Camp Washington – Light Rail Proposal

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EXECUTIVE SUMMARY

The city of Cincinnati is currently studying ways to incorporate other modes of transportation in the area. Light rail is one of the leading forms that the city is trying to implement. The project being proposed is to alter the current light rail path by bringing it into the Camp Washington area. The proposed realignment will bring the light rail line along Colerain Avenue through Camp Washington. Having transit hubs within Camp Washington will make the proposed line more accessible to the people most likely to use it and will have significant social, economic, and environmental benefits as well as ensuring the success of the light rail in general. A light rail in Camp Washington will allow for a transportation oriented development (TOD), with high density housing along with public uses and retail. A TOD will allow for the creation or more jobs and a pedestrian friendly neighborhood.

In order to place the transit hub in Camp Washington, it was decided to have the light rail lines run the length of Colerain Avenue. This will allow the rails to line up with the abandoned subway tunnels which are to be utilized for the light rail system. Three design alternatives were considered for the construction of the light rail lines. These were: bridging over Colerain Avenue, running the tracks parallel to Colerain Avenue and demolishing buildings on one side of the road, and tunneling the lines beneath Colerain Avenue. With the lines under Colerain Avenue and the use of open cut construction, the integrity of the community will be kept and will allow various public utilities to update the aging infrastructure buried under Colerain Avenue. This will be similar in nature to the Riverfront redevelopment and the Fort Washington Way construction.

Construction of the light rail system will be broken into three phases. Phase one will consist of open cut construction along Colerain Avenue, south of Marshall Avenue and tying the lines into the subway tunnels. Phase two will consist of open cut construction from Marshall Avenue to Hopple Street with tunneling of the lines below Hopple Street. Also, during this phase the transit station will be constructed at the corners of Colerain Avenue and Rachel Street. Finally, phase three will consist of open cut construction from Hopple Street to the northern end of Colerain Avenue tunneling under I-75 to reconnect with the proposed light rail system.

The use of green storm water management techniques in the design of the transit station will help reduce the storm runoff in Camp Washington, increase local interest in storm water management techniques, and reduce or eliminate the amount of raw sewage discharged into the Mill Creek by the Combined Sewer Overflows located in Camp Washington.

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INTRODUCTION

The city of Cincinnati is currently studying ways to incorporate other modes of transportation in the area. Light rail is one of the leading forms that the city is trying to implement. The proposed project is to alter the light rail transit route through the Camp Washington area. This alignment will provide better access to Camp Washington and provide the opportunity to update existing infrastructure. There are potential economic, social, and environmental incentives for altering the proposed light rail transit route.

STATEMENT OF THE PROBLEM

In order to entice people to use new forms of transportation, including light rail, they need to be convenient and accessible. Currently, the location of the light rail along I-75 is aligned to the east side of the highway. While this route allows for easier construction of the light rail, it is not the most beneficial location. The limited accessibility of this location hampers potential ridership in the Camp Washington area. In order to encourage ridership, convince is a primary concern in the design of the light rail transit route. Due to the heavy industrial atmosphere of Camp Washington a large portion of the riders will be the workforce traveling to and from employment. This workforce will not use the light rail system if it is less convenient than vehicular travel. The importance of positioning transit hubs in highly accessible locations are paramount to ensure success of the light rail transit both in Camp Washington and throughout the greater Cincinnati area.

An additional problem throughout Camp Washington is the use of a combined sewer system. The problem with this system is the mixture of storm water and sanitary sewage flowing through the same pipes. At overflow points throughout the city, raw sewage is discharged into local waterways called a Combined Sewer Overflow (CSO). This discharge of raw sewage can release harmful bacteria and other contaminates into the local waterways endangering citizens and wildlife.

BACKGROUND INFORMATION

The addition of a light rail station in Camp Washington will have significant economic, social, and environmental benefits, as well as ensuring the success of the light rail transit system. A light rail station will benefit the existing businesses with an influx of potential consumers. In addition to boosting the economy of existing businesses, a transit station will “open the door” to investors interested in opening new industry and commercial properties within Camp Washington. Transit oriented development has helped many cities expand their infrastructure and stabilize their economies. The development of high-density housing, complemented with

public uses and retail will promote growth in the community. Growth will result in more jobs and vitality. Ideally, increasing business and housing within Camp Washington will create more destinations within walking distance, making the light rail a much more desirable option. The proposed hub for the light rail will be located on the corner of Colerain Avenue and Rachel Street. The numerous empty lots and vacant buildings which occupy this plot, allow for ease of construction, and significant growth and development. With the increased traffic flow entering the Camp Washington community, potential transit oriented developments will succeed.

The proposed light rail is routed underneath the length of Colerain Avenue to preserve the atmosphere of the community and provide a direct connection to the station. Open cut construction will be implemented along the length of Colerain Avenue in order to ease the complexity of construction and minimize cost. This involves excavating the ground to the depth of the light rail path, constructing the rails, and finishing by rebuilding Colerain Avenue. Open cut construction will be more efficient than tunneling the surveyed distance, and will provide opportunities for environmental improvements.

As shown in a 2007 Social Impact Inc. study, there were 1,803 people living in Camp Washington and 4,606 people working there for total revenue of almost $1.5 million. If everyone who lives in Camp Washington also works there (very unlikely), there are still almost 3,000 people who commuted to the area to work. This brings a great opportunity to urge people to use the light rail rather than drive to work every day. Potential riders are not willing to take the light rail if they have to use additional means of transportation to arrive at their final destination, especially if they could drive themselves and arrive in half the time.

On the current light rail alignment, stations would be located on the east side of I-75 at Hopple Street and at W. McMillan Avenue. The locations of these stations are the result of poor planning by not allowing access to many nearby amenities. Riders commuting to Camp Washington would be required to traverse I-75 and continue to walk a considerable distance to work or recreation. Riders wanting to get Uptown are more likely to drive instead of walk several miles uphill to get to their destination. By centrally locating the hub in Camp Washington commuters that work nearby will arrive at the hub and make a short walk to their building. Uptown commuters can ride a bus or shuttle to their destination without any extra inconvenience.

During the course of construction, existing infrastructure buried beneath Colerain Avenue will be demolished allowing for replacement and relocation. By employing the open cut method during construction, will allow the public to receive all proposed infrastructure upgrades at a reduced cost. The Metropolitan Sewer District of Greater Cincinnati's (MSD) will grant permission to separate the storm water from the sanitary in the sewers that run through the project area. MSD will work during the construction of the light rail, sharing in the total cost of the project and separating the sewers in all of Camp Washington due to its relatively isolated sewer system.

This project is similar in nature to the Fort Washington way and Riverfront redevelopment project. While the riverfront area was already under construction, MSD used the forced relocation of a sewer main and the decreased cost associated with performing the construction to separate the storm water from the sanitary sewer. This was implemented from the riverfront to 6th Street in the Cincinnati business district.

The City of Cincinnati will take this opportunity to showcase green storm water management techniques, such as rain barrels and vegetative roofing systems into the light rail transit station. These techniques reduce the amount of runoff that is carried into the storm sewer system. New transit oriented development may share in this "greener" approach to Camp Washington and adopt similar techniques when constructing or expanding structures.

Vegetative roofing systems use a section or all available square footage to house plant life. Instead of being discharged into the environment, the storm water is held in the roofing structure and is used to water and feed the plants. A vegetative roof is best built on a surface with minimal slope, but there have been successes with gardens at a pitch of up to 45 degrees. There are currently three different types of vegetative roofing systems: intensive, extensive, and modular. Intensive gardens require one foot of soil and can be used to create a roof top garden with trees and shrubs. They also require irrigation and drainage systems and can add between 80 to 100 pounds per square foot to the roofing structure. Extensive gardens on the other hand house small plants and grasses and require only 1 to 5 inches of soil. They also only add 15 to 50 pounds per square foot to the roofing structure. Modular gardens are simply containers with about 4 inches of soil that are placed on the roofing structure and can weigh between 12 to 18 pounds per square foot. Costs for a rain garden can range from $9.00 to $24.00 per square foot, depending on the type of garden and the vegetation that is planted. (Renetzky)

Rain barrels connect to downspouts which collect rain water from the roofing structure. These can be implemented in various locations such as the light rail transit hub. Rain barrels reduce the amount of runoff that would flow into the storm water system and is a free source of water that can be used for various maintenance tasks.

DESIGN METHODOLOGY

In order to position a light rail transit hub in the Camp Washington area, a feasible route must be determined. After analyzing the existing route and researching the Camp Washington area, laying the rails beneath the length of Colerain Avenue is a more efficient engineering alternative, as seen in Figure 1. The rationale behind this was to use the existing infrastructure (abandoned subway tunnels) to house the light rail route as a gateway to the open cut construction of Colerain Avenue. Additionally, Colerain Avenue is a major thoroughfare for

Camp Washington's business district and primary industrial opportunities. Stimulating the economy in Camp Washington, will lead to existing and proposed transit oriented development.

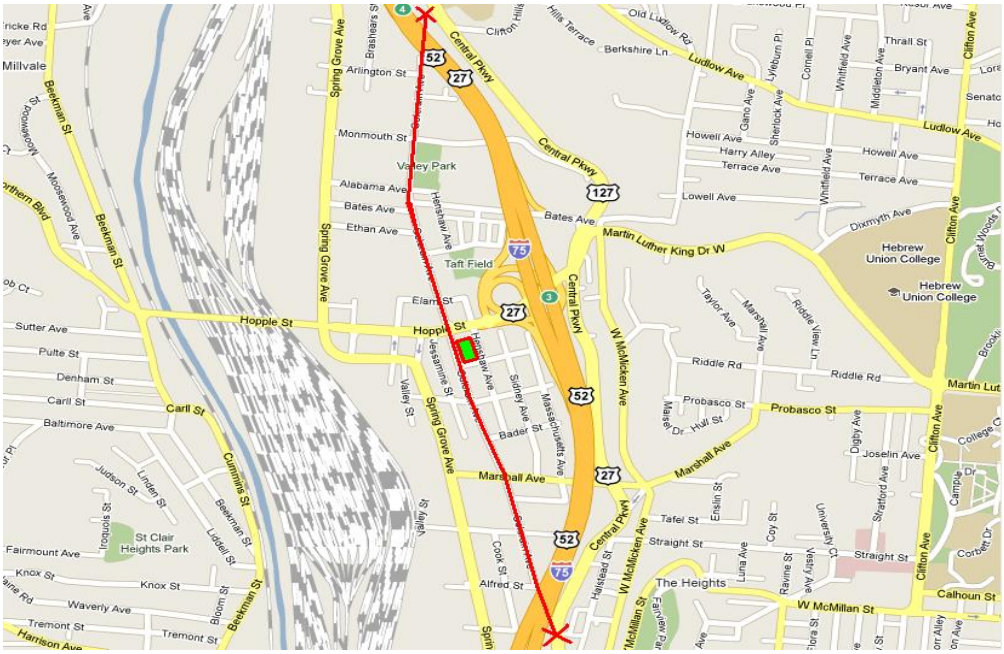

Figure 1

After deciding on the location for the light rail transit path, there were still many options available for how to run the line along Colerain Avenue. The first option available was to run a bridge over the length of Colerain Avenue that supported the light rail transit tracks. This would include a two story hub that would bring riders down from the track to street level. After analyzing this option, it was concluded this would be very costly, an unappealing sight in Camp Washington, and would not allow for same volume of transit oriented development as other options.

The second option was to buy a large amount of property and demolish the structures. This option located the light rail transit route along the east side of Colerain Avenue and run parallel to the road. This option may be the most cost effective, however it was determined this would have compromised the integrity of the neighborhood. The plan would have involved destroying several historic buildings which bring character to the neighborhood. Due to the destructive nature of this plan, it is likely many small businesses would move out of the area.

The third and final option was tunneling the light rail under the length of Colerain Avenue via open cut construction. Although tunneling is usually a rather expensive alternative, due to the complex construction required, Colerain Avenue's low volume of traffic allows for open cut construction. It would be possible to close down Colerain Avenue in three separate phases while open cut construction is performed.

In order to complete the open cut construction of the light rail transit route, the construction will be broken into three phases, having different parts of Colerain Avenue close in each phase. During the first phase, construction will commence from the southern tip of Colerain Avenue north to Marshall Avenue. During the second phase, Colerain Avenue will close from Marshall Avenue north to Hopple Street. For the duration of phase two, the route will be tunneled under the intersection of Colerain Avenue and Hopple Street. This decision was reached due to the large volume of vehicular traffic on Hopple Street. The third and final phase of construction will be from Hopple Street north until the end of Colerain Avenue. Scheduling construction into these phases will allow access to the majority of Colerain Avenue. Access to all crossroads will be accomplished through detouring traffic onto parallel arterials. This method reduces the cost of the project, allows for the updating of the current infrastructure to better distribute ground water, and prevents combined sewer overflows in the surrounding waterways. This is similar to a successful program that was implemented on the Cincinnati Riverfront.

As in the Riverfront redevelopment project, the Metropolitan Sewer District will be working alongside the construction of the light rail transit route in order to update the existing infrastructure by separating sanitary and storm sewers. Due to Camp Washington's relative isolation in the sewer system, MSD can separate the entire combined sewer system located in the area. This separation will eliminate the six CSO points within the Camp Washington area by stopping the discharge of millions of gallons of untreated sewage into the Mill Creek per year.

The light rail hub itself will be located at the corner of Colerain Avenue and Rachel Street, as seen in Figure 2. Currently, there are several empty lots, which would provide roughly 25,000 square feet of room for the hub and surrounding development. With the light rail path running underground at that point, the hub will be a two story structure; the first floor underground at street car level and the second above at street level.

Figure 2

In order to bring the light rail from west of I-75 underneath Colerain Avenue, the best option seemed to be tunneling under the highway. Considering the light rail route will be in the existing subway tunnels underneath Columbia Parkway, it will not be a problem to simply re-route the path and tunnel under I-75.

After traveling the length of Colerain Avenue, the light rail transit route will tunnel below I-75 to the east of the highway. To accomplish this, there are two viable options: tunneling or bridging. The first option of bridging over the highway was investigated. A plan being developed by architect Kelly Hogg proposes building a massive concrete superstructure over I-75. This will provide a bridge for light rail transit cars and vehicular traffic to cross over. After studying the proposed plan, the first problem observed was the elevation. The light rail system ascended out of the ground past Arlington Street. (Figure 3) The elevation at this point was approximately 525.00 feet. After consulting Kelly, it was determined the light rail tracks would be 20 feet below Arlington Street, at an elevation of 505.00 feet. The location where the light rail route needed to bridge I-75, the elevation was approximately 535.00 feet. With the minimum overhead distance being 16 feet, it was assumed there was a 20 foot clearance between the highway and the bottom of the tracks. This required the tracks to cross over the highway at an elevation of 555.00 feet. It was observed there was approximately 330 linear feet to rise this distance. The resulting calculations required the light rail to rise at a slope of roughly 15%. Research determined the maximum slope for light rail transit systems throughout the United States of America was 8%, therefore this design is unfeasible.

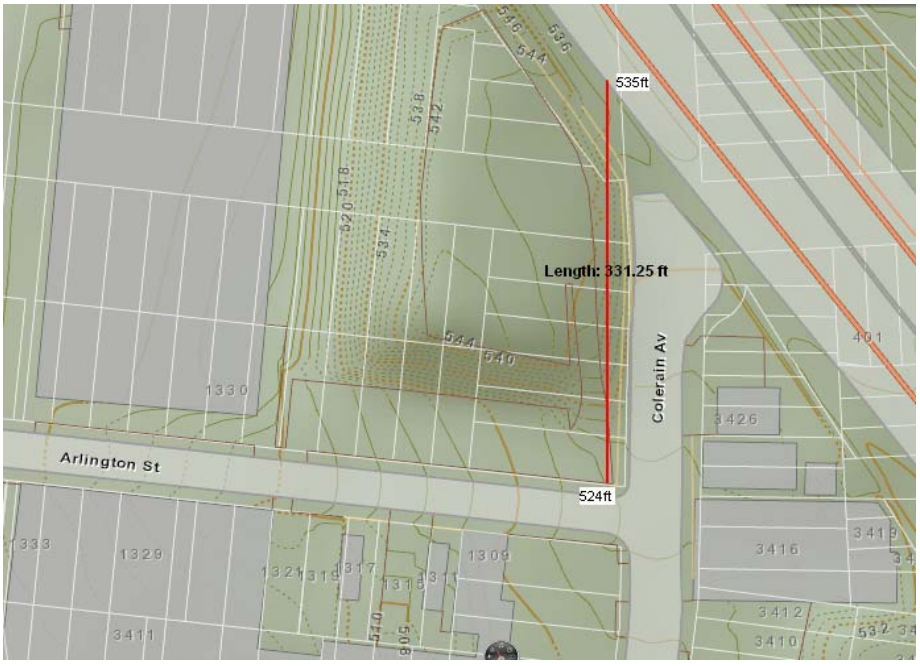

Figure 3

In order to correct this design flaw, Kelly elected to lower I-75 in the area the concrete superstructure was to be constructed. Construction was planned on the highway along this route, allowing for the lowering of the highway to an acceptable elevation. In order to construct this superstructure the light rail would rise 25 feet over 330 linear feet. Therefore, at the highway, the tracks would need to be at an elevation of 530.00 feet. With 20 feet of clearance over I-75, the road elevation must be 510.00 feet. This requires lowering the highway 25 feet. In order to lower it 25 feet in the area of construction, the road needed to be lowered in both directions 500 feet to avoid a slope steeper than 5% at this point. This extensive excavation required approximately 125,000 cubic yards to be removed. This proved to be a very extensive and expensive alteration to the original design.

The alternative to this will be tunneling under I-75 at this location. In order to tunnel under the highway, there must be 25 feet of clearance from the light rail tracks to the bottom of the highway. Therefore, the highest elevation the tracks will be at in this area is 510.00 feet. As mentioned earlier, at Arlington Street, the elevation of the light rail tracks would be around 505.00 feet, allowing the tracks to stay at the same elevation and leave plenty of clearance under I-75.

PROJECT DELIVERABLES

At the end of Spring Quarter, the final project will include a detailed light rail transit route with specific elevations and locations; a preliminary layout of the transit hub; a typical cross section of open cut design with light rail line; an environmental site assessment; environmental implementation plan; rough estimates for cost of construction; ridership study; tunneling information, along with connection into the existing light rail transit route (subway tunnels).

GROUP MEMBERS AND RESPONSIBILITIES

Adam Kirwen (Construction) - Preliminary layout of the transit hub; Rough cost estimates of construction; tunneling information, along with connection into the existing light rail path.

Josh Gilbert (Transportation) - Typical cross section of open cut design with light rail line; Ridership study; Tunneling information, along with connection into the existing light rail path.

Geoff Conklin (Construction) - Preliminary layout of the transit hub; Rough cost estimates of construction; tunneling information, along with connection into the existing light rail path.

Sean Stuessel (Environmental) - Environmental site assessment; Environmental implementation plan.

TIMELINE

Week 1 – Begin evaluating open cut design and hub layout. Start environmental assessment.

Week 2 – Continue evaluating open cut design and hub layout. Continue environmental assessment.

Week 3 – Completion of initial drafts of open cut design and hub layout. Continue environmental assessment.

Week 4 – Evaluation / Revision of open cut design and hub layout. Complete initial draft of environmental assessment. **First Review**

Week 5 – Implementation of first review comments. Begin construction cost estimates. Begin ridership study. Completed draft of environmental site assessment.

Week 6 – Continue work on construction cost estimates and ridership study. Begin environmental implementation plan.

Week 7 – Completion of initial drafts for construction cost estimates and ridership study. Continue working on environmental implementation plan.

Week 8 – Evaluation / Revision of construction cost estimates and ridership study. Complete initial draft of environmental assessment. **Second Review**

Week 9 – Implementation of second review comments. Begin developing tunneling information and connecting into existing rail plans. Evaluation / Revision of environmental assessment. Begin work on poster/report.

Week 10 – Finish gathering tunneling information. Design of where to tie into existing rail plans. Complete final environmental assessment. Finish work on poster/report.

Week 11 – Finishing touches on poster/report. Presentation. **Final Review**

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