existing 2016 year.

2035 No-Build

Future traffic volumes for the corridor were developed after taking historical data and using regression analysis. This analysis showed negative growth in some areas and little to no growth in others. It was decided to use a conservative growth rate of 1% compounded for the 2035 horizon year. The existing counts were grown by this 1% compounding rate in order to develop 2035 traffic volumes.

Future traffic signal timings were optimized in Synchro for the 2035 traffic volumes. Due the numerous unique proposed alternatives, it was decided to use the same No Build 2035 traffic signal timings with the proposed alternatives to reasonably compare these alternatives to one another.

4.0 PROPOSED ALTERNATIVES

The goal of this study is to identify potential alternatives that best accommodate future traffic demand at the intersection of Pleasant Hill Road and Satellite Boulevard while creating a sense of place for the Gwinnett Place CID area. This section of the report outlines potential alternatives identified in the study as well as the methods AECOM used to identify and analyze them. Each alternative is then described in terms of its geometric configuration, constructability, impacts to property, cost of right-of-way acquisition, construction cost and economic analysis.

4.1 Traffic Analysis

AECOM used a variety of traffic analysis methods to compare operational performances of multiple intersection alternatives. Intersection alternatives were divided into two groups and analyzed accordingly. The first group included multiple variations of traffic circle alternatives, which were analyzed using roundabout analysis methods published by FHWA, combined with customized microsimulation models. The second group included other alternative intersection designs recognized by FHWA, which were compared on a high level using the FHWA CAP-X tool before being further analyzed and compared on a more detailed level.

CAP-X is a software tool developed by FHWA to provide high level analysis and comparison of potential intersection improvement alternatives. AECOM used the results from this tool as a guide to further refine and analyze intersections using more detailed software. The CAP-X tool indicated that a Continuous Flow Intersection (CFI) provided the highest level of vehicular operations efficiency at this intersection compared with the other intersection types analyzed. Nevertheless, several other alternative intersection types also performed well in the analysis including a Quadrant Intersection. The full results of this analysis are included in Appendix A. Both the CFI and the Quadrant Intersection alternatives were further developed along with the traffic circle alternatives. The existing conditions PM peak hour model was updated to reflect the forecasted peak hour volumes and improvements proposed under each of the following project alternatives. Traffic signal timings remained the same as the 2035 No-Build model in order to fairly compare the selected Measure of Effectiveness (MOE) with each alternative.

In order to assess the impact the proposed alternatives had to automobile traffic along the corridors, the operational analysis required the use of more sophisticated traffic analysis tools beyond the deterministic and empirical tools that apply Highway Capacity Manual methodologies. Synchro and Highway Capacity Software (HCS) 2010 could not be used as these tools only provide intersection-based analysis and cannot analyze the impacts to the corridor as a whole. Furthermore, the traffic circle alternatives could not be analyzed with these tools as multiple nodes (intersections) make up the composition of this design where different control delays are reported at these nodes. Taking into account all the limitations, it was decided to use travel time as a basis for comparing the existing and proposed alternatives using VISSIM microsimulation models.

Unsignalized Traffic Circle

With an unsignalized traffic circle, turning and through traffic are directed onto a circular roadway where the entering traffic will always yield to circulating traffic. With this proposed alternative, three lanes are entering the traffic circle at each approach with 2-3 internally circulating lanes. Due to this multilane traffic circle, gap acceptance largely regulated the number of vehicles processed through the traffic circle. Research from FHWA's publication of "Assessment of Roundabout Capacity Models for the Highway Capacity Manual" largely guided setting this parameter. Using Tables 20 and 21 from this manual, the critical gap for a roundabout with the same configuration and entry lanes as the traffic circle was calculated to be 2.6 seconds with a follow-up headway of 1.2 seconds. These values were used for all alternatives related to unsignalized multilane traffic circle.

Given that each vehicle has to find this gap in conflicting traffic, this alternative performed significantly worse than the 2035 No-Build model. Cumulative travel times in the unsignalized traffic circle are 71.3 minutes for all directional movements compared to 33.4 minutes in the 2035 No-Build.

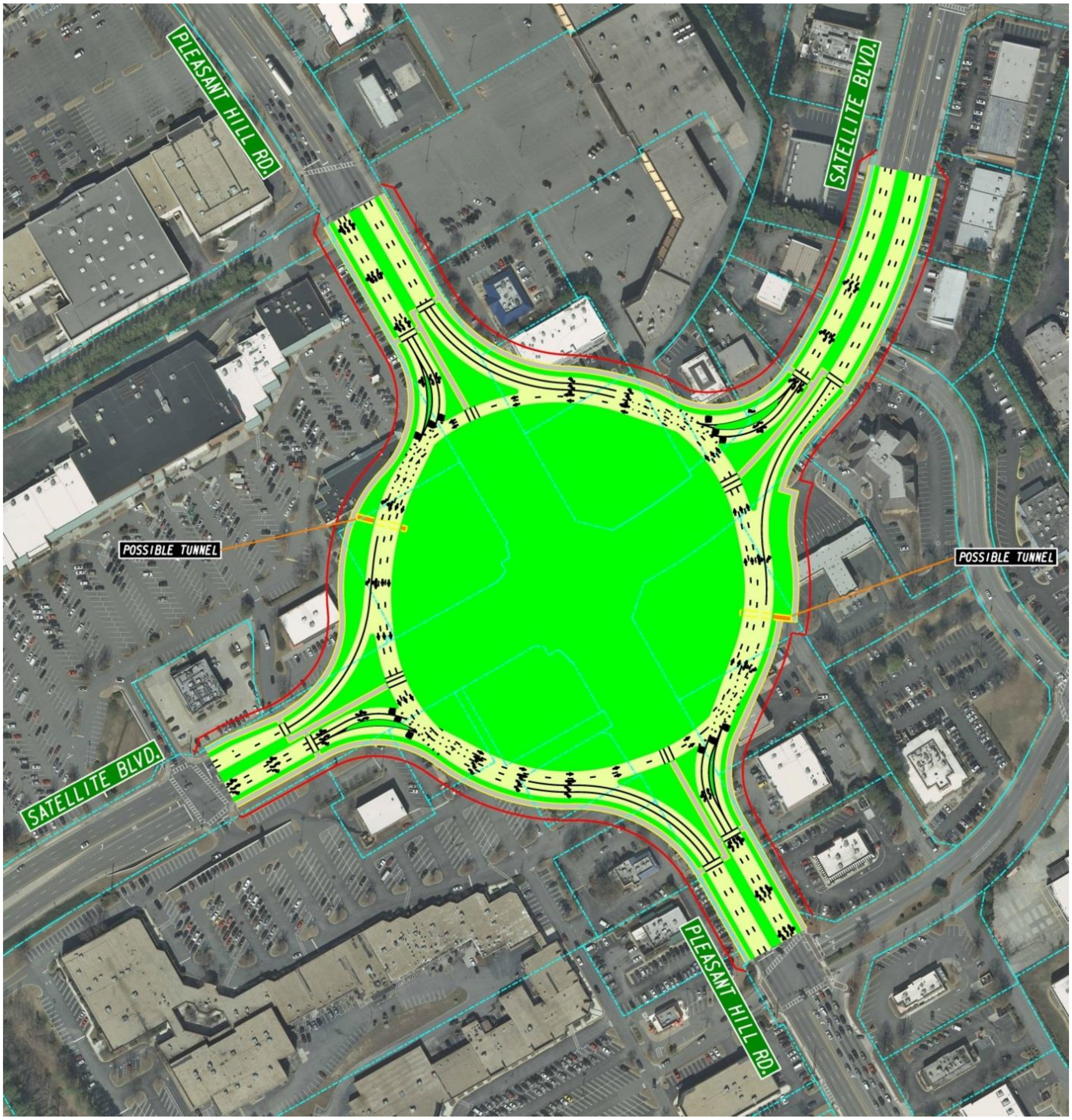

Figure 4-1.1: Unsignalized Traffic Circle Layout

Signalized Traffic Circle

Similar to the unsignalized traffic alternative, this alternative signalizes the four approach intersections of the traffic circle including the conflicting traffic inside the circle. This signalized control allows vehicles to move more freely without having to find a gap in conflicting traffic. In addition, signalization allows regulating vehicles into the circle instead of all at once like that of the unsignalized traffic circle. In addition, heavier movements such as the northbound and southbound through movements along Pleasant Hill Road can be given more green time to process more vehicles. Our analysis showed that this alternative performed better than the unsignalized traffic circle due to eliminating that gap acceptance and regulating flow into the traffic circle. Travel times were much better compared to the unsignalized traffic circle but still worse than the 2035 No-Build. Cumulative travel times are 47.4 minutes for all directional movements compared to 71.3 minutes in the unsignalized traffic circle.

For both the signalized and unsignalized traffic circle AECOM utilized the national expertise of GHD. AECOM has teamed with GHD whose roundabout planning and design team specializes in roundabout research; policy and implementation; analysis, planning and design of roundabout intersections, interchanges and corridors; feasibility and safety studies including benefit/cost analysis; peer review and design assistance; and stakeholder education and public outreach. GHD brought the AECOM team extensive experience throughout the entire project development process, from program initiation through final plans and construction consultation.

GHD provided traffic circle concept design technical guidance and reviews of traffic simulation models. GHD reviewed traffic circle concept drawings based on their history and experience on other traffic circles and other traffic with similar volume characteristics. This concept drawing review addressed components such as potential weaving maneuvers, traffic control types (yield control, traffic signal control), design speeds, and other design characteristics.

GHD also reviewed the VISSIM traffic simulation models for the traffic circles to assist AECOM with modeling realistic potential traffic conditions more accurately. The VISSIM traffic simulation models reviewed addressed components such as circulating speeds, vehicle yield behaviors such as minimum acceptable gaps in traffic, driver characteristics, and other traffic simulation settings.

Unsignalized Bypass Traffic Circle

This alternative introduces a bypass by providing two travel lanes in each direction for only the northbound and southbound movements on Pleasant Hill Road. A smaller sized traffic circle handles the remaining left and right turn movements from Pleasant Hill Road to Satellite Boulevard and all movements from Satellite Boulevard. The bypass provides grade separated travel lanes to the heaviest movement so that it avoids entering the traffic circle. The traffic circle operates similarly to the unsignalized traffic circle alternative with vehicles having to find a gap in conflicting traffic. However, removing the heavy through volumes on Pleasant Hill Road allows the traffic circle to perform significantly better with less delay and queues. Compared to all the proposed alternatives and the 2035 No-Build, the unsignalized bypass traffic circle performs the best with a cumulative travel time of 20.2 minutes.

Signalized Bypass Traffic Circle

Comparable to the unsignalized bypass traffic circle, this alternative incorporates signal control at all four approaches of the traffic circle. This allows traffic to flow better without having to try and find a gap but introduces signal delays where vehicle have to stop and let conflicting traffic proceed. In this situation, signalization of the traffic circle performs worse than the unsignalized bypass traffic circle with a cumulative travel time of 29.7 minutes compared to 20.2 minutes, respectively. However, this alternative performs better compared against the 2035 No-Build alternative at 33.4 minutes.

Figure 4-1.2: Centered Unsignalized Bypass Traffic Circle Layout

Quadrant Intersection

One leading way to improve traffic flow is by reducing or eliminating conflicting movements which allows more time to be given to the mainline where the heaviest volumes typically occur. With this alternative, all left turns at the intersection of Pleasant Hill Road and Satellite Boulevards are eliminated and move to adjacent intersections. The elimination of protected left turns from all approaches at this intersection reduces the number of signal phases from eight to four. Given that the through traffic can now flow concurrently without interruption, this reduces the intersection down to two phases. The first phase allows all vehicles on Pleasant Hill Road to travel and the second phase allows all vehicles on Satellite Boulevard to pass with it repeating back to the first phase.

Left turn movements previously at the intersection will be longer as those vehicles will have to travel along the quadrant roadway to continue to their destination. The southbound left turn movement from Pleasant Hill Road to eastbound Satellite Boulevard will now have to be made by passing the intersection and making a left turn onto the quadrant roadway, traversing the quadrant roadway, and then making a right turn onto eastbound Satellite Boulevard. The northbound left turn movement from Pleasant Hill Road to westbound Satellite Boulevard will now have to be made by making a right turn onto the quadrant roadway, traversing the quadrant roadway, and then making a left turn onto westbound Satellite Boulevard then crossing Pleasant Hill Road. The westbound left turn movement from Satellite Boulevard to southbound Pleasant Hill Road will now have to be made by making a left turn onto the quadrant roadway, traversing the quadrant roadway, and then making a left turn onto southbound Pleasant Hill Road. The eastbound left turn movement from Satellite Boulevard to northbound Pleasant Hill Road will now have to be made by making a right turn onto southbound Pleasant Hill Road, an immediate left turn onto the quadrant roadway, traversing the quadrant roadway, turning left onto westbound Satellite Boulevard and then making a right turn onto northbound Pleasant Hill Road.

This intersection has pros and cons for certain movements but the cumulative travel time of 28.9 minutes is better than the 2035 No-Build. Some movements such as the southbound left turn from Pleasant Hill Road to eastbound Satellite Boulevard have heavy queues from the quadrant intersection that spill back past Pleasant Hill Road due to the short bays that fit the space between Satellite Road and the quadrant intersection.

Figure 4-1.3: Quadrant Intersection Layout

Continuous Flow Intersection (CFI)

In an approach similar to the quadrant intersection, a continuous flow intersection allows the intersection to operate on fewer phases compared to a standard eight signal phase intersection. Variants can be found with only the mainline having a CFI to all approaches having a CFI. Left turn vehicles cross the opposing direction of traffic before approaching the intersection which allows left turn signals to be eliminated thus more time can be allocated to all movements. Cumulative travel times through the corridor support this as it is the second best performing alternative with a time of 23.5 minutes when compared with the 2035 No-Build.

Figure 4-1.4: Continuous Flow Intersection Layout

Center Turn Overpass (CTO)

Also similar to the quadrant intersection and the continuous flow intersection, the center turn overpass reduces the conflicting movements by grade separating all left turns over the intersection and then merging them back onto the corridors. In this alternative, the through and right turning movements remain unaffected. Both the grade separated left turns and the remaining intersection movements operate with two phases.

This alternative was not modeled however, travel times are very comparable to the continuous flow intersection alternative where left turns were eliminated. Similarly, the cumulative travel time for this alternative is about 23.5 minutes compared to the 33.4 minutes of the 2035 No-Build alternative.

Figure 4-1.5: Center Turn Overpass

Summary of Travel Time Results

The future performance of each alternative was evaluated by the cumulative travel time for each movement through the Pleasant Hill Road and Satellite Boulevard intersection during the PM peak hour. The full summary of the travel time analysis is shown in Figure 4.2. Compared to the 2035 No-Build alternative, the unsignalized bypass traffic circle has the best travel time reduction followed by the continuous flow intersection, and then quadrant intersection.

Figure 4-1.6: Travel Time Summary of Alternatives.

Pleasant Hill Road at Satellite Boulevard Intersection Alternatives - Travel Time Results

Direction	From Intersection	To Intersection	Movement	Existing	2035 Analysis Year						
					No-Build	Unsignalized Traffic Circle	Signalized Traffic Circle	Unsignalized Bypass Traffic Circle	Signalized Bypass Traffic Circle	Quadrant Intersection	CFI/DLT
				Minute	Minute	Minute	Minute	Minute	Minute	Minute	Minute
SB	Pleasant Hill Road SB @ Old Norcross Rd	Satellite Boulevard & Old Norcross Rd	L	2.7	4.8	7.2	2.9	2.5	3.5	3.9	3.0
		Pleasant Hill Road & Venture Pkwy	T	1.9	4.7	6.3	2.0	1.1	1.1	1.5	1.6
		Satellite Boulevard & Steve Reynolds Blvd	R	2.0	5.0	5.6	1.9	1.6	2.4	1.4	1.4
WB	Satellite Boulevard WB @ Old Norcross Rd	Pleasant Hill Road & Venture Pkwy	L	2.1	2.1	4.5	10.0	1.3	2.0	1.6	1.4
		Satellite Boulevard & Steve Reynolds Blvd	T	2.3	2.2	7.3	3.8	1.6	2.5	2.4	1.7
		Pleasant Hill Road & Old Norcross Rd	R	2.4	2.4	6.9	3.8	1.6	2.7	3.2	3.0
NB	Pleasant Hill Road NB @ Venture Pkwy	Satellite Boulevard & Steve Reynolds Blvd	L	1.3	1.3	1.4	3.0	1.5	2.5	1.9	1.3
		Pleasant Hill Road & Old Norcross Rd	T	1.7	1.8	1.5	4.2	1.1	1.1	1.4	1.5
		Satellite Boulevard & Old Norcross Rd	R	2.5	2.6	1.8	8.3	2.1	3.2	4.3	2.9
EB	Satellite Boulevard EB @ Steve Reynolds Blvd	Pleasant Hill Road & Old Norcross Rd	L	1.3	1.4	7.1	1.9	1.2	1.9	1.5	1.3
		Satellite Boulevard & Old Norcross Rd	T	2.5	2.4	11.4	2.6	2.1	2.9	2.3	1.7
		Pleasant Hill Road & Venture Pkwy	R	2.7	2.7	10.3	3.0	2.4	3.9	3.4	3.0
Total Travel Time (Minutes)				**25.4**	**33.4**	**71.3**	**47.4**	**20.2**	**29.7**	**28.9**	**23.5**

(1) Travel time for PM peak hour

(2) Travel times of future alternatives labeled as equivalent if within 10% of 2035 No Build travel time

Legend

- (green) = travel time decreased
- (yellow) = travel time equivalent
- (red) = travel time increased

4.2 Geometric/Cost/Constructability Alternative Analysis

In addition to the traffic, "place making," and economic impact analysis, the study also evaluated each intersection alternative for the potential engineering and costs impacts. The evaluation included geometric, constructability, and property impact considerations. It also included an estimation of potential construction and right-of-way costs.

Several parameters were established from the beginning of the project for evaluating the various traffic circle alternatives. The center area would include a "place making" or park area of at least eight acres. The radius of a 30 mph speed design circle would only include seven acres, so it was decided to use a 35 mph speed design. This radius allows for at least 13 acres for potential "place making" and/or park area.

Signalized Traffic Circle

The signalized (non-bypass) traffic circle shown in Figure 4-1.1 on page 7 was drawn and analyzed using a 30 mph design speed for the circulating roadway before the decision was made to standardize all traffic circle alternatives at a 35 mph design speed. This design required 3-5 lanes in the circulating roadway as well as multi-lane entrances and exits. The design speed for the entrances was 20 mph, while the design speed for the exits was 25 mph. This alternative was eliminated prior to further analysis of constructability, costs, and impacts due to its significantly higher vehicular delay compared with that of the other traffic circle alternatives analyzed.

Unsignalized Traffic Circle

The unsignalized (non-bypass) traffic circle shown in Figure 4-1.2 on page 9 was drawn and analyzed using a 30 mph design speed for the circulating roadway before the decision was made to standardize all traffic circle alternatives at a 35 mph design speed. This design required 3-4 lanes in the circulating roadway as well as multi-lane entrances and exits. The design speed for the entrances was 20 mph, while the design speed for the exits was 25 mph. This alternative was eliminated prior to further analysis of constructability, costs, and impacts due to its significantly higher vehicular delay compared with that of the other traffic circle alternatives analyzed.

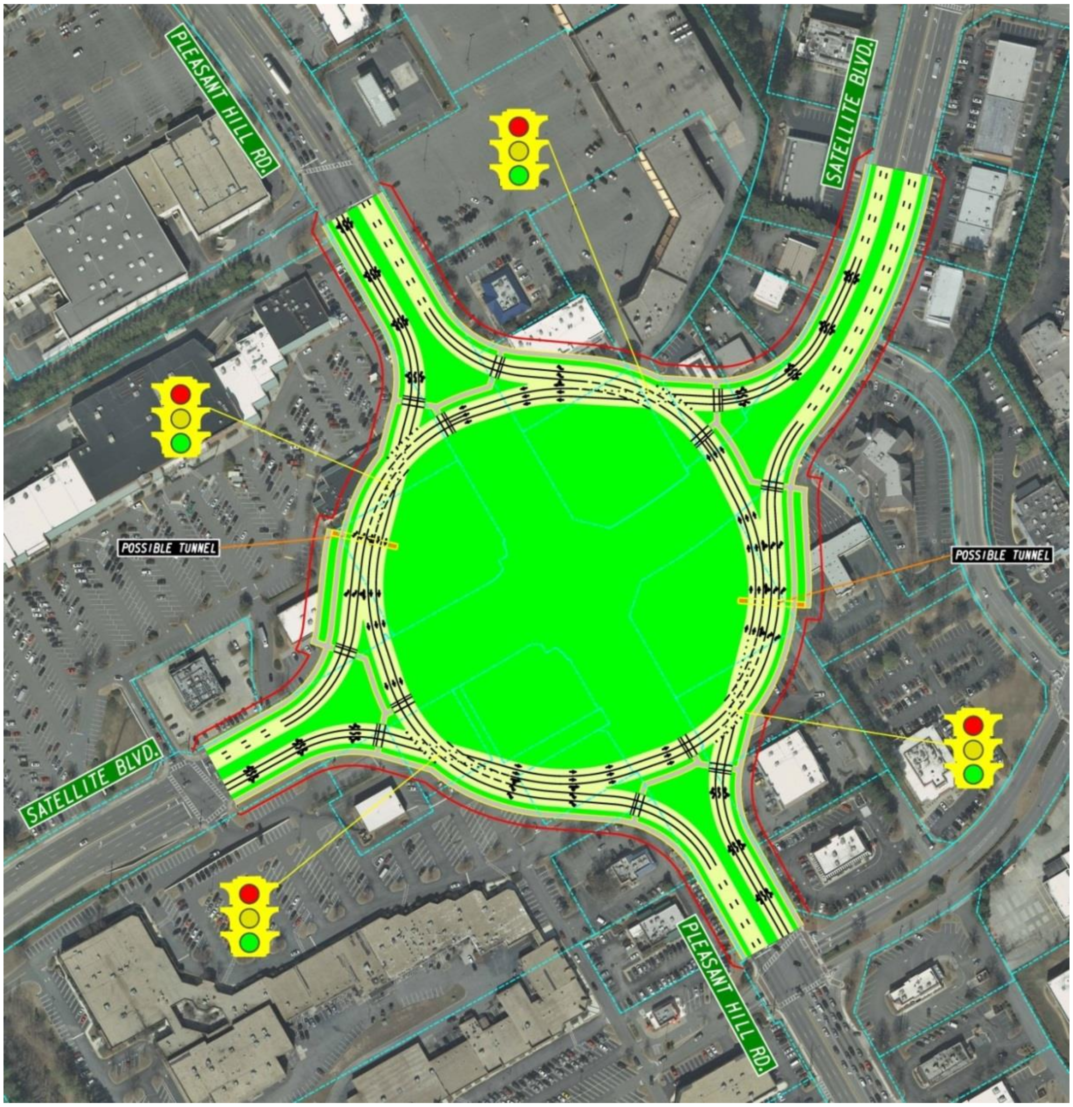

Figure 4-2.1: Signalized Traffic Circle Layout

Unsignalized Bypass Traffic Circle

The unsignalized bypass traffic circles shown in Figure 4-2.2 through Figure 4-2.5 were drawn and analyzed using a 35 mph design speed for the circulating roadway. This design required three lanes in the circulating roadway as well as multi-lane entrances and exits on some approaches. The design speed for the entrances was 20 mph, while the design speed for the exits was 25 mph. This design would be relatively simple to stage and construct with most of the initial work being off the existing roadway. Taking advantage of the flexibility of the unsignalized bypass traffic circle alternative, five main variations were drawn and analyzed separately to compare their relative merits and trade-offs. The five variations consisted of (1) a traffic circle centered on the existing intersection, (2) a traffic circle centered in the northeast quadrant of the existing intersection, (3) a traffic circle centered in the northwest quadrant of the existing intersection, (4) a traffic circle centered on the southeast quadrant of the existing intersection, and (5) a traffic circle centered on the southwest quadrant of the existing intersection. Each variation is described in further detail below.

Centered

Compared to the other unsignalized bypass traffic circle variations, the one centered on the existing intersection impacted 39 parcels and the median acreage of land (22.6). The total cost for this alternative was estimated at $91 million with the majority attributed to right-of-way acquisition. See Figure 4.1.2 on page 9.

Northeast Offset

Compared to the other unsignalized bypass traffic circle variations, the one centered in the northeast quadrant of the existing intersection impacted the second-greatest number of parcels (41) and the second-most acres of land (31.85). The total cost for this alternative was estimated at $94 million with the majority attributed to right-of-way acquisition.

Figure 4-2.2: North East Offset Unsignalized Bypass Traffic Circle Layout

Northwest Offset

Compared to the other unsignalized bypass traffic circle variations, the one centered in the northwest quadrant of the existing intersection impacted the second-fewest number of parcels (34) and the most acres of land (32.82). The total cost for this alternative was estimated at $96 million with the majority attributed to right-of-way acquisition.

Figure 4-2.3: North West Offset Unsignalized Bypass Traffic Circle Layout

Southeast Offset

Compared to the other unsignalized bypass traffic circle variations, the one centered in the southeast quadrant of the existing intersection impacted the second-greatest number of parcels (45) and the second-most acres of land (20.42). The total cost for this alternative was estimated at $94 million with the majority attributed to right-of-way acquisition.

Figure 4-2.4: South East Offset Unsignalized Bypass Traffic Circle Layout

Southwest Offset

Compared to the other unsignalized bypass traffic circle variations, the one centered in the southwest quadrant of the existing intersection impacted the fewest parcels (29) and the median acreage of land (27.65). The total cost for this alternative was estimated at $94 million with the majority attributed to right-of-way acquisition.

Figure 4-2.5: South West Offset Unsignalized Bypass Traffic Circle Layout

Signalized Bypass Traffic Circle

The signalized bypass traffic circle (not pictured) was analyzed using a 35 mph design speed for the circulating roadway. This design required 3-4 lanes in the circulating roadway as well as multi-lane entrances and exits. The design speed for the entrances was 20 mph, while the design speed for the exits was 25 mph. This alternative was eliminated prior to further analysis of constructability, costs, and impacts due to the additional travel time caused by the introduction of traffic signals.

Quadrant Intersection

The quadrant intersection (Figure 4-1.3 on page 10) was drawn and analyzed using a 35 mph design speed for the quadrant roadway. This design required four lanes in the quadrant roadway with additional turn lanes at intersections. This alternative was eliminated prior to further analysis of constructability, costs, and impacts due to the additional travel time caused by the out-of-direction travel to use the quadrant roadway.

Continuous Flow Intersection (CFI)

The CFI (Figure 4-1.4 on page 11) was drawn and analyzed assuming displaced left turn roadways in all four quadrants (the figure only shows two). This design required some right-of-way acquisition to accommodate the displaced left turn roadways (estimated 5.77 acres) but much less than the traffic circle alternatives. Nevertheless, this alternative still had an estimated 32 parcel impacts due to the density of parcels in the areas of impact. The total cost for this alternative was estimated at $54 million with the majority attributed to right-of-way acquisition. This alternative may be moderately difficult to stage due to the constrained area.

Center Turn Overpass (CTO)

The CTO (Figure 4-1.5 on page 12) was drawn and analyzed assuming four lanes would be needed on the upper roadways. This design required significant right-of-way acquisition to accommodate increased overall roadway width over long stretches along each leg (estimated 29.25 acres total), and the number of parcels impacted was significantly higher than any other alternative (70). The total cost for this alternative was estimated at $131 million with the majority attributed to right-of-way acquisition. This alternative would likely be very difficult to stage due to the constrained area.

The CTO concept is currently under patent. A request was made to determine the cost associated with the patent, but no response was received. If this option is selected, the cost to utilize this patent would need to be determined and included in the total project cost.

4.3 Place Making Analysis

Each intersection type was evaluated on its potential to create a sense of place either within the intersection alternative or adjacent to it. The following summarizes the details and opportunities for each alternative evaluated.

Unsignalized and signalized Traffic Circle

The unsignalized traffic circle and signalized traffic circle both create a significant opportunity for "place making." A 35 mph speed design on the circle radii creates 15 acres of potential "place making" opportunity. Pedestrian and bike access can be provided through pedestrian/bike crosswalks and HAWK signals. A HAWK signal or beacon (High-Intensity Activated 21 crosswalk beacon) is a traffic control device used to stop road traffic and allow pedestrians to cross safely. It is officially known as a Pedestrian Hybrid Beacon (PHB). In addition, pedestrian/bike tunnels can be installed under any of the traffic circle's four quadrants and, because of the size of the circle, the constructability of such an access is easily done. The tunnels can be constructed to provide visibility from each adjacent side and access to further increase safety and mobility.

It should also be noted that McDaniel Farm Park is located to the northeast of the intersect and any potential configuration of the traffic circle that offsets close to this existing park could create potential connectivity between these public amenities. A traffic circle offset to the northeast or southeast would provide a closer link for such a connection.

Unsignalized and Signalized Bypass Traffic Circle

The unsignalized bypass traffic circle and signalized bypass traffic circle both create an equal opportunity for “place making.” A 35 mph speed design on the circle radii creates 13 acres of potential “place making” opportunity. The bypass circle as compared to the traffic circles has the through movement of Pleasant Hill Road impacting the center “placing making” opportunities but the acreage provided still meets the eight-acre requirement established at the beginning of the study. The centered bypass circle has the most significant impact to the “place making” area as the through lanes would intersect the “place making” area down the middle, splitting the potential opportunities. This could be mitigated by construction of a bridge cap over the through movements, but this would be costly to construct. The offset options create better opportunities for a large continuous area for “place making.”

Pedestrian and bike access can be provided through pedestrian/bike crosswalks and HAWK (High-Intensity Activated 22 crosswalk) signals. A HAWK signal is a traffic control device used to stop road traffic and allow pedestrians to cross safely. In addition, pedestrian/bike tunnels can be installed under any of the traffic circle’s four quadrants, and because of the size of the circle, the constructability of such an access is easily done. The tunnels can be constructed to provide visibility from each adjacent side and access to further increase safety and mobility.

McDaniel Farm Park is located to the north east of the intersection and any potential configuration of the traffic circle that offsets close to this existing park could create potential connectivity between these public amenities. A traffic circle offset to the northeast or southeast would provide a closer link for such a connection.

Quadrant Intersection

The Quadrant Intersection was evaluated to eliminate the left turns from Satellite Boulevard to Pleasant Hill Road at the existing intersection and move them back to the existing Market Street/Mall Boulevard road system. The area between these roadways could be utilized to create that “place making” opportunity. The existing properties would need to be purchased but approximately 14 acres could be obtained for the opportunity.

Pedestrian and bike access can be provided through pedestrian/bike crosswalks and HAWK signals.
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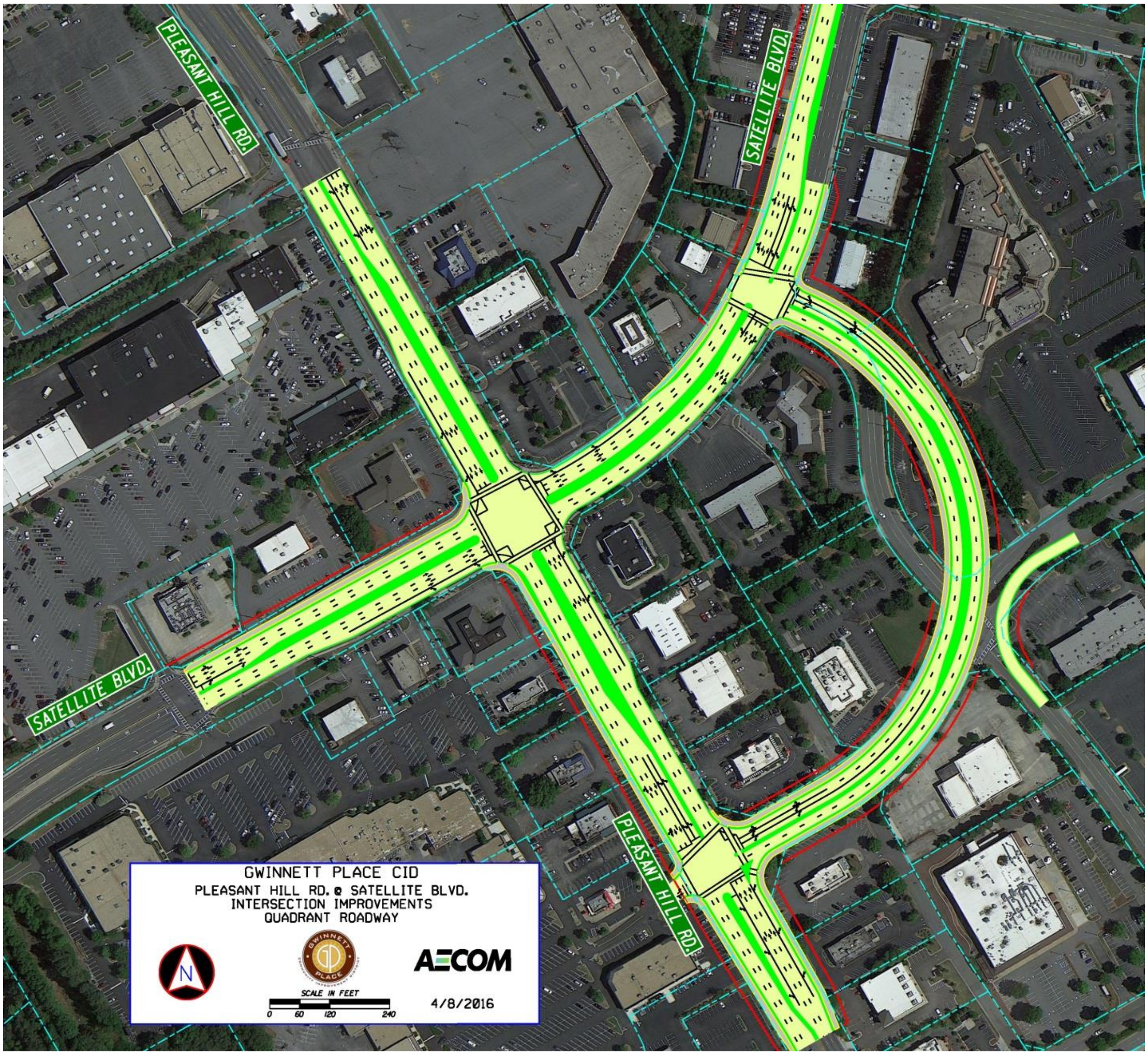


Figure 4-3 Quadrant Intersection

Continuous Flow Intersection (CFI)

The CFI has less place making potential but because of potential displacement for the construction of the CFI, the remainder of these displaced properties could be used to create a linear park or similar "place making" opportunity. While this is not a large area, a couple of acres would remain for this opportunity. Pedestrian and bike access can be provided through pedestrian/bike crosswalks at each of the intersections.

Center Turn Overpass (CTO)

The CTO provides the least opportunity of all the alternatives evaluated for "place making." There may be some remaining areas from displaced properties, but that area would be small. In addition, the grade changes from the CTO could make it difficult for pedestrian/bikes and will create a visual impediment to any potential "place making."

Summary of "Place Making" Opportunities

The Traffic Circles and Quadrant intersection create the greatest opportunity for the creation of a "place" at the intersection of Pleasant Hill Road and Satellite Boulevard intersection. The opportunities vary but could create an area between 13 to 15 acres. In addition, offsetting the traffic circles in the direction of McDaniel Farm Park could create connectivity opportunities between the traffic circle center "place" and the existing park.

4.4 Economic Analysis

In addition to traffic analysis, each alternative intersection type was looked at for opportunities to create a sense of place and potential impacts to economic development. The economic development analysis was completed by Bleakly Advisory Group. The bypass unsignalized traffic circle offset to the northeast and southeast created the largest opportunity for economic redevelopment. Their complete findings are included in Appendix B.

5.0 CONCLUSIONS

The results from all the analysis described above were input into the parameter evaluation spreadsheet shown in **Figure 5-1**. Scoring criteria were assigned to each of the following categories:

- Traffic (25 points)
- Engineering (5 points)
- Potential Economic Impact (30 points)
- Project Costs (20 points)
- Property Impacts (10 points)
- Place Making Potential (10 points)

Because the goals of the study focused on traffic operations and "place making ability," a higher weight was placed on traffic operations and potential economic impact. Project costs were also weighted high since the ability to fund a potential project will be critical to the future implementation of a project. See the full results in **Figure 5.1** on the following page.

The alternative that scored the highest per the evaluation criteria identified within this report is the southeast offset unsignalized bypass traffic circle with a scope of 65 out of 100. This alternative has a high construction and right-of-way cost but provides GPCID with the overall greatest place making potential while significantly improving traffic at the intersection. It is the recommendation of AECOM that the GPCID pursue funding and future development of the southeast offset unsignalized bypass traffic circle.

If another location within the GPCID are can be identified for "place making" then the continuous flow intersection (CFI) provides a more cost effective traffic solution at the intersection of Pleasant Hill Road and Satellite Boulevard while providing an almost equal traffic operational solution. The CFI scored high with 61 out of 100 on the evaluation criteria but the CFI did not provide a large place making opportunity. It did provide high traffic operational improvements at half the cost of the bypass traffic circles.

Next Steps

If the decision is made to further evaluate any of these alternatives then a full corridor VISSIM analysis should be completed to determine the corridor impacts of the potential alternative. The length of evaluation should include east of the Diverging Diamond Interchange at I-85 to Buford Highway to the west.

In addition, a comprehensive pubic outreach campaign should be developed and instituted for both the local business/property owners and the traveling public.

The GPCID should pursue funding for the preferred alternative whether Federal or local. Once funding has been identified GPCID should begin the development of environmental permitting and construction documents.

Figure 5-1: Parameter Evaluation

AECOM

PLEASANT HILL RD. AT SATELLITE BLVD. INTERSECTION IMPROVEMENT SELECTION EVALUATION

Unsignalized bypass traffic circle with through grade separated lanes on Pleasant Hill

	Centered			North East			North West		
	Evaluation	Points	Possible Points	Evaluation	Points	Possible Points	Evaluation	Points	Possible Points
Traffic		24	25		24	25		24	25
Operation	20			20			20		
Safety	4			4			4		
Engineering		5	5		5	5		5	5
Geometrics	Right Turn entry and exits at all major intersection movements, but will eliminate East bound left turn access onto Mall Blvd			Right Turn entry and exits at all major intersection movements, but will eliminate East bound left turn access onto Mall Blvd			Right Turn entry and exits at all major intersection movements, but will eliminate East bound left turn access onto Mall Blvd		
Constructability	Easy to stage			Easy to stage			Easy to stage		
Supports Economic Re-Development	see report	14	30	see report	10	30	see report	15	30
Project Costs		9	20		8	20		8	20
Estimated Engineering	$1,500,000			$1,500,000			$1,500,000		
Estimated ROW	$73,708,000			$74,518,000			$80,697,000		
Estimated Utility	$1,500,000			$1,500,000			$1,500,000		
Estimated Construction	$14,200,000			$16,500,000			$12,500,000		
Total Project Cost	**$90,908,000**			**$94,018,000**			**$96,197,000**		
Property Impacts		2	10		3	10		4	10
Business Impacts (access is not consdered)	6 shopping centers			4 shopping centers			6 shopping centers		
Number of Displacements (including tenants)	151			85			68		
Acreage Impact	22.6			31.85			32.82		
Total Parcels Impacted	39			41			34		
Park/Place Making Potential	Creates circular park, but is evenly divided by Pleasant Hill Rd and separated from McDaniel Farm Park	5	10	Creates circular park in closer proximity to McDaniel Farm Park	9	10	Creates circular park but separated from McDaniel Farm Park	7	10
	EVALUATION SCORE	59	100		59	100		63	100

	South East			South West		
	Evaluation	Points	Possible Points	Evaluation	Points	Possible Points
Traffic		24	25		24	25
Operation	20			20		
Safety	4			4		
Engineering		5	5		5	5
Geometrics	Right Turn entry and exits at all major intersection movements, but will eliminate East bound left turn access onto Mall Blvd			Right Turn entry and exits at all major intersection movements, but will eliminate East bound left turn access onto Mall Blvd		
Constructability	Easy to stage			Easy to stage		
Supports Economic Re-Development	see report	16	30	see report	13	30
Project Costs		8	20		10	20
Estimated Engineering	$1,500,000			$1,500,000		
Estimated ROW	$75,767,000			$60,921,000		
Estimated Utility	$1,500,000			$1,500,000		
Estimated Construction	$19,400,000			$14,300,000		
Total Project Cost	**$98,167,000**			**$78,221,000**		
Property Impacts		3	10		5	10
Business Impacts (access is not consdered)	6 shopping centers			2 shopping centers		
Number of Displacements (including tenants)	65			59		
Acreage Impact	20.42			27.65		
Total Parcels Impacted	45			29		
Park/Place Making Potential	Creates circular park in closer proximity to McDaniel Farm Park	9	10	Creates circular park but separated from McDaniel Farm Park	7	10
EVALUATION SCORE		65	100		64	100

Other Configurations

	Continuous Flow Interestion (CFI)			Center Turn Overpass (CTO)		
	Evaluation	Points	Possible Points	Evaluation	Points	Possible Points
Traffic		18	25		19	25
Operation	15			18		
Safety	3			1		
Engineering		4	5		1	5
Geometrics	Needs extensive signage and public reach campaign			Inside merge		
Constructability	Moderately difficult to stage-constrained			Difficult-constrained		
Supports Economic Re-Development	see report	14	30	see report	12	30
Project Costs		18	20		4	20
Estimated Engineering	$1,100,000			$1,300,000		
Estimated ROW	$47,262,000			$95,798,000		
Estimated Utility	$1,000,000			$1,000,000		
Estimated Construction	$4,400,000			$32,900,000		
Total Project Cost	**$53,762,000**			**$130,998,000**		
Property Impacts		6	10		2	10
Business Impacts (access is not consdered)	6 shopping centers			6 shopping centers		
Number of Displacements (including tenants)	36			72		
Acreage Impact	5.77			29.25		
Total Parcels Impacted	32			70		
Park/Place Making Potential	Creates greater separation between North and South sides of Pleasant Hill Road. Potential for small linear park in remaining corner parcels with displaced businesses.	1	10	Little to no place making/park potential.Creates greater separation and viewshed impacts between North and South sides of Pleasant Hill Road.	0	10
EVALUATION SCORE		61	100		38	100

Appendix A

Capacity Analysis for Planning of Junctions

Input Worksheet

		Critical Lane Volume Sum			
Project Name:	*GPCID Pleasant Hill Rd Traffic Circle*	Acceptable Configurations			
Project Number:	*60479827*	< 1200	1200 - 1399	1400 - 1599	≥ 1600
Location	*Pleasant Hill Rd at Satellite Blvd (2035 PM Peak Hour)*				
Date	March 16, 2016	15	3	7	7

Results for Intersections

#	TYPE OF INTERSECTION	Sheet	Zone 1 (North)		Zone 2 (South)		Zone 3 (East)		Zone 4 (West)		Zone 5 (Center)		Overall v/c Ratio	Ranking
			CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C		
1	Conventional	FULL									1354	0.85	0.85	7
2	Conventional Shared RT LN	CSRL									1442	0.90	0.90	13
3.1	Quadrant Roadway	S-W			1436	0.90			991	0.62	1183	0.74	0.90	12
3.2		N-E	1128	0.70			788	0.49			1048	0.66	0.70	2
3.3		S-E			1180	0.74	1180	0.74			1141	0.71	0.74	5
3.4		N-W	1171	0.73					676	0.42	1173	0.73	0.73	4
4.1	Partial Displaced Left Turn	N-S	594	0.37	981	0.61					1193	0.75	0.75	6
4.2		E-W					582	0.36	398	0.25	1149	0.72	0.72	3
5	Displaced Left Turn	FULL	594	0.37	981	0.61	582	0.36	398	0.25	997	0.62	0.62	1
6.1	Restricted Crossing U-Turn	N-S	1474	0.92	1201	0.75	1958	1.22	1641	1.03			1.22	14
6.2		E-W	4239	2.65	3758	2.35	1321	0.83	1921	1.20			2.65	15
7.1	Median U-Turn	N-S	1242	0.78	826	0.52					1423	0.89	0.89	8
7.2		E-W					675	0.42	835	0.52	1436	0.90	0.90	11
8.1	Partial Median U-Turn	N-S	1009	0.63	730	0.46					1436	0.90	0.90	9
8.2		E-W					494	0.31	660	0.41	1436	0.90	0.90	9

Capacity Analysis for Planning of Junctions

Input Worksheet

Results for Roundabouts

#	TYPE OF ROUNDABOUT	Zone 1 (North)			Zone 3 (East)			Zone 2 (South)			Zone 4 (West)			Overall v/c Ratio	Ranking
		Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3		
9.1	50 ICD	-7.04			-0.71			-5.12			-1.77			-0.71	2
9.2	75 ICD	-10.32			-0.81			-7.85			-2.26			-0.81	1
9.3	1 X 1	8.26			17.98			5.47			5.39			17.98	7
9.4	1 X 2	5.55			8.32	9.66		3.69			3.18	2.21		9.66	5
9.5	2 X 1	4.44	3.82		7.85			2.90	2.57		3.31			7.85	4
9.6	2 X 2	3.19	2.57		2.12	1.36		2.09	1.74		4.17	4.21		4.21	3
9.7	3 X 3	0.49	3.67	2.96	1.16	6.98	6.81	0.49	2.30	2.06	0.87	2.23	1.74	6.98	3

Results for Interchanges

#	TYPE OF INTERCHANGE	Sheet	Zone 1 (Rt Mrg)		Zone 2 (Lt Mrg)		Zone 3 (Ctr. 1)		Zone 4 (Ctr. 2)		Zone 5 (Lt Mrg)		Zone 6 (Rt Mrg)		Overall v/c Ratio	Ranking
			CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C		
10.1	Diamond	N-S					1342	0.84	1137	0.71					0.84	9
10.2		E-W					619	0.39	687	0.43					0.43	2
11.1	Partial Cloverleaf	N-S					1102	0.69	786	0.49					0.69	6
11.2		E-W					839	0.70	507	0.32					0.52	4
13.1	Displaced Left Turn	N-S	838	0.52			1429	0.89	1397	0.87			1505	0.94	0.94	10
13.2		E-W	573	0.36			769	0.48	884	0.55			779	0.49	0.55	5
14.1	Double Crossover Diamond	N-S	614	0.38	993	0.62	1244	0.78	1321	0.83	654	0.41	1090	0.68	0.83	8
14.2		E-W	426	0.27	661	0.41	491	0.31	497	0.31	730	0.46	609	0.38	0.46	3
15.1	Single Point	N-S	634	0.40			1053	0.66					1121	0.70	0.70	7
15.2		E-W	426	0.27			642	0.40					609	0.38	0.40	1

Appendix B

Gwinnett Place CID

Pleasant Hill Road at Satellite Boulevard:

Intersection Improvement Concepts

Redevelopment and Economic Development Assessment

BleaklyAdvisoryGroup WITH AECOM

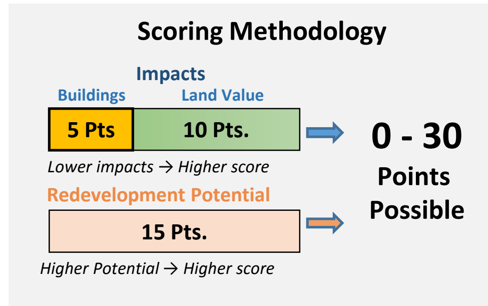
SEPTEMBER 06, 2016

Pleasant Hill Road at Satellite Boulevard Intersection Improvement Concepts

Redevelopment and Economic Development Assessment

Overview of Evaluation and Scoring Methodology

This assessment ranks seven intersection improvement concepts developed by AECOM to alleviate congestion and operational deficiencies at the intersection of Pleasant Hill Road and Satellite Boulevard in unincorporated Gwinnett County. The assessment evaluates and ranks the seven concepts in terms of how they would be likely to contribute to the area's redevelopment and economic development potential.



Using GIS analysis overlaying the potential intersection improvement upon parcel data from the Gwinnett County Tax Assessor and real estate data provided by CoStar Inc., the seven concepts have been evaluated and scored based on three key metrics:

1) **Building Impact: How will the intersection concept potentially impact existing buildings (and by extension, businesses and consumers)?** This metric assesses the net square footage of all buildings likely to be impacted by the project, weighted by:
   - The severity of the impact (Demolition=100%, curtailed access=50%, moderate=20% and minor=10%)
   - The current occupancy rate of the building, with ½% reduction for every 1% of vacancy as of August 2016, to weight the impact more heavily towards buildings with high occupancy rates.
   - The age of the building, with 1% reduction for every year of age, thus weighing for greater impact to newer buildings.
   - Total score is calculated proportionally, on a range from zero (the highest Building Impact value experienced, 515,000 SF) to five (zero Building Impact).

2) **Land Value Impact: How will the intersection concept potentially impact existing parcels and land value?** This metric assesses total 2016 property value (from County tax records) of all parcels that are likely to experience significantly decreased economic usefulness due to the project, including;
   - Parcels that will be significantly adversely impacted by right-of-way (ROW) needs of the transportation improvement, or
   - Parcels with major buildings that will be significantly impacted, or
   - Parcels where the access or parking capacity will be significantly curtailed
   - Total score is calculated proportionally, on a range from zero (the highest Land Impact value experienced, $93 million). to ten (zero Land Impact)

3) **Redevelopment Potential: How will the intersection concept potentially catalyze redevelopment? Will the project amenitize adjacent properties, potentially increasing adjacent property values?** This metric assesses total future property value of all parcels that are likely to be redeveloped based on both the disruption of buildings and land due to the project, and a revised economic development scenario upon completion of the transportation improvement.
   - Potential redevelopment land is based on parcels significantly impacted (see previous section), less land lost to transportation project right-of-way (ROW), plus reclaimed ROW. In cases where ROW is reclaimed from realigned roads, areas greater than one acre are assumed to revert to private development.
   - Redevelopment land value of properties adjacent to the Pleasant Hill-Satellite Intersection are estimated to be $1.1 million/acre (2016 dollars), based on current land value trends.
   - It is assumed that the center of all Bypass Circle scenarios will include a visual or recreational amenity that will enhance the property value of parcels with frontage upon the circle to 120% of average land value.
   - Total score is calculated proportionally, on a range from zero (zero Redevelopment Potential) to fifteen (the highest Redevelopment Potential value experienced, $86 million)

Summary of Intersection Concept Metrics and Scores

The table below shows the results of the three factors and their resulting scores for the seven intersection improvement concepts.

- Based on a combined score of 0-30, scores for all seven concepts fall into a relatively narrow band ranging from 10 to 16.
- The **Bypass Circle Southeast** earned the **highest score** of 16, largely due to the large area of potential redevelopment combined with a fairly high volume of land that would be amenitized by the transportation improvement.
- The **Bypass Circle Northwest earned** a score of 15, largely due to the fact that this was the only scenario in which the Redevelopment Potential value exceeded the Land Value impacts
- The **Bypass Circle Northeast** earned the **lowest score** of 10, mostly due to relatively high impacts combined with lower redevelopment potential and percentage of amenitized land.
- In six of the seven concepts, land value impacts exceeded redevelopment potential, even with the consideration of enhanced land values driven proposed amenity in the Bypass Circle. The economic value (in terms of impacts to existing land uses compared to redevelopment potential) of the proposed intersection improvement concepts are likely to be negative, or in the most optimistic scenario, modest.
- The presence of an attractive visual or recreational public amenity in the Bypass Circle is a crucial element of all the Bypass Circle scenarios. The redevelopment scenarios in this assessment are predicated on the idea of “building a beach to create beachfront property” with increased redevelopment value. Without a strong central amenity, the increased redevelopment value will not occur.

Improvement Concept:	Bypass Center	Bypass NE	Bypass NW	Bypass SE	Bypass SW	CFI	CTO
Building Impact (SF)	341,931	474,323	515,190	451,259	432,088	82,378	220,546
Land Value Impact	$64.86	$65.21	$70.71	$93.61	$62.37	$11.75	$56.91
Redev. Potential	$54.71	$39.07	$76.19	$85.71	$55.59	$7.92	$34.80
Building Score (0-5)	2	1	0	1	1	5	3
Land Score (0-10)	3	3	2	0	3	8	3
Redevelopment Score (0-15)	9	6	13	15	9	1	6
Net Score (0-30)	**14**	**10**	**15**	**16**	**13**	**14**	**12**

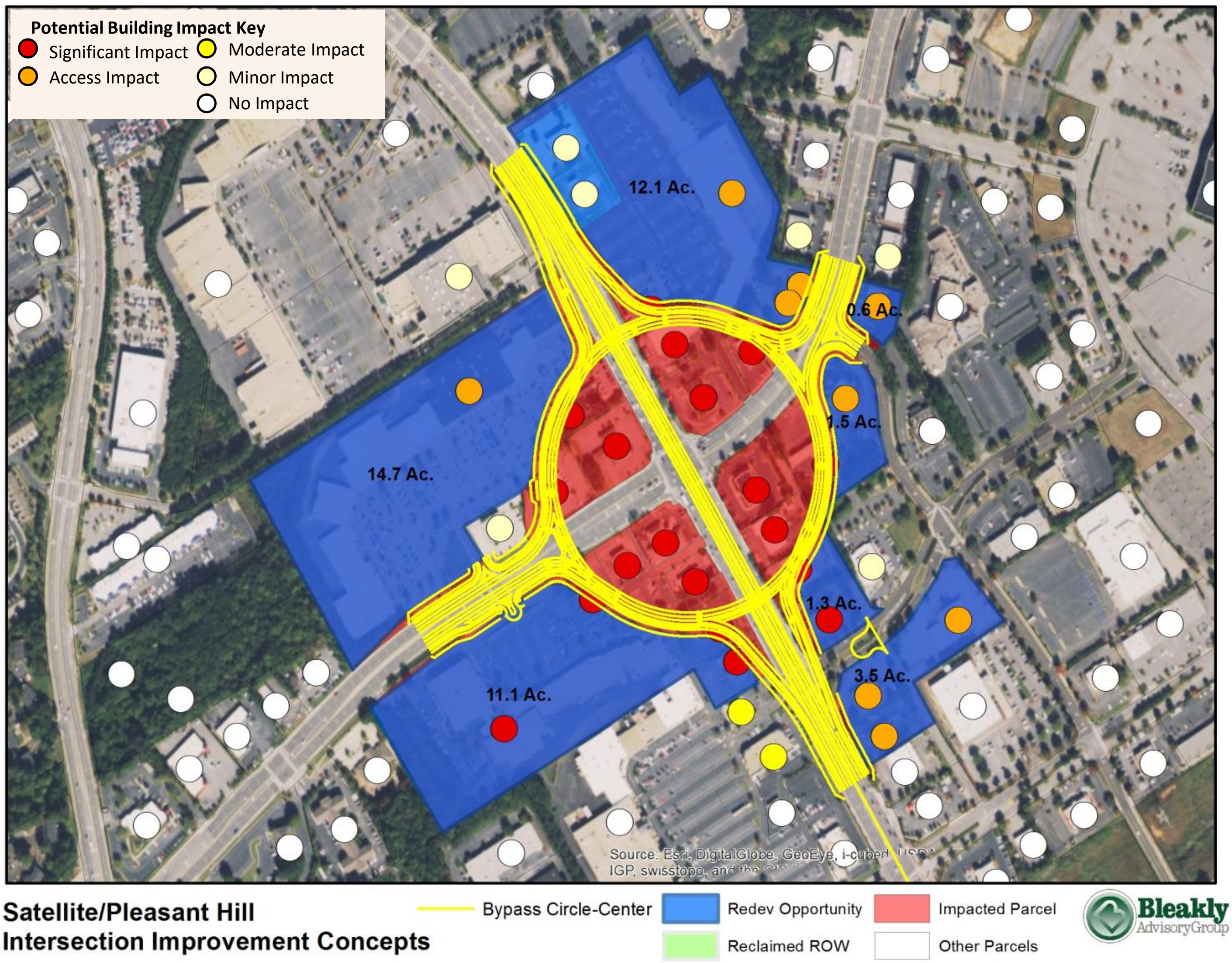
Concept Evaluation: Bypass Circle -Centered

This concept would potentially impact 38 buildings (29 significantly, meaning reduction in building, land, parking or access sufficient to diminish the economic value of building) for a total building impact of 341,931 SF.

It would potentially impact 29 parcels, with a net land value impact of $64.9 million dollars.

It would potentially catalyze 44.8 acres of redevelopment with a net land value of $54.7 million. Approximately 55% of the potential redevelopment land would be amenitized by proximity to the Bypass Circle.

Bypass Circle -Centered	
Building Impact (SF)	341,931
Land Impact ($ Mil)	$64.86
Redev. Potential	$54.71
Building Score (0-5)	2
Land Score (0-10)	3
Redevelopment Score (0-15)	9
Net Score (0-30)	**14**



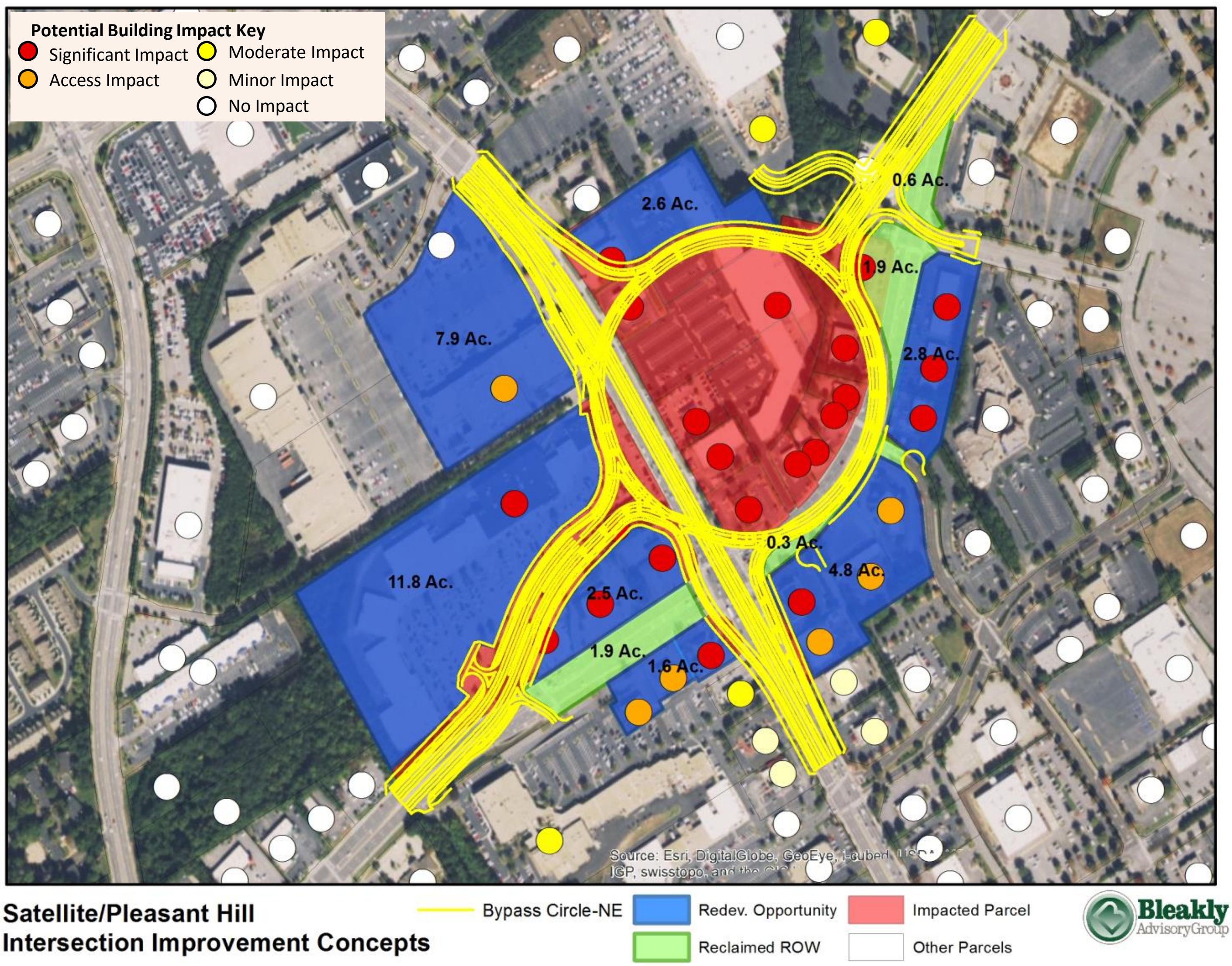
Concept Evaluation: Bypass Circle -Northeast

This concept would potentially impact 36 buildings (28 significantly) for a total building impact of 474,323 SF.

It would potentially impact 27 parcels, with a net land value impact of $39.1 million.

It would potentially catalyze 38.7 acres of redevelopment with a net negative land value of $39.1 million. 4.7 acres of the redevelopment land would be reclaimed ROW from Satellite Blvd. Approximately 22% of the potential redevelopment land would be amenitized by proximity to the Bypass Circle.

Bypass Circle -Northeast	
Building Impact (SF)	474,323
Land Impact ($ Mil)	$65.21
Redev. Potential	$39.07
Building Score (0-5)	1
Land Score (0-10)	3
Redevelopment Score (0-15)	6
Net Score (0-30)	**10**



Concept Evaluation: Bypass Circle -Northwest

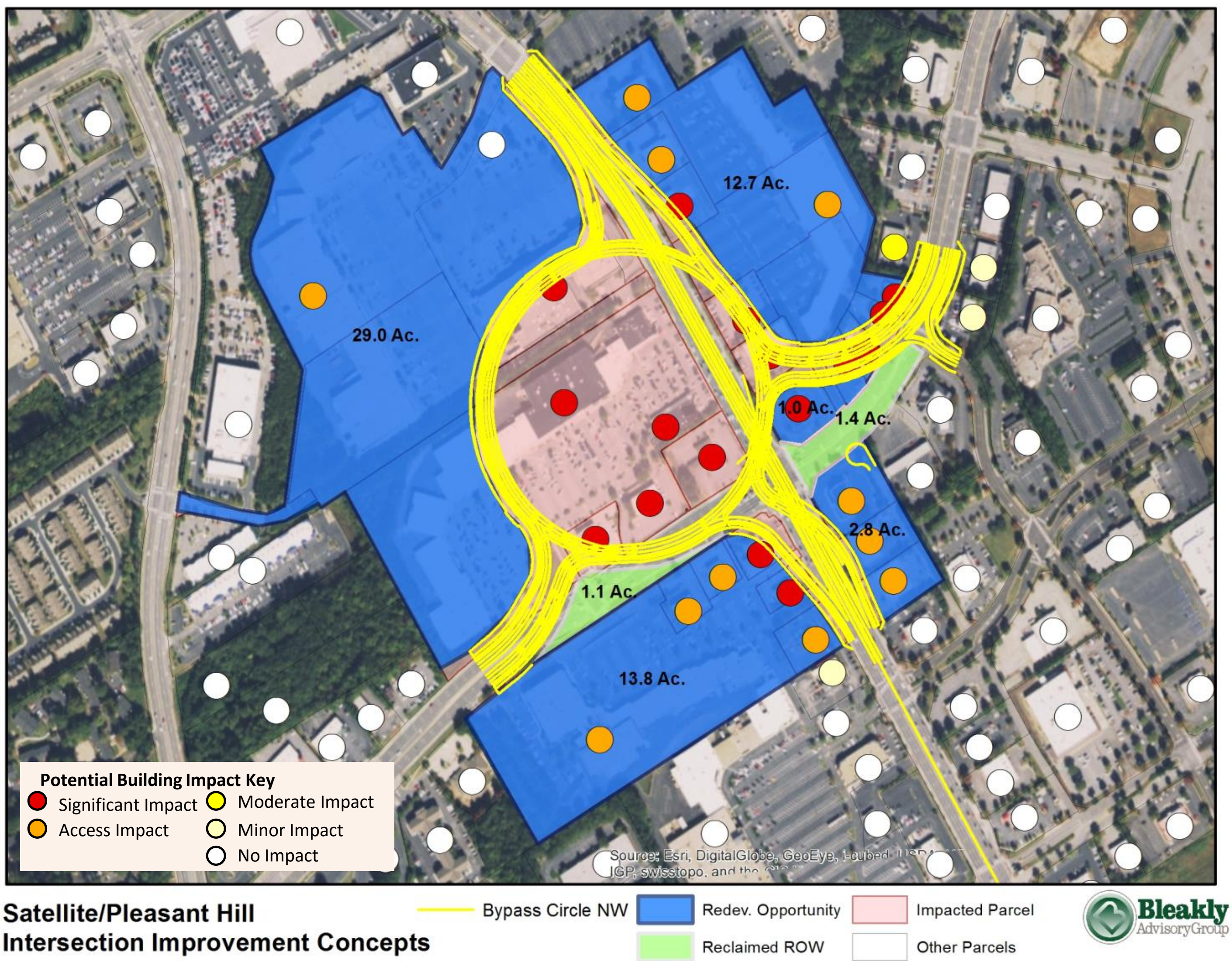
This concept would potentially impact 31 buildings (27 significantly) for a total building impact of 515,190 SF.

It would potentially impact 27 parcels, with a net land value impact of $70.7 million.

It would potentially catalyze 61.8 acres of redevelopment with a net land value of $76.2 million. 2.5 acres of the redevelopment land would be reclaimed ROW from Satellite Blvd. Approximately 72% of the potential redevelopment land would be amenitized by proximity to the Bypass Circle.

This is the only concept in which the value of the potential redevelopment impact exceeds the land value impact.

Bypass Circle -Northwest	
Building Impact (SF)	515,190
Land Impact ($ Mil)	$70.71
Redev. Potential	$76.19
Building Score (0-5)	0
Land Score (0-10)	2
Redevelopment Score (0-15)	13
Net Score (0-30)	**15**



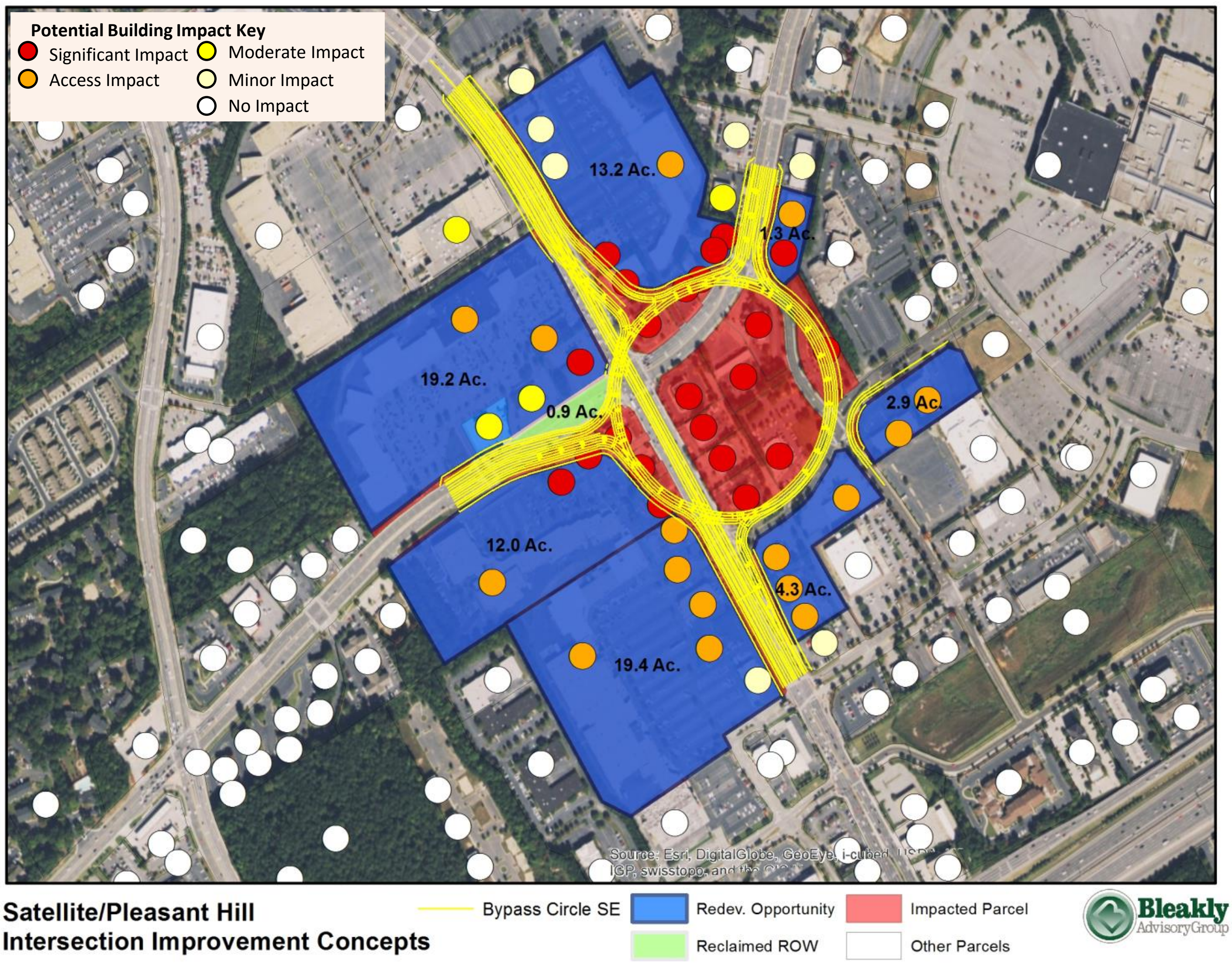
Concept Evaluation: Bypass Circle -Southeast

This concept would potentially impact 49 buildings (38 significantly) for a total building impact of 451,259 SF.

It would potentially impact 40 parcels, with a net land value impact of $93.6 million.

It would potentially catalyze 73.2 acres of redevelopment with a net land value of $85.7 million. Just under 1 acre of the redevelopment land would be reclaimed ROW from Satellite Blvd. Approximately 39% of the potential redevelopment land would be amenitized by proximity to the Bypass Circle.

Bypass Circle -Southeast	
Building Impact (SF)	451,259
Land Impact ($ Mil.)	$93.61
Redev. Potential	$85.71
Building Score (0-5)	1
Land Score (0-10)	0
Redevelopment Score (0-15)	15
Net Score (0-30)	**16**



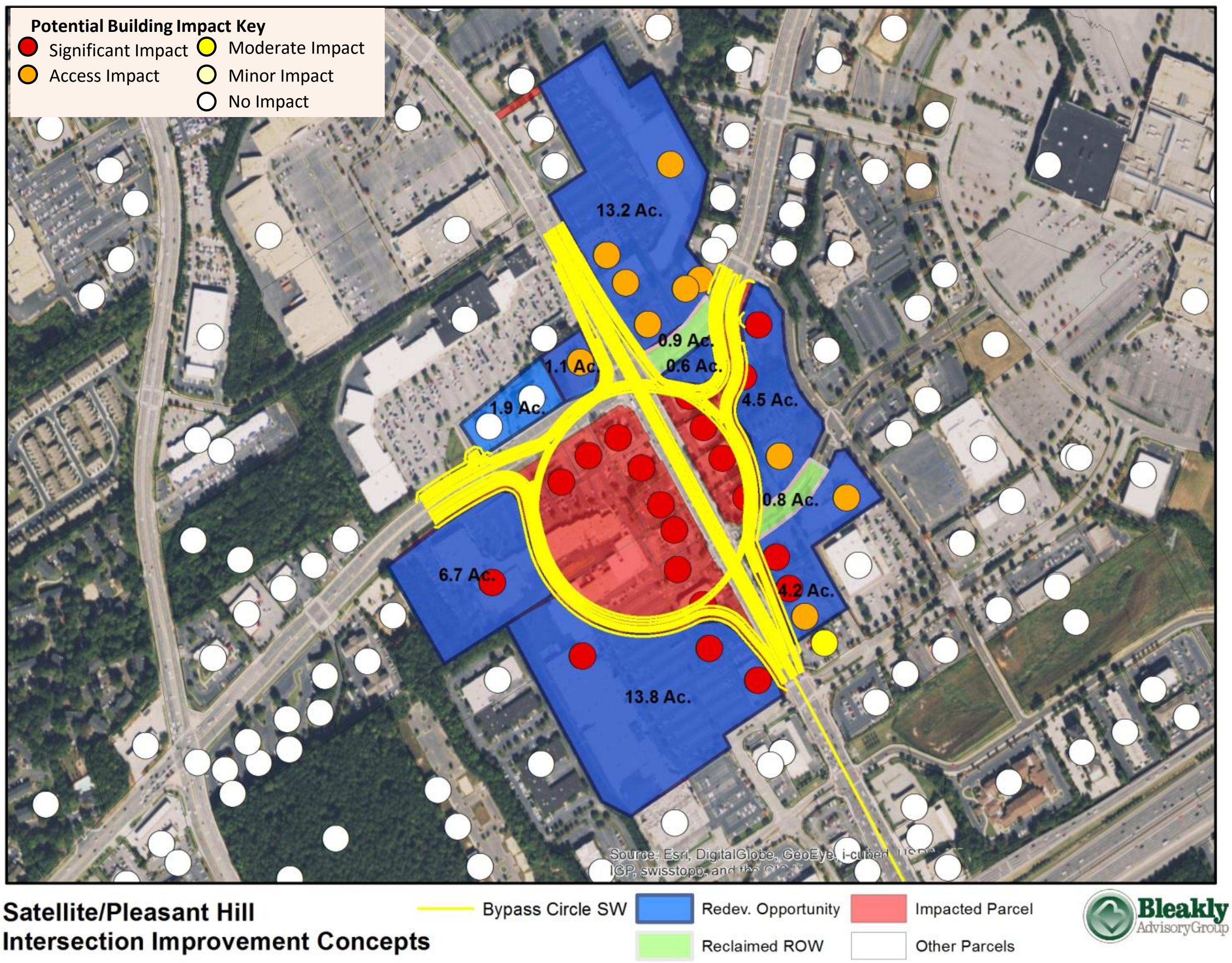
Concept Evaluation: Bypass Circle -Southwest

This concept would potentially impact 31 buildings (30 significantly) for a total building impact of 432,088 SF.

It would potentially impact 30 parcels, with a net land value impact of $62.4 million.

It would potentially catalyze 47.7 acres of redevelopment with a net land value of $55.6 million. Just under 2 acres of the redevelopment land would be reclaimed ROW from Satellite Blvd and Mall. Blvd. Approximately 66% of the potential redevelopment land would be amenitized by proximity to the Bypass Circle.

Bypass Circle -Southwest	
Building Impact (SF)	432,088
Land Impact ($ Mil)	$62.37
Redev. Potential	$55.59
Building Score (0-5)	1
Land Score (0-10)	3
Redevelopment Score (0-15)	9
Net Score (0-30)	**13**



Concept Evaluation: Continuous-Flow Intersection

This concept would potentially impact 20 buildings (11 significantly) for a total building impact of 82,378 SF.

It would potentially impact 11 parcels, with a net land value impact of $11.75 million dollars, making this the least disruptive concept in terms of building and land impacts..

It would potentially catalyze 7.2 acres of redevelopment with a net land value of $7.9 million. This potential redevelopment land would not be amenitized by proximity to the intersection improvement, and no ROW would be reclaimed.

Continuous-Flow Int. (CFI)	
Building Impact (SF)	82,378
Land Impact ($ Mil)	$11.75
Redev. Potential	$7.92
Building Score (0-5)	5
Land Score (0-10)	8
Redevelopment Score (0-15)	1
Net Score (0-30)	**14**

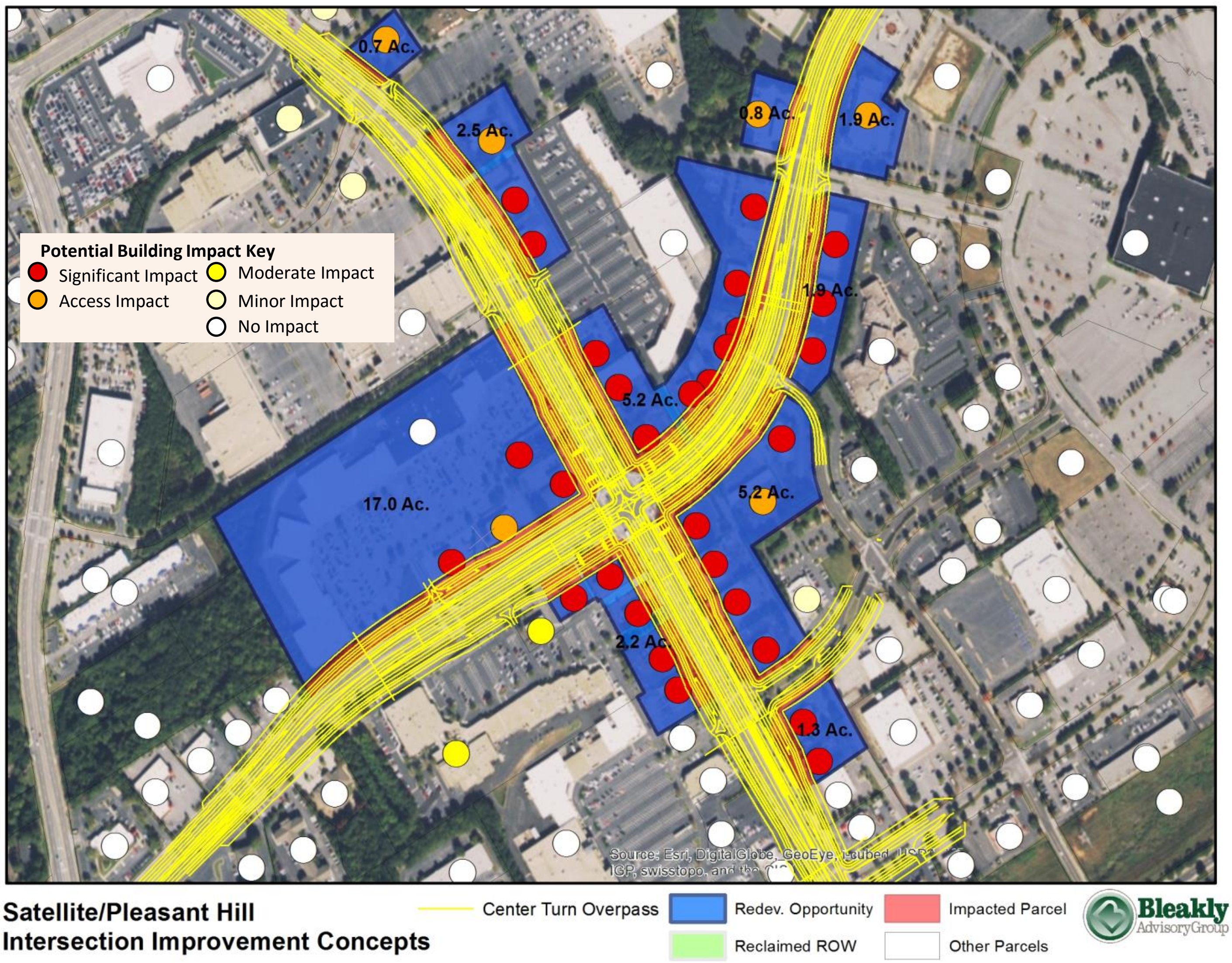
Concept Evaluation: Center-Turn Overpass (CTO)

This concept would potentially impact 42 buildings (35 significantly) for a total building impact of 220,546 SF.

It would potentially impact 33 parcels, with a net land value impact of $56.9 million dollars.

It would potentially catalyze 38.7 acres of redevelopment with a net land value of $34.8 million. Redevelopment land adjacent to the corners of the CTO would likely be valued significantly less than the current value due to the adjacent two-level roadway, and no ROW would be reclaimed.

Center-Turn Overpass (CTO)	
Building Impact (SF)	220,546
Land Impact ($ Mil)	$56.91
Redev. Potential	$34.80
Building Score (0-5)	3
Land Score (0-10)	3
Redevelopment Score (0-15)	6
Net Score (0-30)	**12**



Appendix C


PLEASANT HILL RD.
SATELLITE BLVD.
POSSIBLE TUNNEL
POSSIBLE TUNNEL
SATELLITE BLVD.
PLEASANT HILL RD.
GWINNETT PLACE CID
PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
30 MPH CENTERED CIRCULAR ROADWAY, SIGNALIZED ENTRY
AECOM
SCALE IN FEET
0 100 200 400
7/29/2016

GWINNETT PLACE CID

PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
30 MPH CENTERED CIRCULAR ROADWAY, YIELD ENTRY

7/29/2016

GWINNETT PLACE CID
PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
CENTERED YIELD ENTRY

AECOM

7/29/2016


PLEASANT HILL RD.
SATELLITE BLVD.
SATELLITE BLVD.
PLEASANT HILL RD.
GWINNETT PLACE CID
PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
NORTHEAST YIELD ENTRY
N
AECOM
SCALE IN FEET
7/29/2016
0 100 200 400
APPROXIMATE TIE-IN


PLEASANT HILL RD.
SATELLITE BLVD.
SATELLITE BLVD.
PLEASANT HILL RD.
GWINNETT PLACE CID
PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
NORTHWEST YIELD ENTRY
N
AECOM
SCALE IN FEET
7/29/2016
0
100
200
400


PLEASANT HILL RD.
SATELLITE BLVD.
BRIDGES
SATELLITE BLVD.
ROAD DIET TO 2 LANES
BRIDGE
PLEASANT HILL RD.
GWINNETT PLACE CID
PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
SOUTHEAST YIELD ENTRY
N
AECOM
SCALE IN FEET
0 100 200 400
7/29/2016

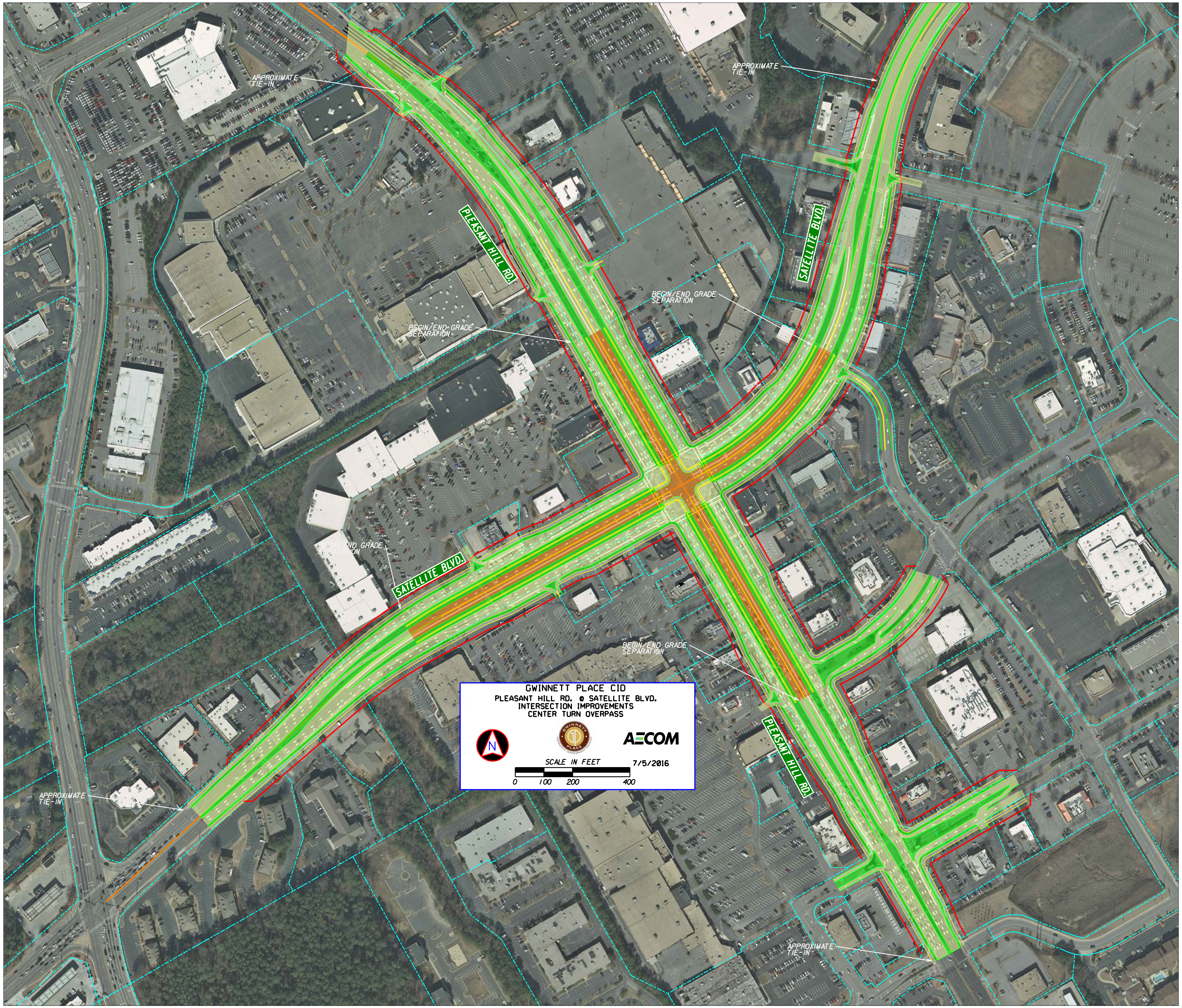

PLEASANT HILL RD.
SATELLITE BLVD.
SATELLITE BLVD.
PLEASANT HILL RD.
GWINNETT PLACE CID
PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
SOUTHWEST YIELD ENTRY
N
AECOM
SCALE IN FEET
0
100
200
400
7/29/2016

GWINNETT PLACE CID

PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
CONTINUOUS FLOW INTERSECTION

AECOM

7/5/2016



APPROXIMATE TIE-IN
APPROXIMATE TIE-IN
PLEASANT HILL RD.
SATELLITE BLVD.
BEGIN/END GRADE SEPARATION
BEGIN/END GRADE SEPARATION
BEGIN/END GRADE SEPARATION
SATELLITE BLVD.
BEGIN/END GRADE SEPARATION
GWINNETT PLACE CID
PLEASANT HILL RD. @ SATELLITE BLVD.
INTERSECTION IMPROVEMENTS
CENTER TURN OVERPASS
N
AECOM
SCALE IN FEET
7/5/2016
0 100 200 400
PLEASANT HILL RD.
APPROXIMATE TIE-IN
APPROXIMATE TIE-IN