ST. LOUIS ICE CENTER PROJECT
DRAFT ENVIRONMENTAL ASSESSMENT
APPENDICES

Maryland Heights, St. Louis County, Missouri

Lead Agency:
US DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE
Omaha, Nebraska

State LWCF Agency:
Missouri Department of Natural Resources – LWCF Management Section
Jefferson City, Missouri

June 2017

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Appendix A

Project Development / Environmental Screening Form

(PD/ESF)

June 2017

OMB Control No. 1024-0031
Expires: 10/31/2016

National Park Service
U.S. Department of the Interior

LWCF Proposal Description and Environmental Screening Form

The purpose of this Proposal Description and Environmental Screening Form (PD/ESF) is to provide descriptive and environmental information about a variety of Land and Water Conservation Fund (LWCF) state assistance proposals submitted for National Park Service (NPS) review and decision. The completed PD/ESF becomes part of the "federal administrative record" in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations. The PD portion of the form captures administrative and descriptive details enabling the NPS to understand the proposal. The ESF portion is designed for States and/or project sponsors to use while the LWCF proposal is under development. Upon completion, the ESF will indicate the resources that could be impacted by the proposal enabling States and/or project sponsors to more accurately follow an appropriate pathway for NEPA analysis: 1) a recommendation for a Categorical Exclusion (CE), 2) production of an Environmental Assessment (EA), or 3) production of an Environmental Impact Statement (EIS). The ESF should also be used to document any previously conducted yet still viable environmental analysis if used for this federal proposal. The completed PD/ESF must be submitted as part of the State's LWCF proposal to NPS.

Except for the proposals listed below, the PD/ESF **must** be completed, including the appropriate NEPA document, signed by the State, and submitted with each new federal application for LWCF assistance and amendments for: scope changes that alter or add facilities and/or acres; conversions; public facility exceptions; sheltering outdoor facilities; and changing the original intended use of an area from that which was approved in an earlier LWCF agreement. Consult the LWCF Program Manual (www.nps.gov/lwcf) for detailed guidance for your type of proposal and on how to comply with NEPA.

For the following types of proposals only this Cover Page is required because these types of proposals are administrative in nature and are categorically excluded from further NEPA environmental analysis. NPS will complete the NEPA CE Form. Simply check the applicable box below, and complete and submit only this **Cover Page** to NPS along with the other items required for your type of proposal as instructed in the LWCF Program Manual.

- ☐ SCORP planning proposal
- ☐ Time extension with no change in project scope or with a reduction in project scope
- ☐ To delete work **and** no other work is added back into the project scope
- ☐ To change project cost with no change in project scope or with a reduction in project scope
- ☐ To make an administrative change that does not change project scope

Name of LWCF Proposal: St. Louis Ice Center **Date Submitted to NPS:** June 2017

Prior LWCF Project Number(s): 29-00292; 29-00478; 29-01146B

Local or State Project Sponsoring Agency: St. Louis County

Local or State Sponsor Contact:
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Paperwork Reduction Act Statement: This information collection is authorized by the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 460*l*-4 et seq.). Your response is required to obtain or retain a benefit. We use this information to obtain descriptive and environmental information about the proposal. Completion times vary widely depending on the use of the form, from approximately 30 minutes to complete the cover page only to 500 hours for a difficult conversion of use. We estimate that the average completion time for this form is 8 hours for an application, 2 hours for an amendment, and 112 hours for a conversion of use, including the time necessary to review instructions gather data and review the form. You may send comments on the burden estimate or any aspect of this form to the Information Collection Clearance Officer, National Park Service, 1849 C Street, NW. (2601), Washington, DC 20240. We may not collect or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number.

STEP 3C: PROPOSAL FOR A PUBLIC FACILITY IN A SECTION 6(F) AREA

1. Describe the purpose and all proposed uses of the public facility such as types of programming, recreation activities, and special events including intended users of the new facility and any agency, organization, or other party to occupy the facility. Describe the interior and exterior of the facility, such as office space, meeting rooms, food/beverage area, residential/lodging area, classrooms, gyms, etc. Explain how the facility will be compatible with the outdoor recreation area. Explain how the facility and associated uses will significantly support and enhance existing and planned outdoor recreation resources and uses of the site, and how outdoor recreation use will remain the primary function of the site. (The public's outdoor recreation use must continue to be greater than that expected for any indoor use, unless the site is a single facility, such as a swimming pool, which virtually occupies the entire site.)

The St. Louis Ice Center (SLIC) is an ice sport public facility to be constructed in Creve Coeur Lake Memorial Park that will offer new outdoor recreational opportunities not currently offered within the Park. The SLIC will fulfill an immediate need for ice skating facilities within St. Louis County and the surrounding area. In addition to helping grow the game of ice hockey the public facility will offer other outdoor recreation such as figure skating, speed skating, ice dancing, synchronized skating and more. Additionally, during the off-season the facility will offer indoor field hockey, floor hockey, indoor lacrosse, indoor soccer and in-line skating. All of these uses are under-served in the community as there are not enough facilities to handle current demand, let alone future growth of outdoor recreational activities such as these.

The public facility will consist of four sheets of ice, three indoor and one outdoor. The event center ice sheet will have a 3,200 seating capacity, a training center ice sheet will have a 700 seating capacity, and the two other sheets will have a 200 to 400 seating capacity. Also included in the facility are a restaurant area that overlooks two of the ice sheets serving as a community gathering space, locker rooms, a pro shop, training facilities, injury rehabilitation facilities, public restrooms, concession areas, mechanical/storage rooms, a kitchen, a hospitality room and office space for facility management. The facility will have 298,000 square feet of floor space within a building footprint of 251,000 square feet. See **Attachment A – Site Development Plan**.

The exterior of the building will consist of reinforced load bearing tilt-up concrete for the rink portion. The lower portions of the building will consist of shorter concrete walls (tilt or concrete masonry unit). The roof will be mechanically fastened and consist of a white thermoplastic polyolefin (TPO) roof system with two layers of insulation. Other building finishes consist of canopy roofing, prefinished sheet metal gutters and downspouts and prefinished sheet metal fascia. The parking pavement will consist of 3 inches of asphalt over 8 inches of stone base for 836 parking spots and 4 inches of asphalt over 10 inches of stone base for drive lanes.

The facility is proposed on a 40-acre site within Creve Coeur Lake Memorial Park, which contains 2,114 acres. This park already has outdoor athletic fields, more than 17 miles of trails, a 320 acre lake, a restaurant, disc golf course, a corporate picnic site, a tree top adventure course and numerous picnic sites, shelters and playgrounds.

A multi-purpose ice sports public facility will enhance the many outdoor program offerings already established in this large regional park. The public facility will offer year-round ice sport use, especially during inclement weather and during the area's challenging summer temperatures and humidity. This public facility will enhance the many outdoor recreation opportunities already established in this park such as:

- The parking lot will serve as a trail head for the new Fee Fee Greenway Trail being established by Great Rivers Greenway (GRG). It is currently under construction and will lie just to the east and south of the proposed SLIC. There will be designated parking at the SLIC for trail users to help promote trail usage.
- Hockey tournaments, figure skating, and other ice sport events will bring people to the Park from a broader region around St. Louis. Participant families and fans would use the outdoor recreational resources available near SLIC including Creve Coeur Lake, picnic sites, the Fee Fee Greenway Trail, and the adjacent disc golf course. Teams would also take advantage of the outdoor activities between games and during other down times. Current construction plans call for a 1km walking/biking trail to encircle the facility and tie directly into the Fee Fee Greenway Trail.
- Currently, the disc golf course to the south of the proposed project site is being partially relocated and renovated due to the construction of the Fee Fee Greenway Trail. The users of the disc golf course have written letters of support for SLIC because the proposed parking lot would support their course and the improvements required to the course as part of their relocation will drive greater participation in this sport.

The SLIC will create a net gain in outdoor recreation benefits in Creve Coeur Lake Memorial Park by offering new outdoor recreational opportunities that currently do not exist within the park and by providing those opportunities in an area of the park that is basically unused for outdoor recreation. The new outdoor recreational opportunities include ice hockey, figure skating, synchronized skating, skating lessons, in-line skating, floor hockey, field hockey, and other outdoor recreational opportunities. In addition, an indoor rink will be used to accommodate recreational activities other than ice sports during the summer months.

Currently, the proposed site for SLIC offers very little opportunity for outdoor recreation. It is a mowed field located just south of an active railroad line. In the middle of the site is a maintenance shed and a gravel road that connects the shed to Marine Drive. A small portion of the site is currently used as a disc golf course; however, as noted above, that activity is being relocated as a result of the construction of the Fee Fee Greenway Trail.

The SLIC facility will include an outdoor skating sheet. During months when the weather is too warm to support ice, the outdoor rink will be used for floor hockey, field hockey, lacrosse, in-line skating or such along with playing host to summer camp activities that are currently offered in the park, but don't have protected space. It will also host public monthly outdoor music concerts throughout the summer and the parking lot will be used for outdoor activities, including farmer's markets and food truck events sponsored by St. Louis County Parks and a municipality.

The SLIC will also encourage people to take advantage of outdoor recreational opportunities year-round, especially during the colder winter months when park usage is lower than in the warmer months of the year. Ice sports are considered outdoor recreational activities under the LWCF program but the climate of the St. Louis region and the accompanying winter rains will not support outdoor rinks for the length of the hockey season. Therefore, indoor rinks are necessary in the St. Louis region to support the year-round demands of ice sport enthusiasts.

2. Indicate the exact location of the proposed public facility and associated activities on the site's Section 6(f) map. Explain the design and location alternatives considered for the public facility and why they were not pursued.

See Attachment B – Project Location. Five possible locations were analyzed for the SLIC. The site chosen for the project is located at: 13750 Marine Ave., just east of Hwy 141. The other locations that were analyzed include: St. Louis County Park ground located along the Page Extension Freeway, just west of the 141 Highway, along River Valley Road (Levee site); the Golfport site located at 3250 Creve

Coeur Mill Road; the Sportport site located at 12525 Sportport Road; and the Queeny Park site at 550 Weidman Road and 1675 South Mason Road.

The challenges for the Levee site include the fact that the property is located directly adjacent to the levee. This poses a number of significant problems including the existence of an under-seepage berm that restricts subsurface penetrations on site; storm water quantity and quality engineering requirements is considerably restricted due to the under-seepage berm; the levee district may require all subsurface construction to be a specific distance from the toe of the levee, which would leave little or no room for the development; consultation with the Corp of Engineers would be required due to potential wetland impacts and proximity of the site to the Missouri River. This location is not recommended for necessary utility connections; sanitary and water connections would have to extend great distances to accommodate these needs; soils in this area tend to be highly plastic, silt and silty clays; and access to this location is poor because it is off of a two-lane road.

The challenges for the Golfport site include the site being privately owned and currently zoned Non-Urban, which would require the site to be rezoned; the site currently sits at an existing grade of 440' which would require five to seven feet of fill to bring elevation up to an appropriate level and to accommodate for storm detention requirements; storm quantity requirements may require the construction of a significant detention basin or design an underground detention system; there are Ameren UE overhead lines on the property and they have a very wide easement of 275 feet and the soils in this area tend to be highly plastic, silt and silty clays. Additionally, inquiries were made to the current land owner about a purchase of the property, but the Foundation was unable to agree to terms with the land owner.

The challenges for the Sportport site include the site being owned by the City of Maryland Heights but privately controlled by an individual tenant and the soils in this area tend to be highly plastic silt and silty clays. Inquiries were made by the Foundation to the tenant controlling the site about use of some of the property; however, the Foundation was unable to agree to terms with this tenant, making it economically infeasible.

The Queeny Park site has its own set of challenges. Most notably, this site would result in poor traffic flow and circulation. The site is served by Weidman and Mason Roads with the nearest four lane road being Manchester Road, approximately 0.65 miles south of Queeny Park. To facilitate improved traffic flow, lane widening along either Weidman or Mason Road would likely be necessary and would add substantive project cost. The Foundation was not able to locate an area of land large enough to meet the minimum 40-acre size requirement within Queeny Park. Queeny Park has rolling topography and suitable land for development is not as abundant as at the previous sites mentioned. The internal traffic circulation would be poor and would likely have adverse impacts on the park experience of park users.

3. Explain who will own and/or operate and maintain the facility? Attach any 3rd party leases and operation and management agreements. When will the facility be open to the public? Will the facility ever be used for private functions and closed to the public? Explain any user or other fees that will be instituted, including the fee structure.

St. Louis County will retain ownership of the property, will own the proposed public facility, and will enter into a lease agreement with the St. Louis Legacy Ice Foundation (the Foundation) to operate the facility. The Foundation plans to engage a locally-owned rink management company to manage the internal programming, operations and maintenance of the SLIC. This operator has extensive background in managing recreational ice sports facilities in St. Louis and other markets and has years of best practices experience managing and operating ice rinks in our challenging climate with wide temperature and humidity level swings.

The lease and management agreements have not yet been drafted. Any such agreement will clearly indicate that the leased/concessioned area is to be operated by the lessee/concessionaire for public outdoor recreation purposes in compliance with provisions of the Land and Water Conservation Fund

(LWCF) Act and implementing guidelines, including but not limited to: (1) the area will be identified as publicly owned and operated as a public outdoor recreation facility in all signs, literature and advertising, and is operated by a lessee as identified in the public information to eliminate the perception that the area is private; (2) all fees charged by the lessee/concessionaire to the public must be competitive with similar private facilities; and (3) compliance with all Civil Rights and accessibility legislation is required and compliance will be indicated by signs posted in visible public areas and statements in public brochures. The lease and management agreements will reserve the right to periodically review the performance of the lessee/concessionaire and terminate the agreement if its terms and the provisions of the grant agreement, including maintenance, public use and accessibility, are not met.

As a publicly financed project, the plan is to have SLIC be managed by the Foundation, a 501(c)(3) organization. Once the initial agreement has expired, the facility will revert back to the public, under the ownership of St. Louis County.

The Ice Center will be used predominately for outdoor recreation activities open to the general public. The facility will be open year round for the following types of activities: public skate, stick and puck, learn-to-skate, learn-to-play, adult and youth leagues, summer camps, hockey practice and games, tournaments, figure skating, indoor field hockey, floor hockey, in-line skating and many other recreational activities that would be well served by having a covered area in which to play. Twenty-five percent of the ice time will be dedicated to public skating sessions, freestyle skating, skating lessons, open stick and puck sessions, and dry floor. An additional thirty-seven percent of the time will be devoted to camps and clinics, as well as youth, high school, and adult hockey leagues. Ice time will also be reserved for hockey for people with disabilities, figure skating, and synchronized skating.

In exchange for their contribution to the facility, the Blues will use two percent of the ice time. They will skate on weekdays from 10 am to 12 pm when no one would otherwise be using the facility due to work and school schedules. Their practices will be open to the public so anyone can come and watch. Moreover, they will only occupy one rink, leaving the other three rinks available for public use. College teams and an amateur hockey team will also use the rink, but again the majority of their ice time will be on weekdays before 3 pm when demand for the ice is lowest and the other rinks are available.
The Ice Center will charge reasonable fees and will not require memberships so that it remains accessible to the public.

See Attachment C - Proposed Ice Usage Breakdown for further details.

STEP 5: SUMMARY OF PREVIOUS ENVIRONMENTAL REVIEW

1. Date of environmental review(s), purpose for the environmental review(s) and for whom they were conducted.

Over the past 20 years a number of environmental reviews have been conducted for various transportation projects at Creve Coeur Lake Memorial Park. The dates, projects, and the agency or organization conducting the reviews are listed below:

- 1995. Final Supplemental Environmental Impact Statement Page Avenue Extension.
- 2001. In-house Environmental Assessment of Spoil Pit Development, Creve Coeur Lake Memorial Park. Saint Louis County Department of Parks & Recreation.
- 2001. In-house Environmental Assessment of Proposed Concrete Batch Plant, Creve Coeur Lake Memorial Park. Saint Louis County Department of Parks & Recreation.
- 2002. Howard Bend Environmental impact Statement Draft Purpose and Need. Prepared for US Army Corps of Engineers, St. Louis District. Prepared by MACTEC Engineering and Consulting, Inc. Under contract with the Howard Bend Levee District.
- 2003. Creve Coeur Lake Memorial Park Master Plan. Developed by Parsons-Brinkerhoff for Saint Louis County Department of Parks & Recreation.
- 2004. Environmental Assessment for Requesting Conversion Transfer of 4(f) and 6(f) Lands. Conducted by Saint Louis County Department of Parks & Recreation.
- 2005 Howard Bend Floodplain Final Environmental Impact Statement.
- 2006. Environmental Assessment for Creve Coeur Lake Memorial Park Requesting Conversion Transfer of 6(f) Lands. In-house Saint Louis County Department of Parks & Recreation.
- 2007. Howard Bend Land Use Plan Implementation Program.
- 2008. Maryland Heights Expressway EIS.
- 2010. Creve Coeur Lake Memorial Park-LWCF 6(f) Conversion for Page-Olive Connector/Creve Coeur Mill Road Realignment (LWCF Project 29-00292. Saint Louis County Department of Parks & Recreation.
- 2010. Olive & 141 Connector EA prepared by MACTEC Engineering and Consulting, Inc..
- 2013. McKelvey Woods Trail Wetland Delineation Phase II. Conducted for the US. Army Corps of Engineers, St. Louis District by Burn & McDonnell Engineering Company, Inc. Under contract with the City of Maryland Heights. (Note: this trail is part of GRG's Fee Fee Greenway).
- 2015. Comprehensive Plan and Updates. City of Maryland Heights.
- 2015. St. Louis Ice Center Study. Created by Generator Studio, ARCO Construction, Castle Construction, Canlan Ice Sports, and Double Eagle Sports, LLC.
- 2017. Waters of the United States Delineation, St. Louis Ice Center. Conducted for ARCO Construction Company by Geotechnology, Inc.
- 2017. Stormwater Management Facilities Report: Detention Volume – Howard Bend Levee District. Conducted for ARCO Construction Company by Stock & Associates Consulting Engineers, Inc.

2. Description of the proposed action and alternatives.

Saint Louis County Department of Parks and Recreation (SLCDPR) is requesting permission for a public facility to be constructed and operated on Section 6(f) land at Creve Coeur Lake Memorial County Park. The proposal would consist of a public recreational facility with four sheets of ice designed to support numerous recreational activities. Proposed activities would include but not be limited to: public ice skating, public learn-to-skate and learn-to-play programs, figure skating, in-line skating, field hockey, floor hockey and all levels of developmental hockey. As envisioned, the facility would attract local, regional and national events ranging from disabled or sled hockey, special needs hockey, U.S. National Figure Skating Championships and so forth. These events could be held due to the number of ice sheets and the total seating capacity of over 4,000 spectators. Office space, concessions, a restaurant, training facilities, rehabilitation areas and a pro-shop would be included in the SLIC.

The cost to construct the SLIC is estimated to be in excess of $55 million. Approximately 60% of the the project's financing will come via Industrial Revenue Bonds with limited backing from St. Louis County. The remaining 40% of the financial requirements are secured via private donations and the project is fully funded. A not-for- profit 501(c)(3), governed by a Board of Directors, will steward operations of the facility with day-to-day activities executed by the aforementioned rink management firm.

Five sites were reviewed as possible locations for the proposed development as identified in the SLIC study, of which four were in the City of Maryland Heights. The five locations were:

- County Park land located at 13750 Marine Avenue, just east of Highway 141;
- County Park land located along the Page Extension Freeway, just west of Highway 141 along River Valley Road;
- Golfsport site located at 3250 Creve Coeur Mill Road;
- Sportport site located at 12525 Sportport Road; and
- Queeny Park site located at 550 Weidman Road and 1675 South Mason Road.

Some of the criteria used to determine site location included:

- The use of public land as compared to purchasing private property;
- Existing transportation amenities;
- Existing utilities or nearby connections;
- Existing location in reference to the Howard Bend Levee District and the levee itself;
- The existing possibility of wetlands;
- Flooding and flood water considerations;
- Stormwater management strategies;
- Sub-surface ground saturation and ground water movement; and
- Cost to construct based on engineering, grading and ground work needs.

Based on the findings it was determined by the developers that the Marine Avenue site was the preferable site. The other sites would have provided significant constraints relative to topography, construction costs and traffic challenges, which would have restricted the ice rink development.

3. Who was involved in identifying resource impact issues and developing the proposal including the interested and affected public, government agencies and Indian tribes.

The SLIC study was developed by Generator Studio, ARCO Construction, Castle Construction, and St. Louis Legacy Ice Foundation. The LWCF Proposal Description and Environmental Screening Form was completed by St. Louis Economic Development Partnership. An informational public meeting was held in January 2017 (see item 7 below).

4. **Environmental resources analyzed and determination of impacts for proposed actions and alternatives.**

   See above number 2.

5. **Any mitigation measures to be part of the proposed action.**

   Initial studies of the proposed project indicate the following mitigation measures:

   - Possible wetland mitigation (pending review of a wetlands delineation report by the U.S. Army Corps of Engineers);
   - Bio-swales to collect and move stormwater runoff;
   - Detention basins to detain runoff;
   - The possibility of using porous pavement;
   - The possibility of installation of rain gardens throughout the parking areas; and
   - The use of BMP as part of the Storm Water Pollution Prevention Plan.

   The proposed site consists of approximately 40 acres.

6. **Intergovernmental Review Process. Was this proposal reviewed by the appropriate State, metropolitan, regional and local agencies, and if so, attach any information and comments received about this proposal.**

   Missouri Department of Natural Resources, Land Water Conservation Fund Management Section.

7. **Public comment periods (how long, when in the process, who was invited to comment) and agency response.**

   The St. Louis County Department of Planning held an informational public meeting on January 25, 2017 regarding the proposed development. Notification of the meeting included postcards mailed to nearby property owners, park signage, a County website notice, email notification sent to County website subscribers as well as open space organizations. Presentations were given by the SLCDPR, the Partnership, and the Foundation prior to opening up the meeting for public comments. A total of 42 individuals provided comments during the meeting: 25 spoke in favor of the development, and 17 spoke in opposition. Representatives from regulatory agencies and other interested agencies were not in attendance at this meeting.

   Following the issuance of the draft Environmental Assessment, there will be additional opportunity for public comment.

8. **Any formal decision and supporting reasons regarding degree of potential impacts to the human environment.**

   N/A

9. **Was the proposed LWCF federal action and/or any other federal actions analyzed/reviewed in any of the previous environmental reviews? What was analyzed and what impacts were identified? Provide specific environmental review document references.**

   The above mentioned environmental documents (see above number 1) do not take into account the specific location of the proposed project area (except the McKelvey Woods Trail Wetland Delineation Phase II). Most of the studies refer to Page Avenue, Howard Bend Levee District, Maryland Heights Expressway and the Olive-Highway 141 Connector. Most of the reference to environmental studies and reviews, listed above, is in reference to the many highway projects that have occurred in and around Creve Coeur Lake Memorial Park. The location of the proposed project was not included in the previous federal environmental reviews.

STEP 6: ENVIRONMENTAL SCREENING FORM (ESF)

Part A. Environmental Resources

A. ENVIRONMENTAL RESOURCES Indicate potential for adverse impacts. Use a separate sheet to clarify responses per instructions for Part A on page 9.	**Not Applicable-** Resource does not exist	**No/Negligible Impacts-** Exists but no or negligible impacts	**Minor Impacts**	**Impacts Exceed Minor** EA/EIS required	**More Data Needed to Determine Degree of Impact** EA/EIS required
1. Geological resources: soils, bedrock, slopes, streambeds, landforms, etc.				X	
2. Air quality			X		
3. Sound (noise impacts)			X		
4. Water quality/quantity				X	
5. Stream flow characteristics	X				
6. Marine/estuarine	X				
7. Floodplains/wetlands				X	
8. Land use/ownership patterns; property values; community livability		X			
9. Circulation, transportation				X	
10. Plant/animal/fish species of special concern and habitat; state/ federal listed or proposed for listing					X
11. Unique ecosystems, such as biosphere reserves, World Heritage sites, old growth forests, etc.	X				
12. Unique or important wildlife/ wildlife habitat	X				
13. Unique or important fish/habitat	X				
14. Introduce or promote invasive species (plant or animal)		X			
15. Recreation resources, land, parks, open space, conservation areas, rec. trails, facilities, services, opportunities, public access, etc. *Most conversions exceed minor impacts. See Step 3.B*				X	
16. Accessibility for populations with disabilities	X				
17. Overall aesthetics, special characteristics/features		X			
18. Historical/cultural resources, including landscapes, ethnographic, archeological, structures, etc. Attach SHPO/THPO determination.					X
19. Socioeconomics, including employment, occupation, income changes, tax base, infrastructure		X			
20. Minority and low-income populations	X				
21. Energy resources (geothermal, fossil fuels, etc.)		X			
22. Other agency or tribal land use plans or policies					X
23. Land/structures with history of contamination/hazardous materials even if remediated	X				
24. Other important environmental resources to address.	X				

Part A. Environmental Resources Explanations

1. Geologic resources, soils, bedrock, slopes, streambeds, landforms, etc.

The proposed action to develop the SLIC will impact the soils and landforms of the 6(f) property in question. The proposed development is located in the Missouri River floodplain and is within the 100-year flood of Creve Coeur Lake and Creve Coeur Creek. Alluvial deposits within the project area are at a depth of greater than 60 feet. The water table is at a depth of two to four feet most of the year according to the Natural Resource Conservation Service (NRCS) (formerly known as the Soil Conservation Service) Soil Survey of St. Louis County and St. Louis City, 1979.

The ground is relatively flat with a slight decrease in elevation along the eastern and northern portions of the project area. The soils located on the site are identified as Peers, silty clay loam by the Natural Resource Conservation Service (NRCS). This soil is identified as a hydric soil in St. Louis County. As described the soil is located on nearly flat ground and is somewhat poorly drained. Permeability is moderate, and surface runoff is slow.

The project site is located at a grade elevation of 448 feet. The 100-year flood elevation of Creve Coeur Lake and Creve Coeur Creek is 450 feet. The entire project site is considered a FIRM (Flood Insurance Rate Map) Zone AE, meaning it has a probability of flooding in any given year of 1%. This is considered a high risk of flooding under the National Flood Insurance Program. The entire project area and portions of roadways leading to the site were inundated in July 2015 and again in January 2016 after substantial amounts of rainfall.

To reduce the risk of flooding most of the project site will be elevated with two to five feet of fill. This will raise the elevation to at least one foot above the 100-year flood elevation. Fill will be obtained from the onsite constructed retention basins. An estimated 195,000 cubic yards of fill will be used from the project site. Constructed retention basins will provide compensatory storage to offset the volume of water displaced by filling.

Checking historical aerial photos revealed the project area has been cleared of woody vegetation since at least 1937 and has been in some form of agriculture since that time. Recent Park Department management has been the seasonal mowing of the site to maintain it as an open field.

Surface bedrock, slopes, streambeds or landforms do not exist on the proposed project site.

2. Air Quality.

The development of the SLIC will have a negative impact on the air quality of the immediate area. With the development of the proposed SLIC, more vehicles will be traveling the roadways thus increasing emissions and lowering air quality. According to the Missouri Department of Natural Resources (MDNR) the air quality in the metro area has improved since 2000 but work still needs to be done to reduce ozone. In July 2012, USEPA designated the metro-St. Louis area as a marginal non-attainment area for ozone. The area had until December 2015 to attain the 2008 ozone standard but this will not be determined until 2017. Ozone is created by chemical reactions between oxides of nitrogen and volatile organic compounds in the presence of sunlight. Emissions from motor vehicle exhaust, gasoline vapors along with some other sources are the major contributors to ozone. Breathing ozone can trigger a variety of health problems and can have harmful effects on sensitive vegetation and ecosystems.

According to the proposed ice center plan the facility will have parking available for 1,037 vehicles plus an adjacent 268 existing spots. The spectator seating attendance for the four ice rinks is a combined at over 4,000 people. If at maximum capacity three spectators would travel together to the facility in one vehicle this would represent slightly over 1,367 vehicles on the nearby roadway traveling to the facility. This number would represent a maximum attendance for each of the four ice rinks and is expected to occur less than eight to ten times annually based upon event scheduling and forecasted attendance. It is unknown at this time how many vehicles will be traveling the roadways to access the facility in any given day; however, a traffic study is currently underway to assess impacts. The operation of the vehicles to attend activities at the ice center would increase vehicle emissions and reduce air quality. The potential impact of increased vehicle traffic will be mitigated due to the location of the SLIC at the edge of the Park at a main Park entrance.

In addition, air quality will decrease during the construction of the facility as a result of grading and construction activity.

3. Sound (noise impacts).

Noise levels will temporarily increase as a result of the proposed ice center being constructed. The temporary and short-term increase in noise generated as a result of the construction of the new facility will impact the surrounding passive park land. Other noise generated by the ice facility will be long term such as: vehicle noise on the park roads leading to the facility, and the operation of the facility itself. The increases in noise as a result of the proposed project can be attributed to:

- Project site grading with heavy equipment during construction;
- Overall construction of the facility, parking lots, building, etc;
- Operation of the ice facility with compressors, and other equipment could increase the outside noise level around the facility; and
- Road noise will increase as more vehicles will be out on the roadways traveling to the ice center.

The nearby receptors that could be impacted by these activities include:

- Disc golf course, at least 500 feet south of the closest rink; golf driving range, approximately 795 feet southeast of the closest rink; and
- A pavilion in Creve Coeur Lake Park, approximately 1,000 feet southwest of the closest rink.

Operational noise from SLIC would attenuate to background levels within 500 feet of the source, so these receptors would see negligible impact as a result of the operation of the facility.

4. Water quality/quantity.

The proposed ice center development and parking areas will cover most of the 40 acre site. Much of this acreage will consist of impervious materials roadways, parking lots, roofs, etc. The remaining acreage represents lawn, retention basins, and bio-retention. The development of the proposed project with its parking for over 1,000 vehicles could impact the quality and quantity of runoff. Oils, vehicle fluids, salts, and trash could impact the quality of water leaving the development site as runoff or being detained on site.

Based on information provided by the U.S. Geological Survey (USGS), a one-inch rain storm will generate 27,154 gallons of runoff on one acre of impermeable surface. Considering the size of the proposed development, a one-inch rain event would generate approximately 651,696 gallons of runoff (or, roughly the volume of an Olympic-sized pool). Retention basins located in low permeable soils with a high water table will hold water for a considerable amount of time. Bio-retention is a depressed landscape feature which stores, filters, and infiltrates stormwater runoff. Bio-retention is an attractive Best Management Practice (BMP) on many developments because it can be tucked into greenspace such as curb islands, landscaping and planter boxes.

The project site currently slopes to the north and east. The proposed ice center development will be divided into multiple sub-basin watersheds: each tributary to a bio-retention basin, and then to retention lakes. To manage runoff, three constructed retention basins will provide compensatory water storage to offset the volume of water displaced by filling. The main retention lake will be interconnected to a secondary “finger lake” immediately west of Marine Avenue. From the second retention lake, an enclosed storm sewer discharge pipe will convey runoff to Creve Coeur Creek. Upstream of the on-site retention lake, bio-retention basins will be utilized to provide water quality treatment and volume reduction for proposed impervious surfaces. The site will be designed such that parking lots will sheet flow into bio-retention basins along their perimeter, and roof drains will “bubble up” into bio-retention basins. Private sewers will then convey stormwater from the bio-retention basins to the on-site retention lakes for storage.

5. Stream flow characteristics.

Runoff generated on the site currently moves to the north and east of the project area to a detention basin. The runoff then discharges to a wooded wetland that begins on the project area and extends into adjoining properties. Off-site runoff moves into a drainage moving to the east and eventually entering Fee Fee Creek. Surface flowing streams do not exist on the project site.

As previously stated, the proposed ice center development will be divided into multiple sub-basin watersheds: each tributary to a bio-retention basin, and then to retention lakes.

6. Marine/estuarine.

Marine or estuarine habitats do not exist on or in the vicinity of the project site.

7. Floodplain/wetlands.

The project site is located within the Missouri River floodplain. The Howard Bend 500-year levee protects the area from Missouri River floodwaters. However, the site is within the 100-year flood of Creve Coeur Lake and Creve Coeur Creek. The area recently experienced two greater than 100-year floods in July 2015 and again in January 2016. The project site and roads leading to the site were inundated. To counter the occurrence of the proposed project being within the 100-year flood zone the site will be raised with two to five feet of fill. This action will bring the project area one foot above the 100-year flood. Roadways leading to the development will be inundated and impassible in a 100 year flood. No actions have been recommended to raise the elevations of any of the roadways serving the immediate project area.

The City of Maryland Heights is an approved municipality to administer the Federal Flood Insurance Program per FEMA. As such, Maryland Heights has ordinances in place under which to review and administer any proposed development within the regulatory floodplain as defined by FEMA Flood Insurance Rate Maps. Specifically, floodplain permits and flood studies are required for any changes via the removal or filling of earth within the designated floodplain. Development within the floodplain must demonstrate a no “net rise” to the stream or river floodway conveyance area, if applicable. A stormwater management study was conducted by Stock & Associates Consulting Engineers, Inc. in March 2017 for the proposed ice center development. In a letter dated March 28, 2017 from Horner & Shifrin, the Howard Bend Levee District has granted approval of the project hydraulics as it relates to compensatory storage and compliance with the stormwater master plan. Information regarding the proposed stormwater management features of the project site is included in Item 4 above.

The 2013 McKelvey Woods Trail Wetland Delineation Phase II report identified two wetlands within the project area. This trail is part of GRG’s Fee Fee Greenway. The delineation was conducted for the US. Army Corps of Engineers, St. Louis District by Burn & McDonnell Engineering Company, Inc. The work was carried out under contract with the City of Maryland Heights and the Great Rivers Greenway. This trail is part of GRG’s Fee Fee Greenway and traverses a portion of the project area. The wetland delineation was only carried out along the course of the proposed trail and not the entirety of the proposed project site. Other wetlands exist in the northeast corner of the property but are outside of the developed area.

In January 2017, Geotechnology completed a Waters of the United States (WOUS) delineation of the proposed development site for ARCO Construction Company. WOUS may include lakes, rivers, streams, wetlands, and similar waters that possess a connection to traditional navigable waters. The US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) was reviewed to obtain information pertaining to NWI-mapped wetlands and waterbodies in the project area. NWI-mapped wetlands do not appear in the project area. The closest NWI-mapped wetlands are west adjacent to Creve Coeur Lake and Creve Coeur Creek and east adjacent to a tributary of Louisville Creek. See **Attachment D – Wetlands** for more details. During the delineation, Geotechnology identified a 0.13-acre forested wetland on the eastern side of the project area. The forested wetland exists within a depression of a drainage area that discharges to a stream system that is present on the east adjoining property. Streams were not identified. Although two emergent wetlands were identified on the western portion of the site, the US Army Corps of Engineers (USACE) has verified that these wetlands are not considered jurisdictional wetlands due to their recent development. The facility development plan does not impact the 0.13-acre

forested wetland or the 0.11-acre emergent wetland (identified in the 2013 Phase II delineation report); therefore, a Section 404 permit will not be required. As a result, the USACE prepared a "No Permit Required" letter, which can be found in Appendix I or the St. Louis Ice Center Draft Environmental Assessment.

8. Land use/ownership patterns; property values; community livability.

Presently the project site is maintained as a mowed field with a small storage shed and a gravel drive connecting the shed to Marine Avenue and does not exhibit active recreational use. The open field is mowed seasonally to restrict woody growth. The site is used on an occasion for special event parking. The Fee Fee Greenway Trail, which is currently under construction, will pass through the project site and will connect residential areas to the east to Creve Coeur Lake Memorial Park. This multi-use asphalt trail is the only other planned action proposed on the project site and will be tied into the SLIC with an asphalt path so as to allow Fee Fee Greenway Trail users access to restrooms and concessions which are not readily available.

Creve Coeur Lake Memorial Park offers a variety of recreational activities and diversity of land uses. Listed below are some, but not all, of the activities and land uses that can be found in the park:

- The Quarry at Crystal Springs 18-hole golf course and a driving range;
- Soccer fields and ballfields;
- Biking and pedestrian trails;
- Boat rentals for the lake;
- Bike rentals for the trails;
- Fishing;
- Picnic sites and shelters;
- Go Ape Zip Line and Treetop Adventure;
- Boating, rowing, sailing and windsurfing;
- Passive areas;
- Natural areas;
- Wetlands, woodlands and prairie areas; and
- A 300-acre natural lake (an old oxbow of the Missouri River).

All of the above activities and land uses make up the 2,100 acre park.

The proposed development would not impact any of the above-mentioned recreational activities.

The listed recreational facilities would benefit from the proposed development, attracting additional attendances and usage as a result of SLIC.

The proposed development will occur on a 40-acre site that is part of Creve Coeur Lake Memorial Park. The site is in the north central portion of the park adjacent to Marine Avenue. The site is seasonally mowed by staff of SLCDPR to maintain its openness. Land use outside of the project area and the park would include residential areas in the higher elevation upland areas. While agriculture is the primary land use within the Missouri River floodplain, nearby private development proposals hope to develop over 1,500 acres in the immediate area next to Creve Coeur Lake Memorial Park. The developments may include residential, commercial and light industrial.

Land ownership would remain with SLCDPR. The property would be leased to a not-for-profit organization, which would oversee the construction and be responsible for the operation of the SLIC.

No private residential or industrial sites exist near the proposed project site. Some commercial sites including the golf course, bike rental, soccer fields and a commercial nursery are located in the vicinity of the proposed project. The project is not expected to have an impact on the property values of the surrounding private properties.

9. Circulation, transportation.

The proposed SLIC project is located approximately 940 feet south of Highway 141 (aka the Maryland Heights Expressway). This highway forms a major connection with I-64 to the south and I-70 to the north,

both of which are major interstates linking St. Louis and St. Charles counties. In addition, Highway 364 (Page Avenue) provides a crucial link between I-270 and Highway 141 as well as a link between St. Louis and St. Charles Counties. These roadways increase the service area of the ice facility and provide improved access. The proposed SLIC will also be served by two secondary roads leading to the site, Dorsett Road and Marine Avenue. Both of these roads are two lane roads and serve the east side of Creve Coeur Lake Memorial Park and the proposed ice center. Currently, there are no known traffic improvements planned or proposed for Marine Avenue. Traffic would increase within Creve Coeur Lake Memorial Park as a result of the proposed ice center; however, most of the traffic to and from the public facility is expected to enter and leave the Park at the adjacent entrance at the intersection of Marine Avenue and Highway 141. Listed below are average weekday traffic counts for 2015 at various locations in and around Creve Coeur Lake Memorial Park as provided by the Missouri Department of Transportation (MoDOT) and St. Louis County Department of Transportation (SLCDOT):

LOCATION	Average Weekday Traffic (AWT)
Marine Ave. south of Highway 141 (at project site)	5,670
Highway 141 south of Highway 364 (Page Ave.)	28,243
Highway 141 between I-70 and Highway 364	40,306
Marine Ave. north of Dorsett Rd.	8,130
Dorsett Rd. east of Marine Ave.	5,440
Marine Ave. south of Dorsett Rd.	6,100
Creve Coeur Mill Road between Hwy. 141 and Hwy. 364	5,780

A traffic study is currently being conducted for the proposed ice center development. This section will be updated when the traffic study results are available.

10. Plant/animal/fish species of special concern and habitat, state/federal listed or proposed for listing.

Most of the proposed site consists of old field herbaceous growth. The site has been open and used for various agriculture practices since at least 1937. Current management over the past few years has been a seasonal mowing to keep woody growth from invading the site. Some of the old field herbaceous species would include but not be limited to the following species: Johnson grass, Virginia wild rye, goldenrod,, fescue, fleabane, blackberry, poison ivy, thistle, vetch, white sweet clover, white woodland aster, chicory, ragweed, red clover, as well as other species.

The boundary of the project site on the north, east and south is lined with woody vegetation as a combination of trees and shrub species. The woody corridor is made up of a combination of mature and immature species. Some of the woody species found along the project site boundary would include but not be limited to the following species: silver maple, box elder, elderberry, honey locust, hackberry, black walnut, white ash, Kentucky coffee tree and basswood. Other species growing in the corridor include bush honeysuckle, autumn olive and Siberian elm. The wooded corridor provides a travel lane for more mobile wildlife to reach other portions of the park.

Two wetlands as identified in the McKelvey Woods Trail Wetland Delineation Phase II study exist on the proposed site. This trail is part of GRG's Fee Fee Greenway. Only the proposed trail route was delineated and not the entire project area for wetlands. One of the wetlands is along the south east corner of the project area the other wetland is located on the central portion of the eastern boundary. Both sites are highly degraded as a result of seasonally mowing. The floristic display is not very well developed. The forested wetland exists within a depression of a drainage area that discharges to a stream system that is present on the east adjoining property. The forested wetland is dominated by box elder (*Acer negundo*) and American elm (*Ulmus americana*) trees. Hydric soils and wetland hydrology were observed within the wetland. The surrounding forested riparian corridor is dominated by box elder, American elm, silver maple (*Acer saccharinum*), honey locust (*Gleditsia triacanthos*), and bush honeysuckle (*Lonicera maackii*). Generally, trees within this area are relatively young with the majority under 8 inches diameter at breast height (dbh). However, a few, mature cottonwood (*Populus deltoides*) species are present. Some of the herbaceous species found in the wetlands include the following species: narrow leaved cattails, sedges, bulrush and other species. Ponded water was observed in the

vicinity of the emergent wetlands in the western portion of the site in December 2016 (following a precipitation event). It should be noted that the eastern quarter of the proposed site is lower in elevation and shows a greater concentration of bulrush and sedge species. Evidence does exist of surface water pooling across the proposed site.

The project area represents beneficial wildlife habitat for many common species of wildlife found in the park and the surrounding area. The site could provide some valuable forage habitat for bats. As part of the Fee Fee Greenway Trail proposal a bat roosting survey was conducted along the route of the trail which traverses the project area. The area where the trail traverses the proposed development does not have any trees growing along the trail route. However, good bat roosting trees do exist adjacent to the development. Indiana bats and Northern Long Eared bats both are federally and state endangered species and both occupy select trees during the summer months. Trees with flakey bark or trees will hollow cavities or old mature trees would be beneficial to both species of bats. Both species would utilize the field and wetlands as hunting areas for insects. Because of the relative small size of the project area and the lack of quality habitat other federally and state endangered species would not be found on the project area. No known plants or fish species exist on the project site that would be considered of special concern.

11. Unique ecosystems, such as biosphere reserves, World Heritage sites, old growth forests, etc.

No unique habitats exist on the project site. The site consists of an old field community primarily with herbaceous vegetation with minimal plant development and diversity. Two degraded wetlands are found on the site. But they support minimal plant diversity and lack a constant hydrology. The entire site is mowed seasonally to reduce woody growth.

12. Unique or important wildlife/wildlife habitat.

As previously mentioned (see item 10 above) the Indiana bat and the Northern Long Eared bat, both federally and state endangered species may occupy some of the surrounding trees and utilize some of the open field to forage for insects. No studies or surveys have been conducted to determine if the project area is an important habitat for the two endangered species. The proposed development site contains two small emergent wetland habitats in the western portion of the proposed site, a forested wetland in the eastern portion of the proposed site, and an emergent wetland in the eastern portion of the proposed site as identified in the referenced wetland delineation reports. The closest NWI-mapped wetlands are west adjacent to Creve Coeur Lake and Creve Coeur Creek and east adjacent to a tributary of Louisville Creek. Ponded water was observed in the area of the two non-jurisdictional wetlands during the December 2016 site visit. The project area is utilized by a host of wildlife but these species would not be classified as unique or important wildlife with the exception of the two endangered bat species. The older field habitat of the project area represents a habitat that is not very common in the 2,100 acre park.

13. Unique or important fish/habitat.

No permanent water is found on the project site so fish and their habitat do not exist on site.

14. Introduce or promote invasive species (plant or animal).

The following invasive species can be found in the project area: Johnson grass, white and yellow sweet clover, fescue, thistle, red clover, Korean clover, crown vetch, callery pear and other species as well. The proposed ice facility would encompass the 40 acre site. The proposed development should not introduce nor promote invasive species. Landscape plans can be reviewed for possible threats to native landscapes.

15. Recreation resources, land, parks, open space, conservation areas, recreation trails, facilities, services, opportunities, public access, etc.

The proposed ice center will provide a recreational opportunity that does not exist in the St. Louis area. The four ice rinks will allow for tournament opportunities that do not exist in the area today. The ice center will not take away or have a direct negative impact on recreational resources that are found in the park or the immediate surrounding area. The proposed facility will occupy a site that currently supports

very little use. Any potential impact on open space within the Park is mitigated by the location of the facility at the edge of the park along a neighboring railroad line.

The development will provide ice skating and other recreational opportunities for the general public, especially during winter months when outdoor activities can be limited by challenging weather.

The SLIC would create a net gain in outdoor recreation benefits in Creve Coeur Lake Memorial Park by offering additional outdoor recreational opportunities that currently do not exist within the park and by providing those opportunities in an area of the park that is basically unused for outdoor recreation. SLIC will provide new outdoor recreational opportunities including ice hockey, figure skating, synchronized skating, skating lessons, in-line skating, floor hockey, field hockey, and other outdoor recreational opportunities via use of an outdoor rink that is part of the project.

Currently, the proposed site for the public facility offers very little opportunity for outdoor recreation. It is a mowed pasture field located just south of an active railroad line. In the middle of the site is a maintenance shed and a gravel road that connects the shed to Marine Drive. A small portion of the site is currently used as a disc golf course; however, as noted above, that activity will be relocated as a result of the construction of the Fee Fee Greenway Trail.

As noted above, SLIC will include an outdoor skating sheet and an outdoor athletic area. During months when the weather is too warm to support ice, the outdoor rink will be used for floor hockey, field hockey, lacrosse, in-line skating or such along with playing host to summer camp activities that are currently offered in the park, but don't have protected space. It would also host a local municipality's monthly outdoor music concerts throughout the summer and the parking lot would be used for outdoor activities, including farmer's markets and food truck events sponsored by St. Louis County Parks and a municipality.

SLIC would also encourage people to take advantage of outdoor recreational opportunities year-round, especially during the colder winter months when park usage is lower than in the warmer months of the year. Ice sports are considered outdoor recreational activities under the LWCF program but the climate of the St. Louis region will not support outdoor rinks for the length of the ice hockey and ice sport seasons. Therefore, indoor rinks are necessary in the St. Louis region to support year-round recreation.

16. Accessibility for populations with disabilities.

The proposed St. Louis Ice Center will be constructed to meet ADA specifications. The conceptual plans identify handicapped parking spaces and facilities of benefit inside the ice rinks. Additionally, two of the rinks are being equipped with special dasher board and ice entry systems that will allow for the disabled, such as sled hockey players, to have ADA-type access to the ice as well as being accommodating to those hockey players and ice skaters with special needs (see http://www.gatewaylocomotives.org/).

17. Overall aesthetics, special characteristics/features.

See Attachment E – Project Rendering for more details. The visual landscape of an area is formed by physical, biological and man-made features that combine to influence both landscape identifiability and uniqueness. Scenic resources within a landscape are evaluated based on a number of factors that include scenic attractiveness, integrity and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures and visual composition of each landscape. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance. The subjective perceptions of a landscape's aesthetic quality and sense of place is dependent on where and how it is viewed.

Scenic visibility of a landscape may be described in terms of three distance contexts: (1) foreground, (2) middleground and (3) background. In the foreground, an area within 0.5 mile of the observer, individual details of specific objects are important and easily distinguished. In the middleground, from 0.5

to 4 miles from the observer, object characteristics are distinguishable but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with a particular action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the character of an existing site is an important factor in evaluating potential visual impacts.

The location of the proposed project is in a portion of Creve Coeur Lake Memorial Park that is not used for recreation. Presently the proposed site consists of an old field that is seasonally mowed for maintenance. In the middle of the site is a maintenance shed and a gravel road that connects the shed to Marine Drive. No active recreational opportunities exist at this old field. The site may be used by the occasional birder or botanist or other form of nature study but this is unconfirmed and there are multiple other areas in the park that support these passive recreation activities. The topography around the proposed site is relatively flat and consists of a mixture of open space (grass areas) and trees. Existing scenic attractiveness is minimal and scenic integrity of the site is low.

The building would be one story with a mezzanine, with a maximum height of the parapet roof of roughly 50 feet from the ground. The exterior of the building would be concrete and glass with a varied roof line. Other building finishes would consist of canopy roofing over the outdoor rink. An asphalt parking lot with spaces for 1,037 cars would be located on the proposed site. Additional parking may be provided west of Marine Avenue adjacent to an existing parking area. The grounds around the facility would include maintained lawn and landscaped areas consisting of a variety of trees, shrubs, and herbaceous planting.

Currently, the 40-acre site is located at the northern edge of the park and is bounded by: Marine Avenue and an existing parking lot on the west; the Southern Pacific Railroad on the north; Creve Coeur Lake Memorial Park and a golf driving range to the south; and a tributary to Creve Coeur Creek to the east. The proposed building would present a visual contrast to the existing undeveloped landscape. There would be a moderate visual change in the landscape at the foreground viewing distance due to the change from the natural landscape. The greatest impact would be experienced by users of the Fee Fee Greenway Trail as the building and parking area could decrease the aesthetic quality of this short portion of the trail. However, the trail would also encourage access to the public facility as there will be an asphalt connector to the trail and bike parking outside the SLIC. In more distant views, the facility would likely merge with the existing roadways and surrounding development which would minimize visual intrusions.

Photos of the existing project site can be found in **Attachment F – Existing Project Site Photos**.

18. Historical/cultural resources, including landscapes, ethnographic, archeological, structures, etc.

Based on the cultural resources identified in the Howard Bend Environmental Impact Statement no historical, cultural archeological, structural or ethnographic resources exist on the proposed project site. Two identified archeological sites from the Howard Bend study do exist east of the project site. One is a pre-historic campsite that was not evaluated at the time of the Howard Bend study. The other site is a historic midden that was not evaluated but was listed as poor condition in the study. Individual Native American artifacts could exist in the field of the proposed project site just as they could appear in other places of the park. It is known that Native Americans lived in the surrounding area of Creve Coeur Lake for thousands of years. Archeological artifacts would be the only impacted historical resource with the proposed development.

19. Socioeconomics, including employment, occupation, income changes, tax base, infrastructure.

The St. Louis Ice Center will be operated by a not-for-profit organization, thus, the facility will not generate tax revenues. The exception to this would be any merchandise or food sold would have to pay

sales taxes. As stated in the St. Louis Ice Center Development Plan the development will have the following economic benefits:

- 970 one-year construction jobs.
- $29.1 million in new labor income.
- $34 million in value added to St. Louis County's economy.
- The ice complex when it is fully up and running will create 156 jobs, nearly $7 million in labor income and nearly $22 million in value added to the county's economy annually.

The 156 jobs created in the local economy will cover the gamut of jobs both full-time and part-time; professional and non-professional. Some of the positions to be created by the St. Louis Ice Center and other impacted employers would include but not limited to the following:

- General manager
- Office manager
- Sales & marketing manager
- Sales coordinator
- Program manager
- Program coordinator
- Janitorial services
- Concession manager
- Cooks & servers
- Pro shop supervisor
- Reception clerks
- Store clerks

According to the ice plan study the expected direct spending resulting from SLIC will be $11,100,000 and total spending of $20,100,000. The proposed ice facility study addresses infrastructure and maintenance by setting aside funds for preventive maintenance activities, repairs, and maintenance expenses which also include all costs to keep the facility clean, safe and secure.

20. Minority and low-income populations.

The following information is provided by the US Census Bureau, 2015 American Community Survey 5-Year Estimates for 2011-2015 for the City of Maryland Heights:

Subject	Number
Population	27,401
Median Age	35.2
Racial Composition	
White	69.0 %
Black or African American	11.0 %
Asian	13.5 %
Hispanic/Latino	6.1 %
Median Household Income	$58,911
Persons Below the Poverty Level	9.0 %

The following information is provided by the US Census Bureau, 2015 American Community Survey 5-Year Estimates for 2011-2015 for St. Louis County:

Subject	Number
Population	1,001,327
Median Age	40.2
Racial Composition	
White	69.6 %
Black or African American	23.3 %

Asian	3.8 %
Hispanic/Latino	2.7 %
Median Household Income	$59,755
Persons Below the Poverty Level	10.9 %

The construction of SLIC will not negatively impact minorities or low income populations. The facility could provide some benefits by providing jobs.

21. Energy resources (geothermal, fossil fuels, etc.).

The current commitment of energy resources (mainly gasoline and diesel fuels) near the project site is related to vehicular access to Creve Coeur Lake Memorial Park. Energy use is influenced by park usage demand, which influences local traffic flow patterns.

Construction of the proposed project will require indirect consumption of energy for processing materials, construction activities, and maintenance and operation of the proposed facility. Energy consumption by vehicles in the area may increase during construction due to possible traffic delays.

The project includes provisions for improved bicycling and walking (Fee Fee Greenway Trail), thereby encouraging travel by these non-motorized and non-energy consuming modes of transportation.

The uniqueness of the SLIC and the recreational demand for it will increase the consumption of fossil fuels as more vehicles are driven to the site. The proposed project will increase fossil fuel consumption as determined by the following:

- Construction equipment (i.e. earth movers, dozers, loaders);
- Construction vehicles (i.e., delivery trucks, construction workforce);
- Operation of the site (i.e., HVAC equipment, ice chillers, electrical use); and
- Travel to and from the site by users of the facility.

The extent of energy use at the proposed site is not known; however, the increased energy consumption is expected to be minor.

22. Other agency or tribal land use plans or policies.

The Great Rivers Greenway District (GRG) and the City of Maryland Heights are currently beginning Phase II construction of the Fee Fee Greenway Trail, a multi-purpose trail that, as planned, will traverse a portion of the project area. GRG is a tax sponsored agency supported by the citizens of St. Charles and St. Louis Counties and the City of St. Louis. When complete, the trail will connect residential areas in Maryland Heights to the east of Creve Coeur Lake Memorial Park to the park.

SLCDPR will be constructing and managing a 13-field outdoor soccer complex about ½ of a mile west of the proposed SLIC. It is anticipated that this complex will be completed in 2017.

The City of Maryland Heights is currently seeking private development for over 1,800 acres known as the Maryland Park Lake District. As planned the area would include commercial, light industrial, residential and recreation development. This development is next to the proposed site.

23. Land/structures with history of contamination/hazardous materials even if remediated.

No known hazardous materials are known to occur on the project site. Upon review of historic aerial photos, no structures have been built or have existed on the site as far back as 1937. The site has been a mowed field and agricultural crop field since ownership by SLCDPR.

24. Other important environmental resources to address.

Other resources to address are not anticipated at this time.

Part B. Mandatory Criteria Explanations

B. MANDATORY CRITERIA If your LWCF proposal is approved, would it…	Yes	No	To be determined
1. Have significant impacts on public health or safety?		X	
2. Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation, or refuge lands, wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (E.O. 11990); floodplains (E.O 11988); and other ecologically significant or critical areas.		X	
3. Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources [NEPA section 102(2)(E)]?		X	
4. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?		X	
5. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?		X	
6. Have a direct relationship to other actions with individually insignificant, but cumulatively significant, environmental effects?		X	
7. Have significant impacts on properties listed or eligible for listing on the National Register of Historic Places, as determined by either the bureau or office.(Attach SHPO/THPO Comments)		X	
8. Have significant impacts on species listed or proposed to be listed on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species.		X	
9. Violate a federal law, or a state, local, or tribal law or requirement imposed for the protection of the environment?		X	
10. Have a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898)?		X	
11. Limit access to and ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007)?		X	
12. Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area, or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112)?		X	

2. Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation, or refuge lands, wilderness areas, wild or scenic rivers, national natural landmarks; sole of principal drinking water aquifers, prime farmlands; wetlands; floodplains; and other ecologically significant or critical areas.

The proposed project will impact the floodplain of Creve Coeur Creek. The project site is below the 100-year flood zone of Creve Coeur Lake and Creve Coeur Creek. To facilitate project construction, 24 acres of land will be elevated with two to five feet of fill so that the proposed facility is one foot above the 100-year flood. Even with that rise in elevation all of the roads leading to the facility will be inundated with a 100-year flood. The project area is a mowed field and does not exhibit high diversity or a high quality resource.

3. Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources?

The proposed project has raised concerns with some of the public in that it proposes to place a building on land that is currently open space within Creve Coeur Lake Memorial Park. However, as discussed previously, the land being considered for this project was not formerly used and is not actively being used for outdoor recreation. Other public entities and individuals have expressed their support of the project stating that it will provide more active recreation opportunities in Creve Coeur Lake Memorial Park and that some of this will be outdoor recreation. The project is also projected to increase the outdoor recreation experience throughout other areas of the park.

Recently the city of Maryland Heights announced it would entertain private development proposals on the Maryland Park Lake District which encompasses 1,800 acres near the project site. This development area is protected from floodwaters of the Missouri River with a 500-year levee. The city is weighing the effects of developing this land or leaving it for agriculture and open space.

4. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?

One of the issues of the proposed project is constructing the facility one foot above the 100-year flood of Creve Coeur Creek. There have been two recent 100-year floods in the vicinity of the project area leaving part of the site inaccessible for a brief period of time. There is concern that as more development occurs in the Creve Coeur Creek watershed, it could have cumulative effects on the 100-year floodplain and could contribute to additional flood concerns. However, all future development in this floodplain will need to meet the overall floodplain management plan as administered by the City of Maryland Heights, the organization that administers the flood insurance program for the Creve Coeur Creek floodplain. As previously stated, a stormwater management study was conducted by Stock & Associates Consulting Engineers, Inc. in March 2017 for the proposed ice center development. In a letter dated March 28, 2017 from Horner & Shifrin, the Howard Bend Levee District has granted approval of the project hydraulics as it relates to compensatory storage and compliance with the stormwater master plan.

5. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?

The proposed project could lead to future cumulative actions. However, the extent of these potential future effects is not known and cannot be determined.

6. Have a direct relationship to other actions with individually insignificant, but cumulatively significant, environmental effects?

The development of the proposed project will increase traffic on adjacent roadways through and adjacent to Creve Coeur Lake Memorial Park. The increase in traffic could have the following impacts:

- Increased congestion in the park;
- Reduced air quality;
- Increased noise; and
- Increased risk of vehicular accidents and public safety.

The proposed project is just south of Highway 141, a four-lane divided highway. The project site was chosen in part because of its close proximity to a major arterial highway in order to facilitate traffic flow and access. Highway 141 is the type of transportation facility that is consistent with a development such as the proposed SLIC.

8. Have significant impacts on species listed or proposed to be listed on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species.
Two federally and state endangered species (Indiana bat & Northern Long Eared bat) may occur adjacent to the project area and use the existing field to forage for insects. Some trees adjacent to the project area would provide roosting habitat for the bats during the summer months. No trees exist on the project site that would support any roosting habitat for bats. The extent of these species is yet to be determined; however, the project construction schedule will minimize potential adverse impact to these species consistent with current guidelines published by the United States Fish and Wildlife Service.

Environmental Reviewers

The following individual(s) provided input in the completion of the environmental screening form.

Steve Coates
Amec Foster Wheeler
NEPA Specialist

Karen Boulware
Amec Foster Wheeler
NEPA Specialist

Michael Roark
Geotechnology, Inc.
NEPA Specialist

The following individuals conducted a site inspection to verify field conditions.

Robin Ledford
Geotechnology, Inc.
Wetlands Biologist
April 13, 2017

Vince Warner
Amec Foster Wheeler
Archeologist
May/June 2017

ATTACHMENTS:

Attachment A – Site Development Plan

Attachment B – Project Location Map

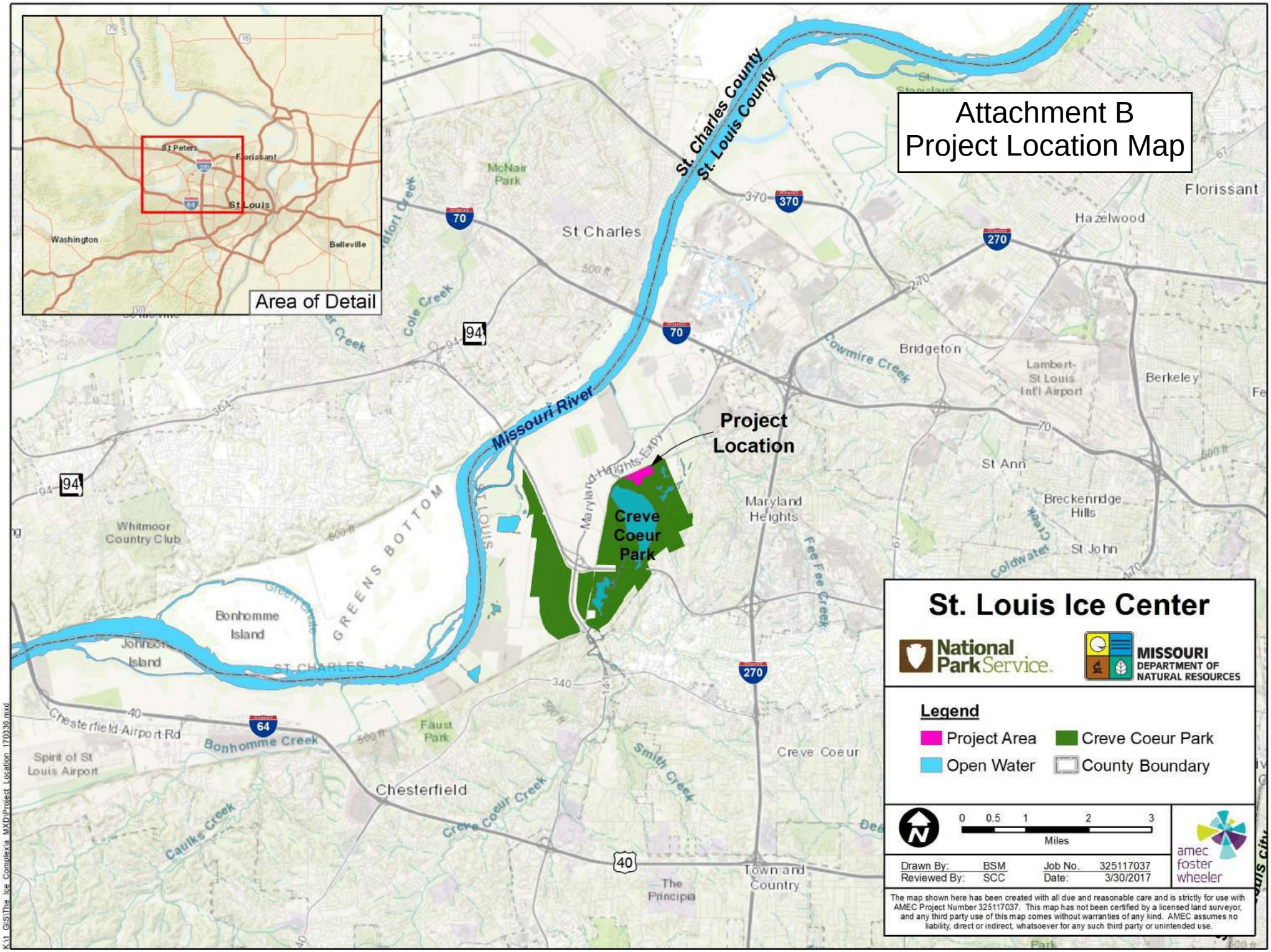
Attachment C – Proposed Ice Usage Breakdown

Attachment D – Wetlands

Attachment E – Project Rendering

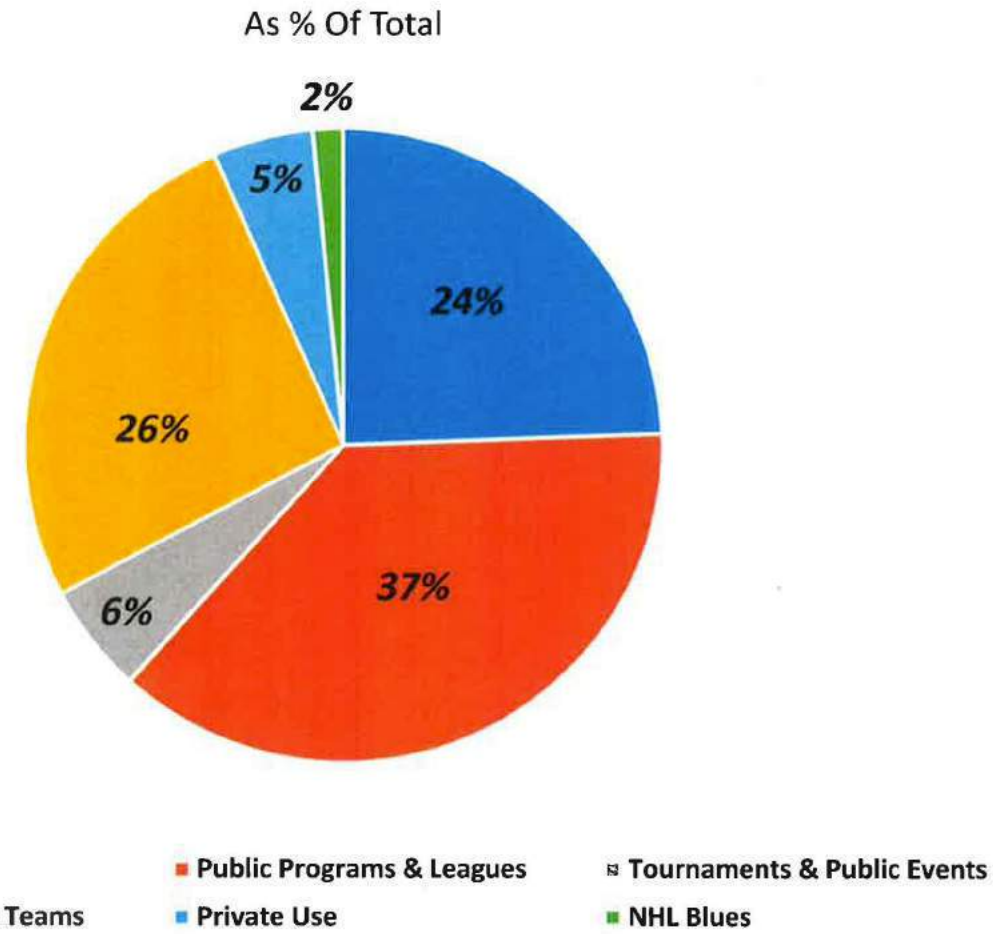
Attachment F – Existing Project Site Photos

Attachment A - Site Development Plan


Attachment B
Project Location Map
Area of Detail
St Peters
Florissant
St Louis
Washington
Belleville
St. Charles County
St. Louis County
Missouri River
Project Location
Creve Coeur Park
McNair Park
St Charles
Florissant
Hazelwood
Bridgeton
Lambert-St Louis Int'l Airport
Berkeley
St Ann
Maryland Heights
Breckenridge Hills
St John
Whitmoor Country Club
GREENS BOTTOM
Bonhomme Island
Johnson Island
ST CHARLES
Chesterfield Airport Rd
Spirit of St Louis Airport
Bonhomme Creek
Faust Park
Chesterfield
Creve Coeur Creek
Caulks Creek
Smith Creek
Creve Coeur
Town and Country
The Principia
Fee Fee Creek
Coldwater Creek
Cowmire Creek
Cole Creek
Maryland Heights Expy
St Louis
70
64
40
94
270
370
St. Louis Ice Center
National Park Service
MISSOURI DEPARTMENT OF NATURAL RESOURCES
Legend
Project Area
Creve Coeur Park
Open Water
County Boundary
0 0.5 1 2 3
Miles
Drawn By: BSM
Reviewed By: SCC
Job No. 325117037
Date: 3/30/2017
amec foster wheeler
The map shown here has been created with all due and reasonable care and is strictly for use with AMEC Project Number 325117037. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. AMEC assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.
K:\1_GIS\The_Ice_Complex\a_MXD\Project_Location_170330.mxd

Attachment C - Proposed Ice Usage Breakdown

Category	# Hours Used	As % Of Total	Description For Category
Open Public Use	2,956	24%	Public skating sessions, freestyle skating, learn-to-skate, learn-to-play, stick & puck and DRY FLOOR
Public Programs & Leagues	4,507	37%	Camps/clinics, Youth, high school and adult hockey leagues
Tournaments & Public Events	673	6%	Tournaments & showcases for figure skating, synchronized skating and ice hockey
Amateur & College Teams	3,170	26%	USHL and 5 teams from two universities with over 70% of ice used during off-peak M-F 8am-3pm
Private Use	614	5%	Disabled hockey, figure skating, synchronized skating and private teams/events
NHL Blues	185	2%	10am-12pm Monday through Friday off-peak (as needed) practice sessions during NHL season
TOTAL FACILITY HOURS	**12,105**		



Attachment D - Wetlands

NOTES

1. Plan adapted from 2015 aerial imagery courtesy of East-West Gateway Council of Governments and field reconnaissance performed by Geotechnology, Inc.

2. Site Features shown approximate only.

LEGEND

- Non-Jurisdictional Wetland
- Jurisdictional Forested Wetland
- Wetland Identified by Others

N

0 500 1,000

SCALE IN FEET

Drawn By: WAH	Ck'd By:	App'vd By:
Date: 4-14-17	Date:	Date:

GEOTECHNOLOGY INC
FROM THE GROUND UP

St. Louis Ice Center
Maryland Heights, Missouri

SITE LOCATION AND TOPOGRAPHY

Project Number J025325.02	PLATE 1

Attachment E - Project Rendering

Photo 1 – View to the east from the site. Taken from east of Marine Ave near the west end of the site.

Photo 2 – View to the northwest from the site. Taken from east of Marine Ave near the east end of the site.

Photo 3 – View to the northeast. Taken from east of Marine Ave near the middle of the site.

Photo 4 – View to the northeast. Taken from west of Marine Ave.

Appendix B

Traffic Impact Study

May 7, 2017

May 9, 2017

Mr. George Stock, PE
President
Stock & Associates Consulting Engineers, Inc.
257 Chesterfield Business Parkway
St. Louis, Missouri 63005

RE: Traffic Impact Study – Proposed Ice Complex
Marine Avenue near Route 141
Maryland Heights, Missouri
CBB Job Number 27-2017

Dear Mr. Stock:

As requested, CBB has prepared the following study to address the traffic impacts associated with a proposed Ice Complex, located on Marine Avenue near Missouri Route 141 in Maryland Heights, Missouri. **Figure 1** illustrates the general location of the proposed site relative to the surrounding area.

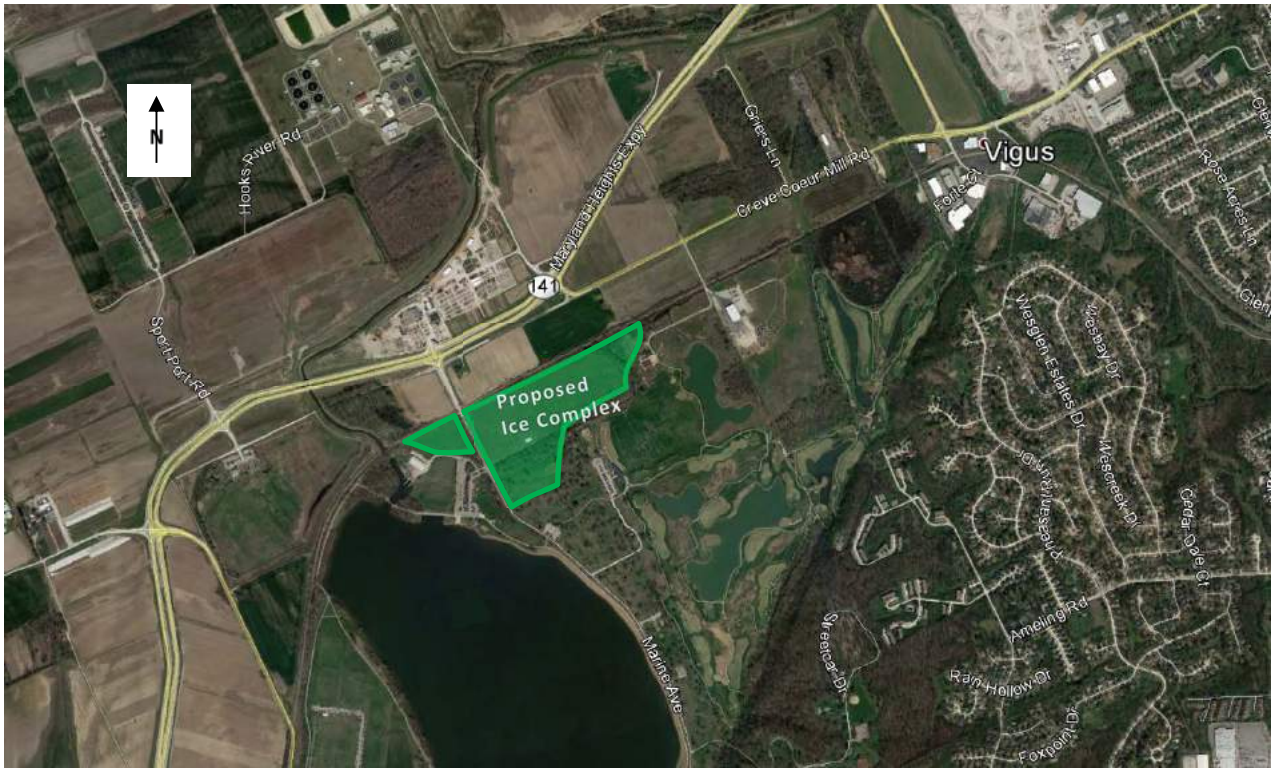


Figure 1: Site Location Map

It is our understanding that the proposed Ice Complex would have four sheets of ice. One rink would be a competition rink with a seating capacity of 3,500 seats. Two additional training rinks are proposed along with an outdoor rink for general recreational use.

Access to the Ice Complex is proposed via three entrances along the east side of Marine Avenue. The middle entrance would be opposite the existing "Sailboat Cove" entrance, with the other two entrances north and south of the "Sailboat Cove" entrance. An additional access is proposed on the west side of Marine Avenue, opposite the proposed north entrance, to serve a potential future overflow parking lot that would also connect to the existing Sailboat Cove parking lot. **Exhibit 1** illustrates the preliminary site plan provided.

This study was prepared in accordance with parameters discussed with the City of Maryland Heights, St. Louis County Department of Transportation (SLCDOT), and the Missouri Department of Transportation (MoDOT) in a meeting held at the initiation of the work. The purpose of this traffic impact study was to determine the number of trips that would be generated by the proposed Ice Complex; evaluate the impact of those trips on operating conditions along the adjacent roadways; determine the ability of motorists to safely enter and exit the site; and recommend appropriate access locations and configurations based on SLCDOT's Access Management Guidelines (AMG). Where necessary, roadway improvements and/or traffic control modifications were recommended to mitigate the impact of the development and promote safe access.

Based on the anticipated peak operating hours of the proposed Ice Complex, the focus of our analyses was the PM commuter peak hour of a typical weekday (4:00 to 6:00 PM) as well as the Saturday evening event peak hour (6:00 to 8:00 PM).

Existing Traffic Conditions

To identify the traffic impacts associated with the proposed ice complex, it was first necessary to quantify the existing roadway, traffic and operating conditions. To that end, an operational analysis of existing traffic volumes on the surrounding road system was performed.

Existing Roadways

Missouri Route 141 (Maryland Heights Expressway) is a north-south divided expressway with two through lanes in each direction plus separate left and right-turn lanes at the signalized intersections. Route 141 has a posted speed limit of 45 miles per hour (mph) within the study area. For the purposes of this study Route 141 will be referenced as a north-south roadway.

PARKING:

PROPOSED SITE (EAST OF MARINE)	= 880 SPACES
PROPOSED LOT "B" (WEST OF MARINE)	= 257 SPACES
TOTAL	= 1,137 SPACES

COMPENSATORY STORAGE:

REQUIRED FOR MAIN SITE (448.7 TO EX. GRADE)	= 994,313 c.f. OF VOLUME
REQUIRED FOR LOT B (450.4 TO EX. GRADE)	= 78,975 c.f. OF VOLUME
REQUIRED FOR TRAIL (BY OTHERS)	= 426,195 c.f. OF VOLUME

SITE DETENTION:

REQUIRED FOR SITE/PARKING:	= 300,000 c.f. OF VOLUME

TOTAL REQUIRED VOLUME:

COMPENSATORY STORAGE/DETENTION	= 1,799,483 c.f. OF VOLUME
TOTAL PROVIDED (ELEV. 449-442.75)	= 1,851,434 c.f. OF VOLUME

- ELEV. 442.75 IS BASED ON PIEZOMETER #9 AND #10 (HISTORICAL HIGH GROUND WATER ELEVATION)

MARYLAND HEIGHTS EXPRESSWAY

CREVE COEUR MILL ROAD (VARIABLE WIDTH) PUBLIC

N/F
THE HILDA COHEN FAMILY PARTNERSHIP LP
2001 CREVE COEUR MILL RD
DB. 12457, PG. 538

MARINE AVENUE (VARIABLE WIDTH) PUBLIC

MARINE AVENUE (60' w.) PUBLIC

UNION PACIFIC R.R. (formerly ST. LOUIS SOUTHWESTERN R.R.) (100' w.)

LAKE "B"
202,980 c.f. STORAGE VOLUME
(ELEV. 449.00 TO ELEV. 442.75)

STORM DISCHARGE PIPE SUBJECT TO HELD APPROVAL

EXISTING LOT LINE

LAKE "A"
1,466,734 c.f. STORAGE VOLUME
(ELEV. 449.00 TO ELEV. 442.75)
(NORMAL POOL ELEV. = 442.75)
(BTM ELEV. = 431)

AREA "C"
89,191 c.f. STORAGE VOLUME
(2.0'-3.0' DEEP)

WETLANDS TO REMAIN

'ST. LOUIS ICE CENTER'
TOTAL LOT AREA = 35.73 AC.
TOTAL PARKING EAST SIDE
MARINE AVE. = 875 SPACES

FF=453.50

FUTURE OUTDOOR ATHLETIC FIELD (SYNTHETIC TURF)

FUTURE PARKING LOT B (257 Spaces)

ADDRESS: 13777 MARINE AVE
ST. LOUIS, MO 63146

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

GENERAL NOTES:

1) Subject property lies within Flood Zone AE (Base flood elevations determined, Eelev.=449 & 450), Floodway areas within Zone AE, and Zone Shaded X (areas of 0.2% annual chance flood, areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas of less than 1 square mile, and areas protected by levees from the 1% annual chance flood) according to the National Flood Insurance Rate Map Number 29189C0176K with an effective date of February 4, 2015.

PLAN NOTES:

SITE IMPROVEMENTS ARE SHOWN FOR CONCEPTUAL PURPOSES ONLY. APPROVAL OF THIS GRADING PLAN DOES NOT CONSTITUTE APPROVAL OF PROPOSED SITE IMPROVEMENTS IN ANY FORM. PLANS TO BE SUBMITTED TO THE CITY OF MARYLAND HEIGHTS FOR REVIEW, APPROVAL AND PERMITTING PRIOR TO CONSTRUCTION OF ANY SITE IMPROVEMENTS SHOWN.

PROPOSED GRADING MAY NEED TO BE REVISED WITH FURTHER SITE IMPROVEMENT PLAN REVIEW. THIS IS INCLUSIVE OF ANY SITE WORK THAT IS PROPOSED WITHIN RIGHT-OF-WAY.

CONTRACTOR TO ADD TEMPORARY SAFETY FENCING AND SIGNAGE WHERE NECESSARY, OR REQUIRED BY ST. LOUIS COUNTY OR CITY OF MARYLAND HEIGHTS, TO PREVENT ACCESS FROM THE MCKELVEY WOODS TRAIL TO ST. LOUIS ICE CENTER SITE, OR VICE VERSA, UNTIL PROJECTS ARE COMPLETED AND OPEN FOR USAGE.

CONTRACTOR TO PROVIDE 48 HOURS ADVANCED NOTICE TO MATT MCGRATH WITH THE CITY OF MARYLAND HEIGHTS (mmcgrath@marylandheights.com) OR 314-738-2257 PRIOR TO COMMENCING ANY WORK ADJACENT TO, WITHIN OR THAT MAY IMPACT THE CITY'S MCKELVEY WOODS TRAIL - PHASE 2 PROJECT.

PREPARED BY:
STOCK & ASSOCIATES Consulting Engineers, Inc.
257 Chesterfield Business Parkway
St. Louis, MO. 63005 PH. (636) 530-9100 FAX (636) 530-9130
e-mail: general@stockassoc.com
Web: www.stockassoc.com

PROPOSED PLAN FOR:

ST. LOUIS ICE CENTER

13750 MARINE AVENUE
MARYLAND HEIGHTS, MISSOURI 63043

05/10/2017

GEORGE M. STOCK E-25116
CIVIL ENGINEER
CERTIFICATE OF AUTHORITY
NUMBER: 000996

REVISIONS:

1	4-14-2017 GRADING
1	5-10-2017 I-PLANS

DRAWN BY: T.P.S./J.M.B.	CHECKED BY: G.M.S.
DATE: 4-14-2017	JOB NO.: 216-5826.1
M.S.D. P #: ---	BASE MAP #: 13-P
S.L.C. H&T #:	H&T S.U.P. #:
M.D.N.R. #:	

SHEET TITLE:
OVERALL SITE PLAN

SHEET NO.:
C4.0

Creve Coeur Mill Road North, which intersects Route 141 to the north of the study area, is a major collector maintained by SCLDOT. Creve Coeur Mill Road North provides access to Baxter Farm & Nurseries and the Metropolitan St. Louis Sewer District (MSD) Missouri River Treatment Plant west of Route 141. Creve Coeur Mill Road east of Route 141 serves commercial and residential uses with a connection to McKelvey Road. The posted speed limit along Creve Coeur Mill Road North immediately east of Route 141 is 45 mph. An aerial view of the Route 141 and Creve Coeur Mill Road North/MSD intersection is shown in **Figure 2.**

Figure 2: Route 141 and Creve Coeur Mill Road North/MSD

Marine Avenue is a minor arterial serving Creve Coeur Park and residential areas east of the park with connections to Dorsett Road and the Westport area. Marine Avenue is a two-lane road through the park with a posted speed limit of 30 mph. Marine Avenue widens to provide a separate right-turn lane at its signalized intersection with Route 141. The west leg of the intersection also has a separate right-turn lane, which serves Schmittel's nursery. An aerial view of the Route 141 and Marine Avenue/Schmittel's nursery intersection is shown in **Figure 3.**

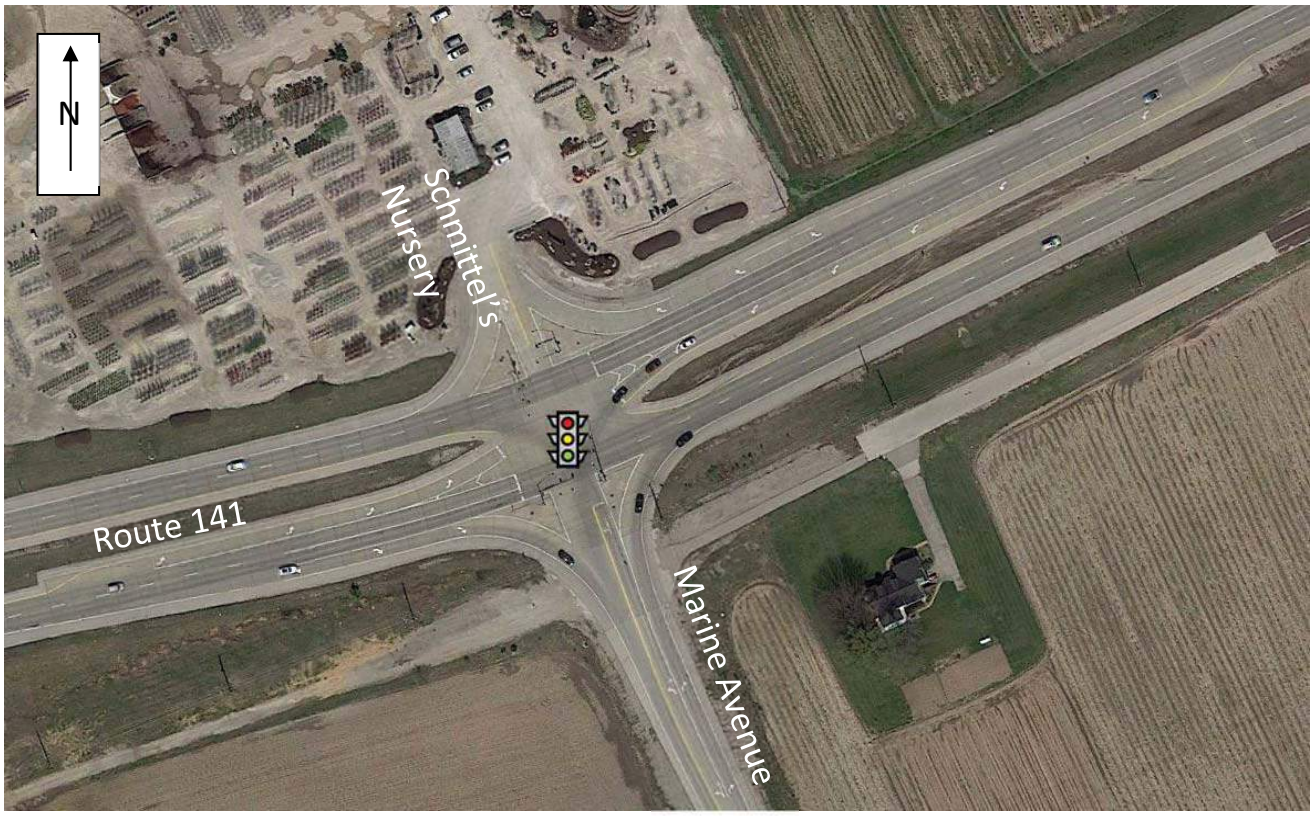


Figure 3: Route 141 and Marine Avenue/Schmittel's Nursery

Sportport Drive is a two-lane local road on the west side of Route 141 that provides access to Sportport, the City's 64-acre multi-purpose sports facility for soccer, rugby, lacrosse, field hockey, entertainment and recreational leagues. Golfport Drive comprises the east side of the intersection and serves a 27.7-acre golf instruction and driving range with athletic recreational facilities. Both approaches to Route 141 have a left-turn lane and a shared through/right-turn lane. An aerial view of the Route 141 and Sportport Drive/Golfport Drive is shown in **Figure 4.**

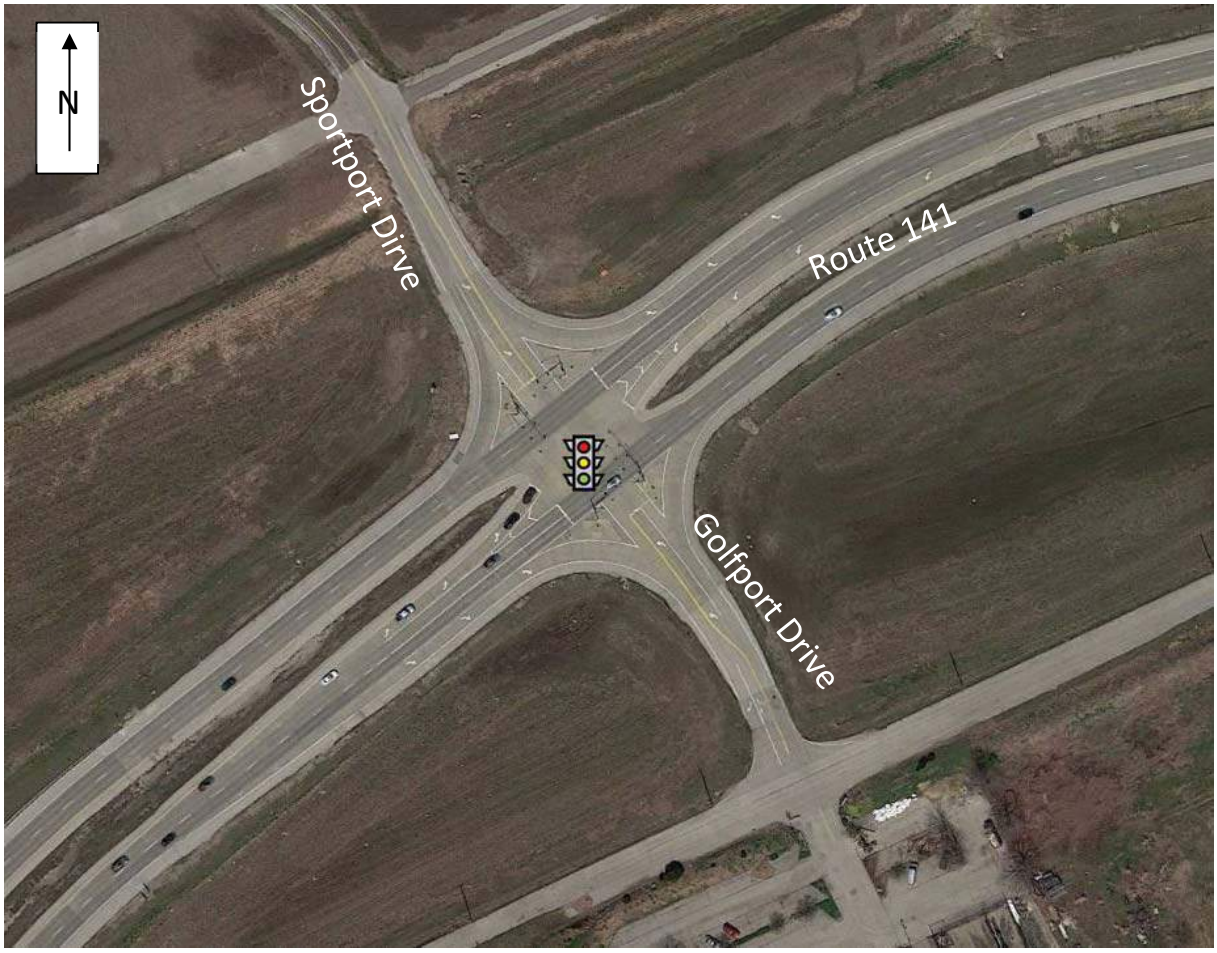


Figure 4: Route 141 and Sportport Drive/Golfport Drive

Creve Coeur Mill Road South intersects the east side of Route 141 opposite the access road for Creve Coeur Airport. Creve Coeur Mill Road South is a local road that provides access to Creve Coeur Park and a connection to Olive Boulevard. Airport Road provides access to Creve Coeur Airport and Thies Farm. Both approaches to Route 141 have a short left-turn lane and a shared through/right-turn lane. An aerial view of the Route 141 and Creve Coeur Mill Road South/Airport Road intersection is shown in **Figure 5.**

Figure 5: Route 141 and Creve Coeur Mill Road South/Airport Road

The traffic signals along Route 141 are part of a coordinated signal system that extends from near I-70 to the north to Route 364 (Page Avenue) to the south. All of the traffic signals operate with protected-only mainline left-turns off of Route 141. The east-west approaches to Creve Coeur Mill Road South/Airport Road, Sportport Drive/Golfport Drive, and Marine Avenue operate under a common phase, while the east/west approaches at Creve Coeur Mill Road North/MSD operate under split phase. The signals have a 100-second cycle length during the weekday PM peak hours and operate "free" after 6 PM on Saturday and Sunday.

The intersection of Marine Avenue and Dorsett Road is a 3-leg intersection controlled by a traffic signal. The eastbound approach of Dorsett Road provides separate left and right-turn lanes. The southbound approach of Marine Avenue provides a separate left-turn lane and one through lane. The northbound approach of Marine Avenue provides one through lane and a separate channelized right-turn lane. The southbound left-turn from Marine Avenue operates with a protected-plus-permitted phasing and the westbound right-turn from Dorsett Road operates with an overlap phase with the southbound left-turn. An aerial view of the Dorsett Road and Marine Avenue intersection is shown in **Figure 6.**

Figure 6: Dorsett Road and Marine Avenue

Existing Traffic Volumes

Manual turning movement counts were completed in March 2017 at the following signalized intersections along Route 141 during the weekday PM (4:00 to 6:00 PM) and Saturday evening event (6:00 to 8:00 PM) peak periods:

- Missouri Route 141 at Creve Coeur Mill Road North/MSD Entrance;
- Missouri Route 141 at Marine Avenue;
- Missouri Route 141 at Golfport/Sportport; and
- Missouri Route 141 at Creve Coeur Mill Road South/Airport Road.

SLCDOT provided a traffic count at the intersection of Dorsett Road and Marine Avenue for the PM peak hour and CBB collected a Saturday evening event count (6:00 to 8:00 PM) at Dorsett Road and Marine Avenue.

Traffic data revealed the peak hours to be from 4:30 to 5:30 PM for the PM commuter peak hour and 6:00 to 7:00 PM for the Saturday evening event peak hour. The existing peak hour traffic volumes are summarized in **Exhibit 2**. It was assumed to that 20 vehicles would enter and exit (10 left-turns and 10 right-turns) the Sailboat Cove Entrance during the PM peak hour.

Given the traffic characteristics in the study area and the anticipated trip generation for the proposed development, the peak periods identified would represent a "worst-case scenario" with regards to the traffic impact for the proposed ice rink. If traffic operations are acceptable during these peak hours, it can be reasoned that conditions would be acceptable throughout the remainder of the day.

Existing Operation Conditions

Existing operating conditions for the study intersections were evaluated using SYNCHRO 8, which is based on procedure outlined in the *Highway Capacity Manual* to determine estimates of capacity and operational performance of signalized and unsignalized intersections. Our traffic operations analysis includes measures of effectiveness generated by the SYNCHRO software.

The operating conditions were graded in accordance with six levels of traffic service (Level A "Free Flow" to Level F "Fully Saturated") established by the *Highway Capacity Manual*. Levels of service (LOS) area measures of traffic flow which consider such factors as speed, delay, traffic interruptions, safety, driver comfort, and convenience. Level C, which is normally used for highway design, represents a roadway with volumes ranging from 70% to 80% of its capacity. However, Level D is generally considered acceptable for peak period conditions in urban and suburban areas. **Table 1** summarizes the thresholds used in the analysis for signalized and unsignalized intersections.

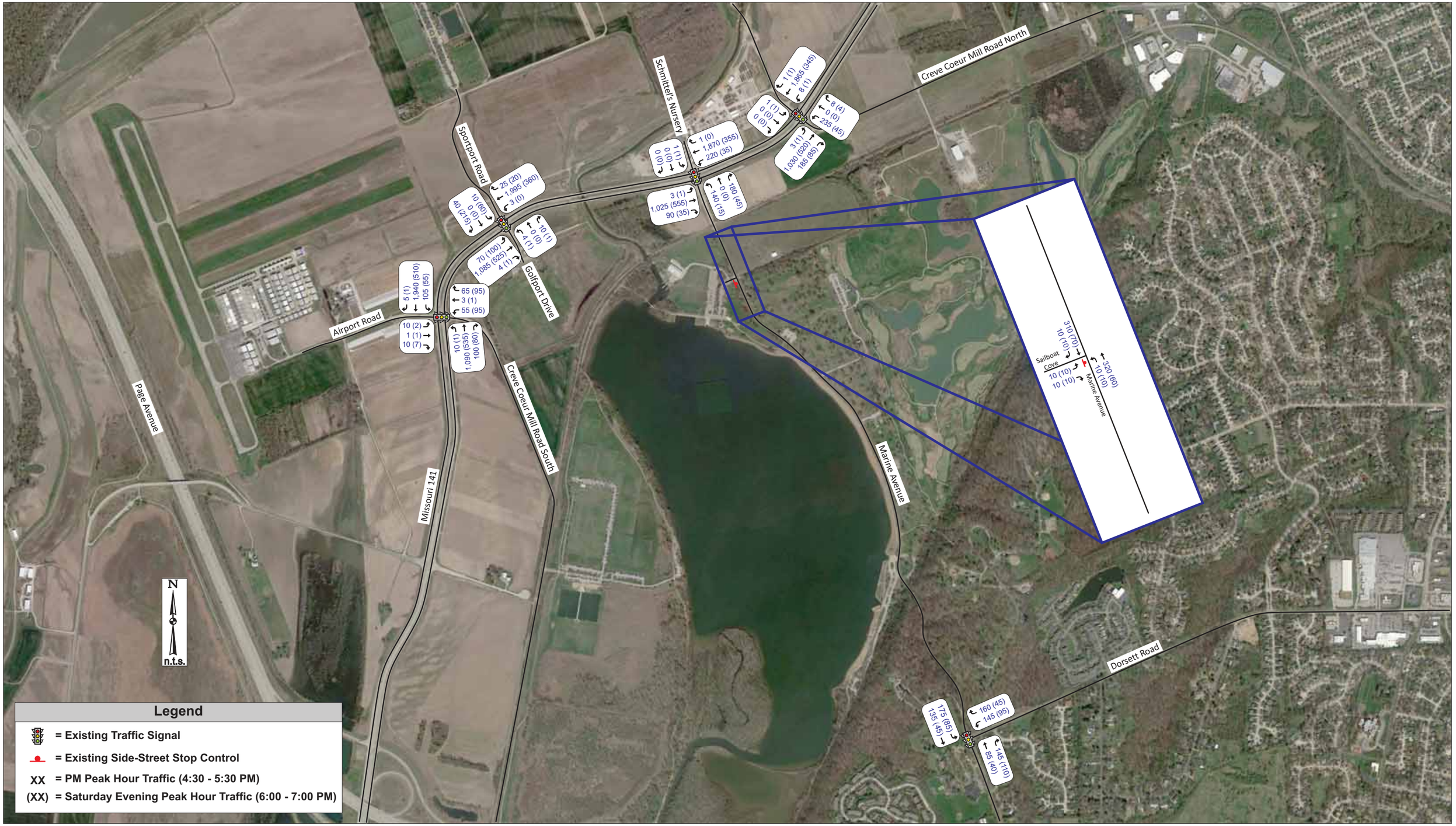


Exhibit 2: Existing Traffic Volumes

Job# 027-17
05/07/17

CBB TRANSPORTATION ENGINEERS+PLANNERS

Table 1: Level of Service Thresholds

Level of Service (LOS)	Control Delay per Vehicle (seconds/vehicle)	
	Signalized Intersections	***Unsignalized Intersections***
A	≤ 10	0-10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

The study intersections were evaluated using the methodologies described above. The results of the SYNCHRO evaluations are summarized in **Table 2**. All the study intersections currently operate at overall acceptable levels (LOS D or better) during the weekday PM and Saturday evening peak hours.

However, the westbound approach of Creve Coeur Mill Road North at Route 141 currently operates at LOS F during the weekday PM peak hour. Since the Creve Coeur Mill Road North approaches currently operate split phase and there are minimal westbound throughs or right-turns, the westbound through/right-turn lane could be re-striped/reassigned to accommodate a westbound shared left/through/right lane instead. Assuming this condition, the existing operating conditions for the westbound approach would improve to LOS C during the PM peak hour.

Additionally, the southbound left-turn movement from Route 141 to Marine Avenue currently operates at LOS F during the PM peak hour. This is due to the minimal amount of green time provided to serve the 220 left-turns during the PM peak hour. However, the southbound left-turn queues are generally short and contained within the storage bay currently provided.

The traffic volumes in the study area are significantly lower during the Saturday evening event peak hour. As such, the intersections operate at highly desirable levels during the Saturday evening event peak hour.

Table 2: Existing Operating Conditions

Traffic Movement	***Weekday PM Peak Hour***	***SAT Evening Event Peak Hour***
Route 141 at Creve Coeur Mill Road North/MSD (Signalized)		
Eastbound MSD Approach	B (16.1)	C (21.3)
Westbound Creve Coeur Mill Road North Approach	F (197.1)	B (19.7)
Northbound Route 141 Approach	B (15.9)	A (8.2)
Southbound Route 141 Approach	C (27.9)	A (8.6)
Intersection Overall	**D (35.8)**	**A (8.9)**
Route 141 at Marine Avenue/Schmittel's (Signalized)		
Eastbound Schmittel's Approach	C (35.0)	B (15.5)
Westbound Marine Avenue Approach	D (35.2)	A (6.2)
Northbound Route 141 Approach	A (6.4)	A (8.5)
Southbound Route 141 Approach	C (26.1) *Ave Queue = 145 LT* *95th Queue = 195 LT*	A (8.1) *Ave Queue = 30 LT* *95th Queue = 35 LT*
Intersection Overall	**C (20.7)**	**A (8.3)**
Route 141 at Sportport/Golfport (Signalized)		
Eastbound Sportport Approach	A (9.7)	A (5.2)
Westbound Golfport Approach	B (11.9)	B (8.5)
Northbound Route 141 Approach	A (2.4)	A (8.2)
Southbound Route 141 Approach	B (17.2)	B (14.9)
Intersection Overall	**B (11.8)**	**A (9.5)**
Route 141 at Creve Coeur Mill Road South/Airport Road (Signalized)		
Eastbound Airport Road Approach	C (33.7)	B (13.4)
Westbound Creve Coeur Mill Road South Approach	D (36.7)	B (15.0)
Northbound Route 141 Approach	A (7.9)	B (12.9)
Southbound Route 141 Approach	A (5.4)	B (10.2)
Intersection Overall	**A (7.6)**	**B (12.1)**
Dorsett Road at Marine Avenue (Signalized)		
Westbound Dorsett Road Approach	B (11.4)	B (11.9)
Northbound Marine Avenue Approach	B (10.4)	A (8.1)
Southbound Marine Avenue Approach	A (7.0)	A (5.4)
Intersection Overall	**A (9.5)**	**A (8.5)**
Marine Avenue at Sailboat Cove (Unsignalized)		
Eastbound Sailboat Cove Exit	B (12.4)	A (9.1)

X (XX.X) – Level of Service (Vehicular delay in seconds per vehicle)

Proposed Development

It is our understanding that the proposed Ice Complex would have 4 sheets of ice. One rink would be a competition rink with a seating capacity of 3,500 seats. Two additional training rinks are proposed along with an outdoor rink for general recreational use.

Site Access

Access to the Ice Complex is proposed via three entrances along the east side of Marine Avenue; the middle entrance would be opposite the existing "Sailboat Cove" entrance, another is proposed approximately 360 feet south of the middle entrance and a third entrance is proposed approximately 500 feet north of the middle entrance. In addition, an access on the west side of Marine Avenue is also proposed to serve a 257-space overflow parking lot opposite the north entrance. The potential future overflow lot would also connect to the existing Sailboat Cove parking lot.

Proposed Driveway Spacing

The proposed driveway locations were reviewed with respect to agency access management guidelines and preferences. The proposed driveways spacing and corner clearances along Marine Avenue for the Ice Complex were evaluated using the *St. Louis County's "Access Management Guidelines"* (AMG), last updated in 2008.

St. Louis County's AMG specifies a minimum corner clearance of 660 feet for non-residential driveways from the nearest principal arterial road (Route 141), measured from the edge of the public roadway to the edge of the driveway. The proposed north access drive will provide approximately 800 feet of corner clearance from Route 141 which meets St. Louis County's AMG guidelines for corner clearance.

For driveways spacing along a minor arterial or collector street (Marine Avenue), the AMG specifies a minimum of 460 feet between non-residential driveways. The driveway spacing is measured edgeline to edgeline. St. Louis County's AMG also recommends that "Driveways should also be lined up across the public roadway from each other whenever possible".

Based on the preliminary site plan, the middle driveway is proposed opposite the Sailboat Cove Driveway; a north driveway is proposed approximately 500 feet north of Sailboat Cove/middle access drive; and a south driveway is proposed approximately 300 feet south of the Sailboat Cove/middle access drive.

Based on St. Louis County's AMG, the proposed south driveway would not meet the minimum driveway spacing requirement since the proposed spacing (300 feet) is less than the recommended spacing (460 feet). Based on the site and parking layout, it is anticipated that the middle access drive would be less utilized than the north or south drives. The north

entrance is expected to serve a majority of the traffic to/from Route 141, while the south entrance is expected to serve most of the traffic to/from the southeast on Marine Avenue.

Additionally, the ice rink is an event based land use that will have a large amount of traffic entering or exiting the facility in a short amount of time, especially during the Saturday evening event peak hour. Providing the three proposed entrances will help to disperse traffic to multiple access points instead of concentrating the event traffic at two locations. The three proposed driveways are not anticipated to be problematic from a traffic and operations perspective.

Trip Generation

Trip generation forecasts were prepared to estimate the amount of traffic that the proposed development would generate during each peak period. The trip forecasts for the Ice Complex were estimated based on the user's anticipated usage of the Ice Complex. The trips generated by the facility during the PM peak hour are expected to be the competition rink participants, some public skate and some spectators to watch practices. The owner expects approximately 120 inbound trips and 60 outbound trips during the typical weekday PM peak hour.

The Ice Complex expects to accommodate a competition team that would have at most 32 games from September to April. Games would typically be held on Saturday evenings or Sunday afternoons. The larger games where the team would play another major amateur USHL team could draw up to 3,000 visitors to the Ice Complex. The owner expects about three spectators per vehicle on average for the games. Thus, these major games could generate 1,000 inbound trips before game time. To be conservative, it was also assumed that 100 trips would leave the facility from the general public skate rink.

The trip generation estimate for the Ice Complex is summarized in **Table 3**. As shown, it is estimated that the Ice Complex would generate 180 vehicular trips during the weekday PM peak hour and up to 1,100 trips during the Saturday evening peak hour when there is an event.

Table 3: Trip Generation – Maryland Heights Ice Complex Development

Land Use	*Units*	*Weekday PM Peak Hour*			*Saturday Evening Event Peak Hour*		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Trip Generation Based on anticipated operating conditions							
Ice Complex (custom)*	4 Sheets of Ice	120	60	180	1,000	100	1,100

*Custom Trip Generation Based on anticipated operations

Trip Distribution

The traffic generated by the Ice Complex were assigned to the adjoining roadway system based on existing and projected traffic patterns, as well as the proposed access points for the site. The anticipated directional distribution during the PM and Saturday evening event peak hours would be as follows:

- 55% to/from the South on Route 141;
- 40% to/from the North on Route 141; and
- 5% to/from the east on Marine Avenue/Dorsett Road.

The trip distribution was applied to the site-generated traffic volumes and assigned to the roadways, as shown in **Exhibit 3**.

The Ice Center site-generated trips (Exhibit 3) were added to the existing traffic volumes (Exhibit 2) to reflect the 2017 Build Traffic Volumes for the weekday PM peak and Saturday evening event peak hours as shown in **Exhibit 4**.

As can be seen in Exhibit 4, the peak volumes for the proposed ice complex are relatively small during the PM peak when traffic volumes along Route 141 are larger. Conversely, the ice complex will generate the most traffic on a Saturday evening event peak hour when the traffic flows along Route 141 and Marine Avenue are significantly lower when compared to the commuter peak hours. Furthermore, the proposed events would occur during the winter season, when the park is utilized the least.

Auxiliary Turn Lane Warrants

The need for separate turn lanes at the proposed intersections along Marine Avenue was compared to turn lane criteria using the St. Louis County's AMG. This guideline considers auxiliary lanes an asset in promoting safety and improved traffic flow at relatively high conflict locations. Separate turn lanes are intended to remove turning vehicles from the through lanes to reduce the potential number of rear-end collisions at intersections. Nonetheless, turn lanes are not typically required for low turning volumes, less than 10 vehicles per hour (vph).

2017 Build Condition Left-Turn Lanes Evaluation: The St. Louis County left-turn lane evaluation method compares the total advancing volume (which includes all turning traffic) to the total opposing volume during the design hour with respect to the number of percentage of left-turns for a given posted speed. The need for separate left-turn lanes along Marine Avenue were evaluated using the *St. Louis County's Left-Turn Lane Guideline for Two-lane Road <= 40 mph*.

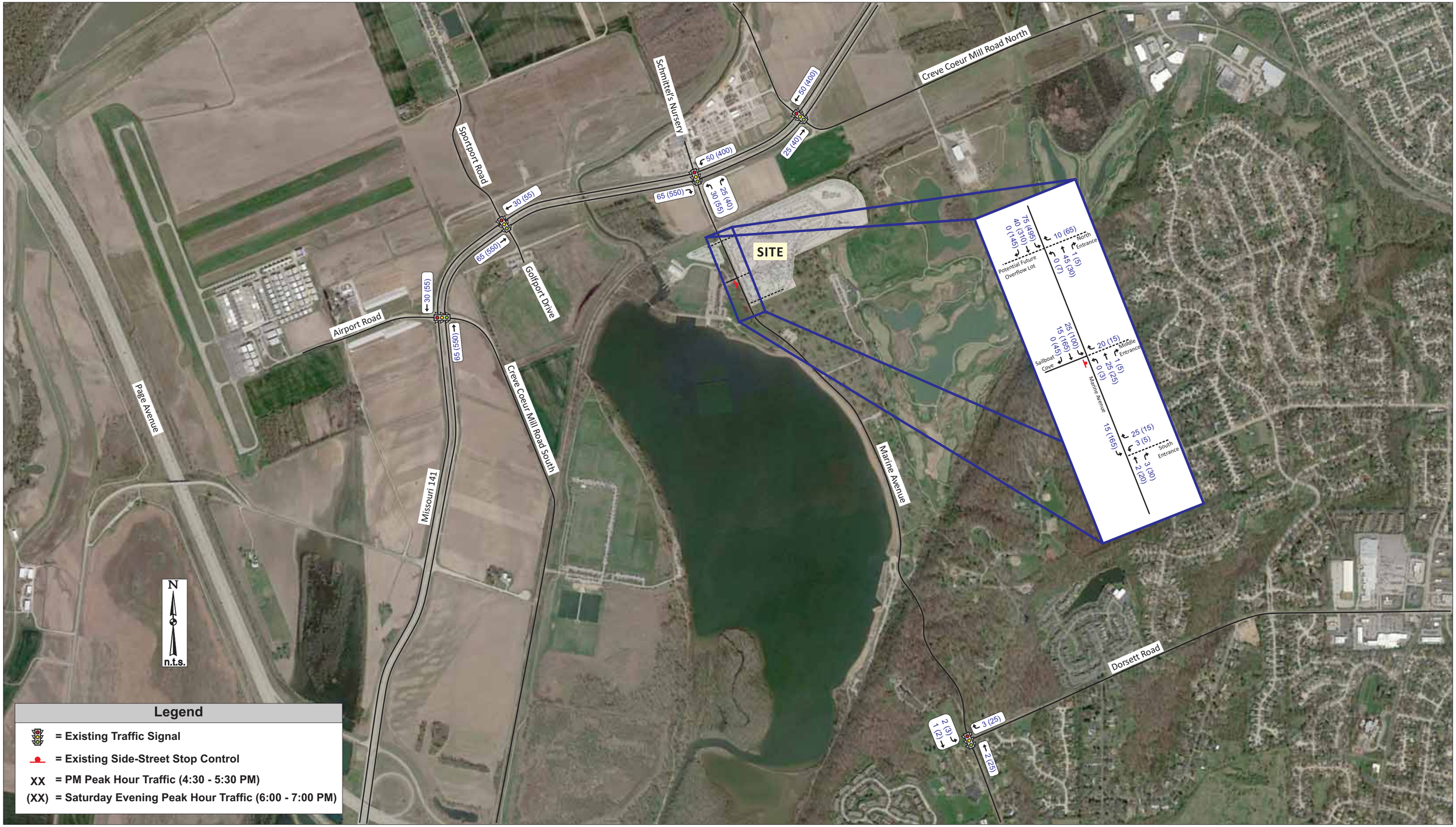


Exhibit 3: Site-Generated Traffic Volumes

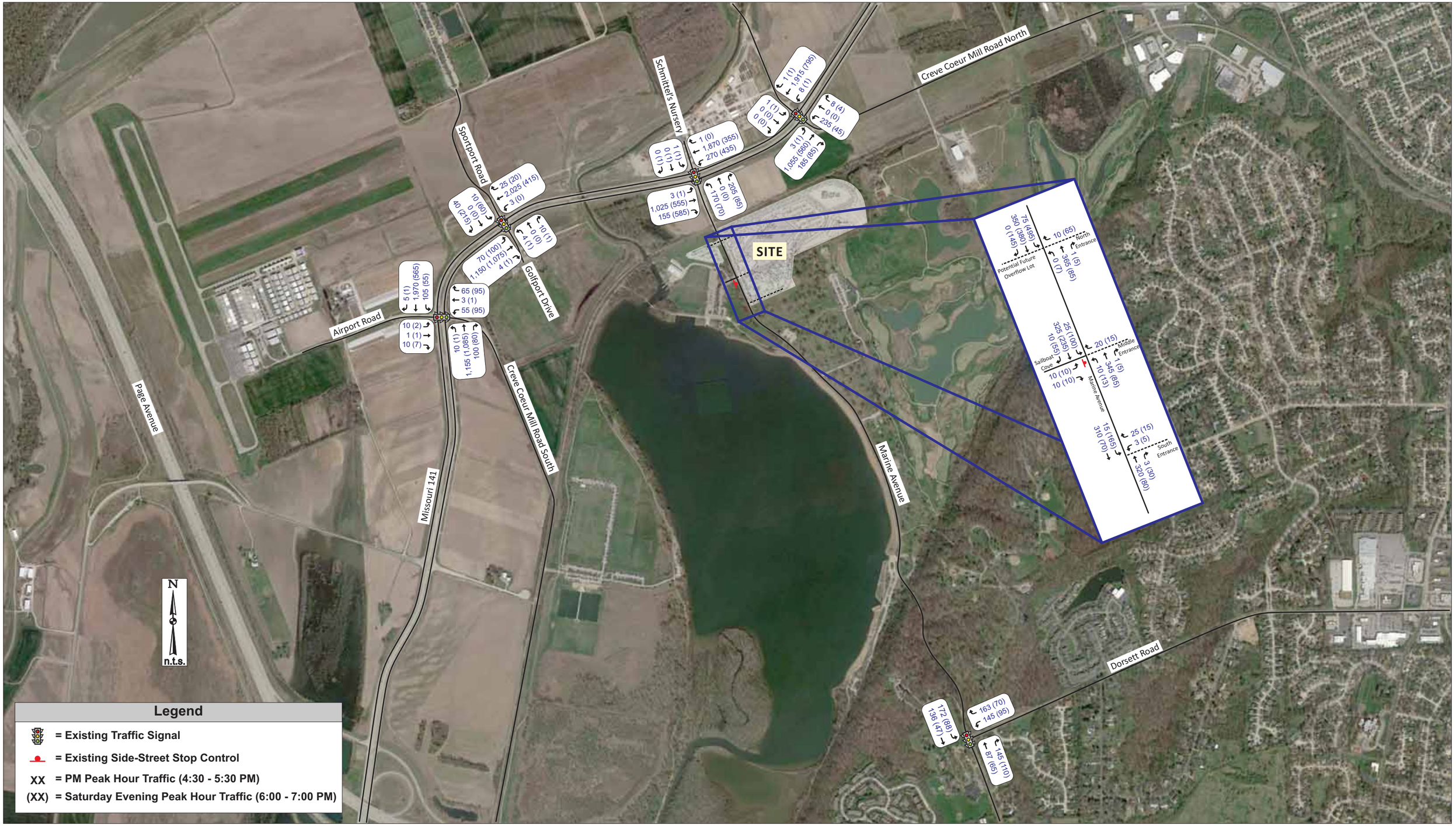


Exhibit 4: 2017 Build Traffic Volumes

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Figure 2 illustrates left-turn evaluation using the 2017 Build Traffic Volumes during the weekday PM peak hour and Saturday evening event peak hour for southbound Marine Avenue at the proposed north entrance. The mainline left-turn percent along Marine Avenue at the proposed north entrance is forecasted to be approximately 18% during the weekday PM peak hour and approximately 49% during the Saturday evening event peak hour. As shown in Figure 2, a separate left-turn lane is warranted on Marine Avenue at the proposed north entrance during both the weekday PM and Saturday peak hours.

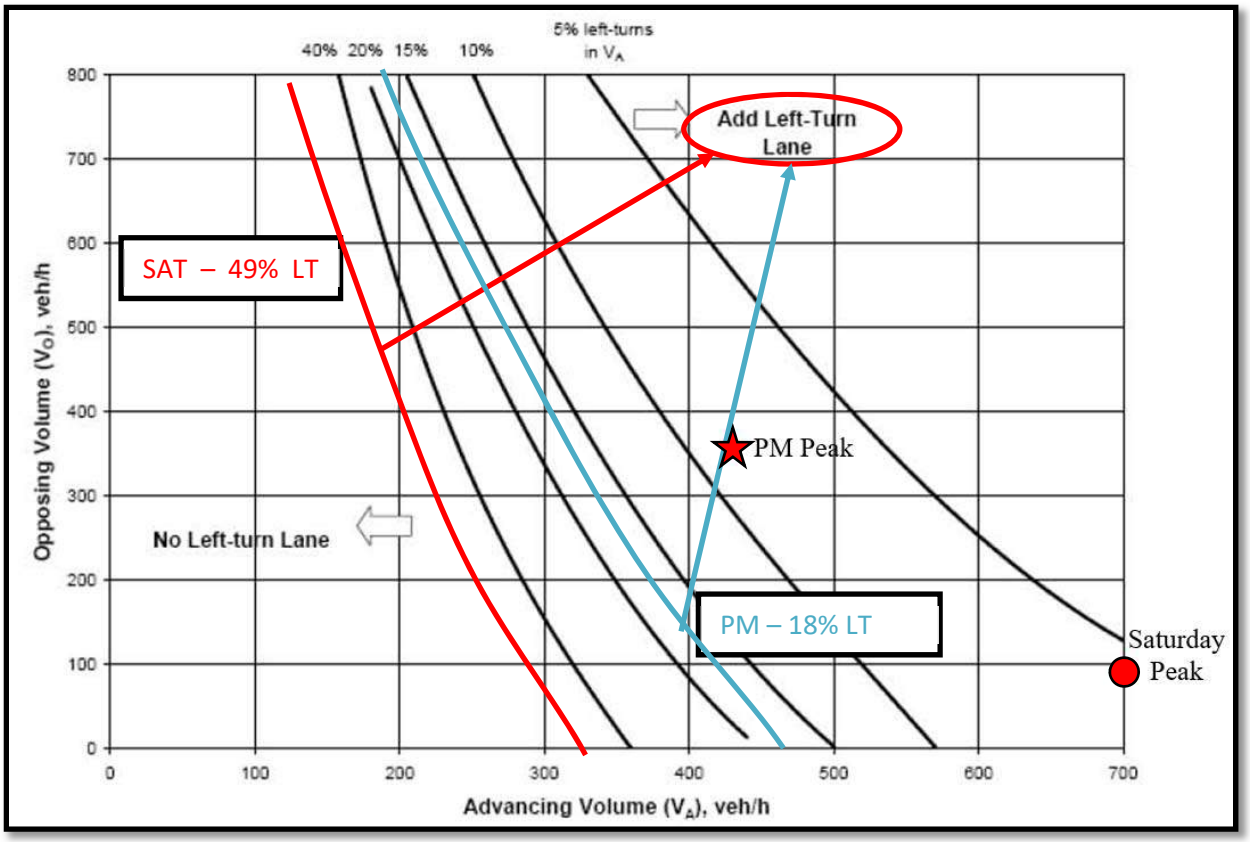

Figure 2: Left-Turn Lane Needs Evaluation - 2017 Build Traffic Volumes
Southbound Marine Avenue at Proposed North Entrance

Figure 3 illustrates the left-turn evaluation using the 2017 Build Traffic Volumes during the weekday PM and Saturday evening event peak hours for southbound Marine Avenue at the proposed middle entrance (opposite Sailboat Cove). The mainline left-turn percent along Marine Avenue at the proposed middle entrance is forecasted to be approximately 7% during the PM peak hour and approximately 26% during the Saturday evening event peak hour. As shown in Figure 3, a separate left-turn lane is warranted on Marine Avenue at the proposed middle entrance during the Saturday evening event peak hour.

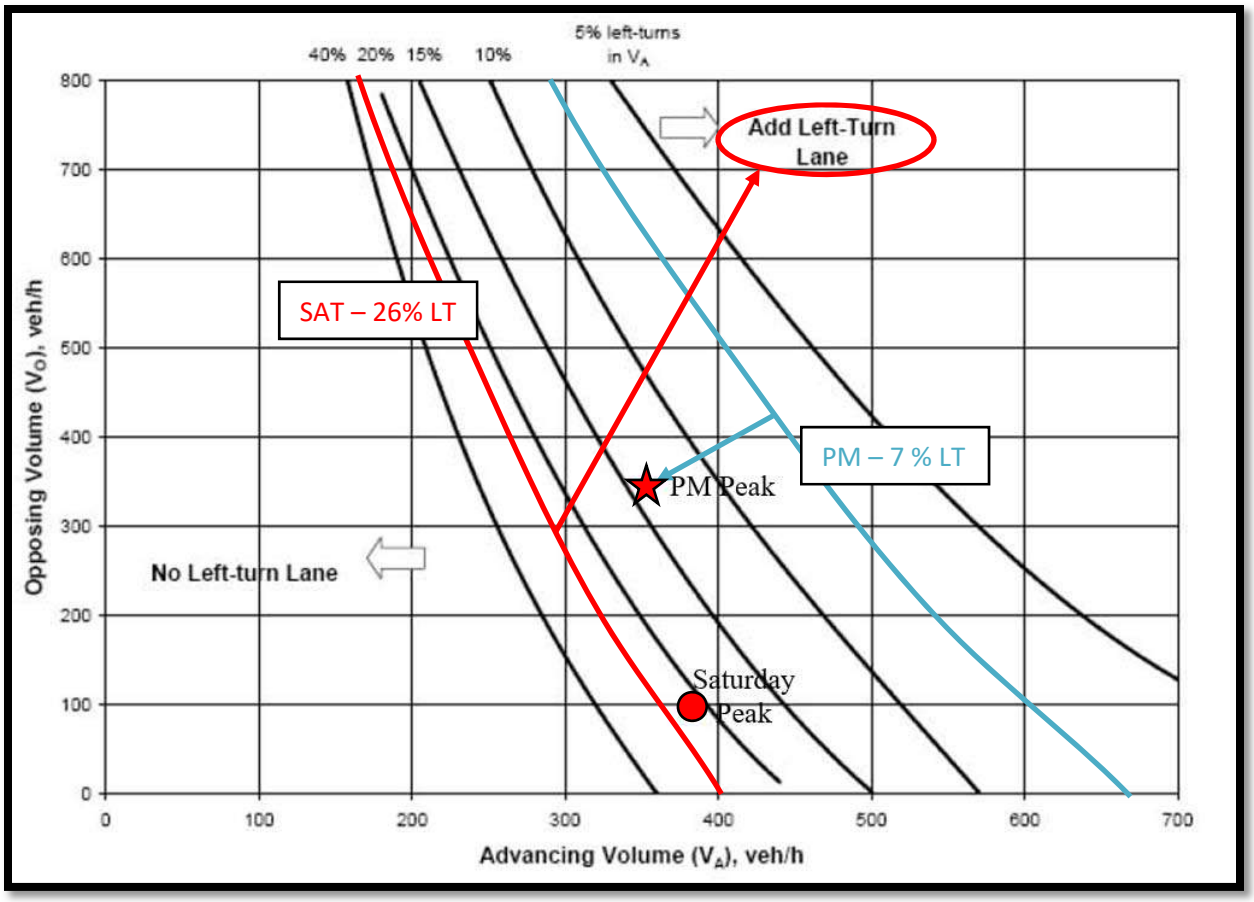

Figure 3: Left-Turn Lane Needs Evaluation - 2017 Build Traffic Volumes
Southbound Marine Avenue at Proposed Middle Entrance

Figure 4 illustrates the left-turn evaluation using the 2017 Build Traffic Volumes during the weekday PM and Saturday evening event peak hours for southbound Marine Avenue at the proposed south entrance. The mainline left-turn percent along Marine Avenue is forecasted to be approximately 5% during the weekday PM peak and approximately 70% during the Saturday evening event peak hour. As shown in Figure 4, a separate left-turn lane is warranted on Marine Avenue at the proposed south entrance during the Saturday evening event peak hour.

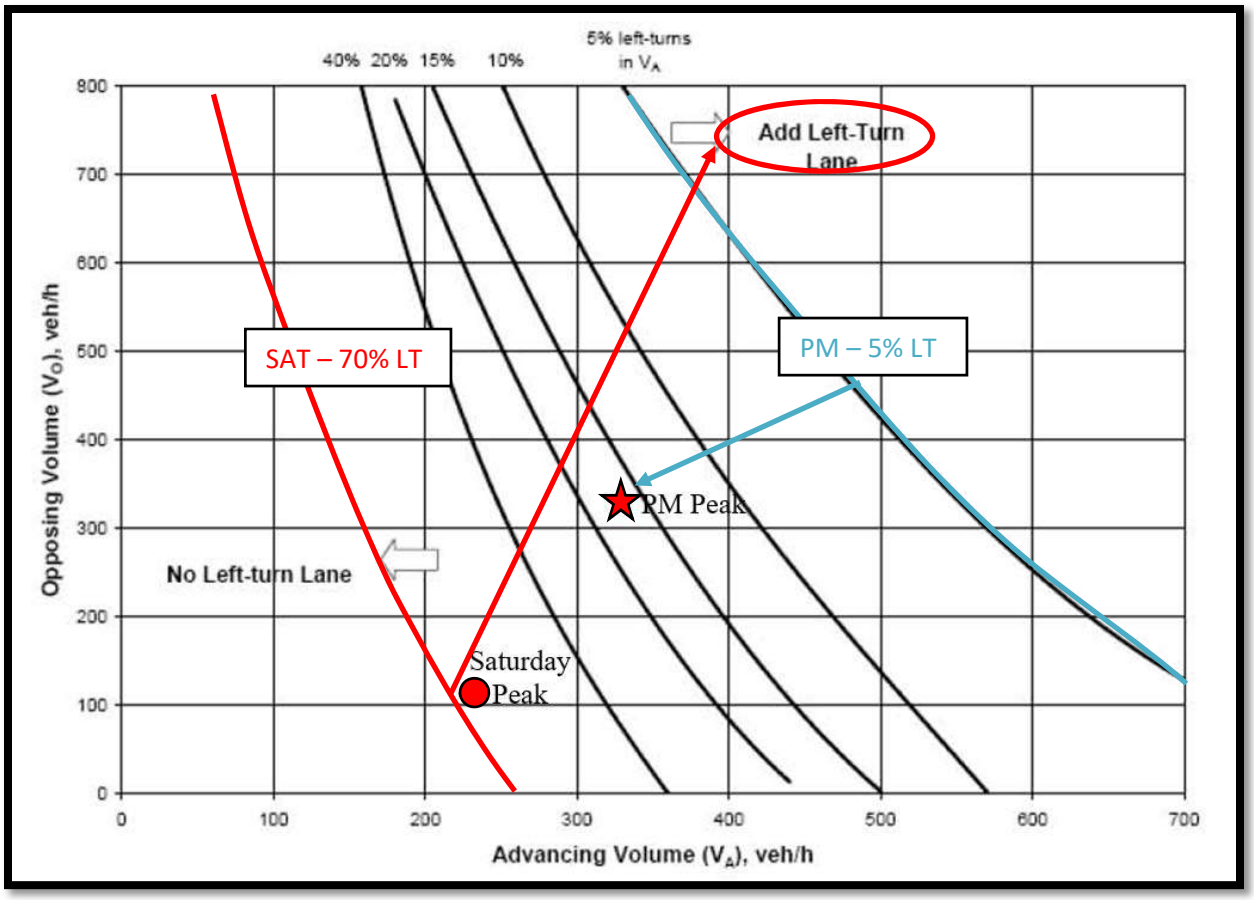

Figure 4: Left-Turn Lane Needs Evaluation - 2017 Build Traffic Volumes
Southbound Marine Avenue at Proposed South Entrance

2017 Build Condition Right-Turn Lanes Evaluation: The St. Louis County method provides volume guidelines for the consideration of separate right-turn lanes by comparing the total advancing volume (which includes all turning traffic) to the number of right-turns during the design hour with respect to a given major road speed.

The need for right-turn lanes on Marine Drive was evaluated using *Figure 7.2.2 Right Turn Lane Guideline for Two-lane Roadway*. It should be noted that a right-turn lane is not needed for a right-turn volume less than 10 vph.

The 2017 Build Traffic Volumes were compared to the right-turn lane warrants. The right-turn volumes during the weekday PM peak hour are forecasted to be less than 10 vph at all the proposed entrances; therefore, separate right-turn lanes would not be warranted at the entrances during the PM peak hour.

The northbound right-turns are forecasted to be 30 vph at the proposed south entrance and less than 10 vph at the proposed middle and north entrances, with the northbound through volumes along Marine Avenue forecasted to be less than 100 vph during the Saturday evening event peak hour. Based on these low volumes, northbound right-turn lanes are not needed at the proposed entrances along Marine Avenue.

The southbound right-turns from Marine Avenue to the Sailboat Cove Entrance and to the potential future overflow lot opposite the proposed north entrance are only expected to be utilized a few times a year (during a major amateur USHL game with a packed house) assuming the potential future overflow lot is built. As noted above, separate left-turn lanes are warranted for all the entrances so the left-turn volume should be removed from the advancing volume. The southbound right-turns are forecasted to be 55 to 145 vph for a packed house assuming the potential future overflow lot is built. As a result, it does not appear practical to provide a separate right-turn lane to serve 145 vehicles a few days a year, if the overflow lot is built.

Based on the preceding analysis, there is a need to provide separate left-turn lanes at each of the proposed entrances. Based on the distance between the entrances, a three-lane cross section is recommended along Marine Avenue (one lane in each direction plus a two-way left-turn lane) between the proposed south entrance to the proposed north entrance.

2017 Build Traffic Analysis

The 2017 Build Traffic Volumes (Exhibit 4) were analyzed using the same methodology applied to the existing traffic volumes to identify the traffic impacts of the proposed Ice Complex. Results of the SYNCHRO evaluations for the 2017 Build Traffic operating conditions are summarized in **Table 4**. The recommended left-turn lanes along Marine Avenue at all proposed entrances were included in these evaluations.

It must be acknowledged that the traffic during the Saturday evening event peak will have event-based traffic patterns. That is to say, a majority of patrons will arrive and depart within a relatively short period of time before and after the scheduled event. The intersection of Route 141 and Marine Avenue would be impacted the most by the event traffic. To account for concentrated traffic entering the event, the Peak Hour Factor (PHF) for the northbound right-turn from Route 141 to Marine Avenue and the southbound left-turn from Route 141 to Marine Avenue was decreased to a PHF of 0.75 during the Saturday evening event peak hour.

The operating conditions summarized in Table 4 include the modified PHF at the intersection of Route 141 and Marine Avenue during the Saturday evening event peak hour. It should be noted that the operating conditions summarized in Table 4 represents the operating conditions during the worst 15-minutes. Moreover, it may be difficult to obtain acceptable these levels of service and short queue lengths during these arrival/dismissal peak times since the event style traffic floods the intersection for a short time after which demand is significantly reduced.

Typically, it is not feasible to provide adequate capacity for event traffic to operate at normal levels of service during the peak arrival and dismissal hours. Infrastructure needs for churches, stadiums, auditoriums, and to a lesser extent, schools and universities are more often based on total duration of loading and unloading the site's parking facilities in addition to maintaining safe operating conditions on the public roadway.

As shown in Table 4, the 2017 Build operating conditions of all intersections within the study area are expected to operate at overall acceptable levels (LOS D or better) during both the PM and Saturday evening event peak hours, except the westbound approach of Creve Coeur Mill Road North during the PM peak hour, which could be improved by lane reassignment as discussed in the existing conditions. The poor westbound approach is an existing condition and the additional traffic from the proposed ice complex it not expected to have an impact on the westbound approach during the PM peak hour.

As previously noted, the southbound left-turn movement from Route 141 to Marine Avenue currently operates at less than desirable levels during the PM peak hour and the additional southbound left-turns would exacerbate those conditions. Small signal timing adjustments, a reallocation of 6 seconds of green time from the northbound throughs to southbound left-turns during the PM peak hour, would improve southbound left-turn levels of service and queues with negligible impacts to delays, operation and progression for northbound Route 141.

Table 4: 2017 Build Traffic Operating Conditions

Traffic Movement	***Weekday PM Peak Hour***	***SAT Evening Event Peak Hour***
Route 141 at Creve Coeur Mill Road North/MSD (Signalized)		
Eastbound MSD Approach	D (43.0)	C (26.0)
Westbound Creve Coeur Mill Road North Approach	F (194.6)	C (22.4)
Northbound Route 141 Approach	B (15.6)	A (8.4)
Southbound Route 141 Approach	C (28.8)	A (8.9)
Intersection Overall	**D (35.8)**	**A (9.2)**
Route 141 at Marine Avenue/Schmittel's (Signalized)		
Eastbound Schmittel's Approach	C (35.0)	D (47.5)
Westbound Marine Avenue Approach	D (38.5)	C (40.3)
Northbound Route 141 Approach	A (6.3)	C (32.5)
Southbound Route 141 Approach	D (35.8) *Ave Queue = 225 LT* *95th Queue = 270 LT*	C (33.4) *Ave Queue = 405 LT* *95th Queue = 540 LT*
Intersection Overall	**C (26.6)**	**C (33.4)**
Route 141 at Sportport/Golfport (Signalized)		
Eastbound Sportport Approach	A (9.7)	A (5.6)
Westbound Golfport Approach	B (11.9)	A (9.5)
Northbound Route 141 Approach	A (2.3)	A (9.4)
Southbound Route 141 Approach	B (18.0)	B (14.6)
Intersection Overall	**B (12.1)**	**B (10.0)**
Route 141 at Creve Coeur Mill Road South/Airport Road (Signalized)		
Eastbound Airport Road Approach	C (33.7)	B (19.5)
Westbound Creve Coeur Mill Road South Approach	D (36.7)	C (22.4)
Northbound Route 141 Approach	A (8.6)	B (16.4)
Southbound Route 141 Approach	A (5.7)	A (9.6)
Intersection Overall	**A (8.0)**	**B (14.9)**
Dorsett Road at Marine Avenue (Signalized)		
Westbound Dorsett Road Approach	B (11.3)	B (11.0)
Northbound Marine Avenue Approach	B (10.5)	A (9.1)
Southbound Marine Avenue Approach	A (7.0)	A (5.3)
Intersection Overall	**A (9.5)**	**A (8.7)**
Marine Avenue at Sailboat Cove/Middle Entrance (Unsignalized)		
Eastbound Sailboat Cove Exit	B (11.6)	B (11.3)
Westbound Proposed "Middle" Access Exit	B (10.5)	A (8.8)
Marine Avenue at North Entrance/Potential Future Overflow lot (Unsignalized)		
Eastbound Proposed Lot "B" Exit	A (1.0)	A (1.0)
Westbound Proposed "North" Access Exit	B (10.7)	A (9.1)
Marine Avenue at South Entrance (Unsignalized)		
Westbound Proposed "South" Access Exit	B (10.5)	A (9.6)

X (XX.X) – Level of Service (Vehicular delay in seconds per vehicle)

Table 5 summarizes the operations at the Route 141 to Marine Avenue intersection assuming the signal timing reallocation.

Table 5: 2017 Build Traffic Operating Conditions with Signal Adjustment

Traffic Movement	***PM Peak Hour*** [1]
Route 141 at Marine Avenue/Schmittel's (Signalized)	
Eastbound Schmittel's Approach	C (35.0)
Westbound Marine Avenue Approach	D (38.5)
Northbound Route 141 Approach	A (8.9)
Southbound Route 141 Approach *Southbound Left-Turn*	C (24.7) *Ave Queue = 165 LT* *95th Queue = 205 LT*
Intersection Overall	**C (21.1)**

[1] 6 seconds reallocated from northbound through to southbound left-turn

The left-turn is expected to operate at acceptable levels during the Saturday evening event peak hour, but long queues are expected based on the heavy peak hour factor. The 95th percentile queue for the southbound left-turn is expected to be 540 feet during the Saturday evening event peak hour, but has an existing storage bay of approximately 590 feet; therefore, the storage bay has adequate capacity to accommodate the Saturday evening event traffic.

Based on the above evaluations, the additional traffic generated by the proposed Ice Complex could be accommodated with some minor signal timing modifications during the PM peak hour as well as the addition of separate left-turn lanes along Marine Avenue between the proposed entrances.

20-Year Traffic Analysis (2037)

To assist the agencies with their long-term traffic plan, background linear traffic growth was used to develop 20-year traffic volume projections for the "design year". An annual growth rate of 0.5% was applied to the roadways within the study area.

2037 No-Build (Existing Plus 20 years of Background Growth) Traffic Volumes

The 2037 No-Build Traffic Volumes include an annual growth rate of 0.5%, which represents a global increase of approximately 10.5% over the existing conditions through the 20-year period. The 2037 No-Build Traffic Volumes for the weekday PM peak hour and Saturday evening event peak hours are shown in **Exhibit 5**.

2037 Build (2037 No-Build Plus Proposed Ice Complex Site-Generated Trips) Traffic Volumes

The site-generated trips for the proposed Ice Complex (Exhibit 3) were added to the 2037 No-Build Traffic Volumes (Exhibit 5) to determine the total volumes in the 2037 Build conditions for the proposed development. The 2037 Build Traffic Volumes for the weekday PM peak hour and Saturday evening event peak hours are shown in **Exhibit 6**.

2037 Build - Right-Turn Lane Evaluation: Again, due to the infrequent and low volume of right turning vehicles from Marine Avenue into the potential future overflow lot and Sailboat Cove and relatively small number of through vehicles during the Saturday evening event peak hour, it does not appear practical to provide a separate right-turn lane at the potential future overflow lot to serve 145 vehicles a few days out of the year.

20-Year Operating Conditions

The study intersections were reevaluated using the same methodologies previously described. **Table 6** summarizes the results of the 2037 No-Build and 2037 Build operating conditions during the weekday PM and Saturday evening event peak hours. These evaluations assume that left-turn lanes are provided along Marine Avenue from the proposed north driveway to the proposed south driveway (center two-way left-turn lane), as previously recommended.

As shown, the 2037 operating conditions at the study intersections will continue to operate at overall acceptable levels (LOS D or better) during the weekday PM and Saturday evening event peak hours even with proposed Ice Complex. The westbound approach of Creve Coeur Mill Road North at Route 141 could be re-striped to allow for two westbound left-turn lanes to improve the operation of the westbound approach.

As with the 2017 Build conditions, minor signal timing adjustments could also be made to provide additional southbound left-turn green time during the 2037 Build conditions to minimize the southbound left-turn delays and queues, while still providing desirable levels for northbound Route 141.

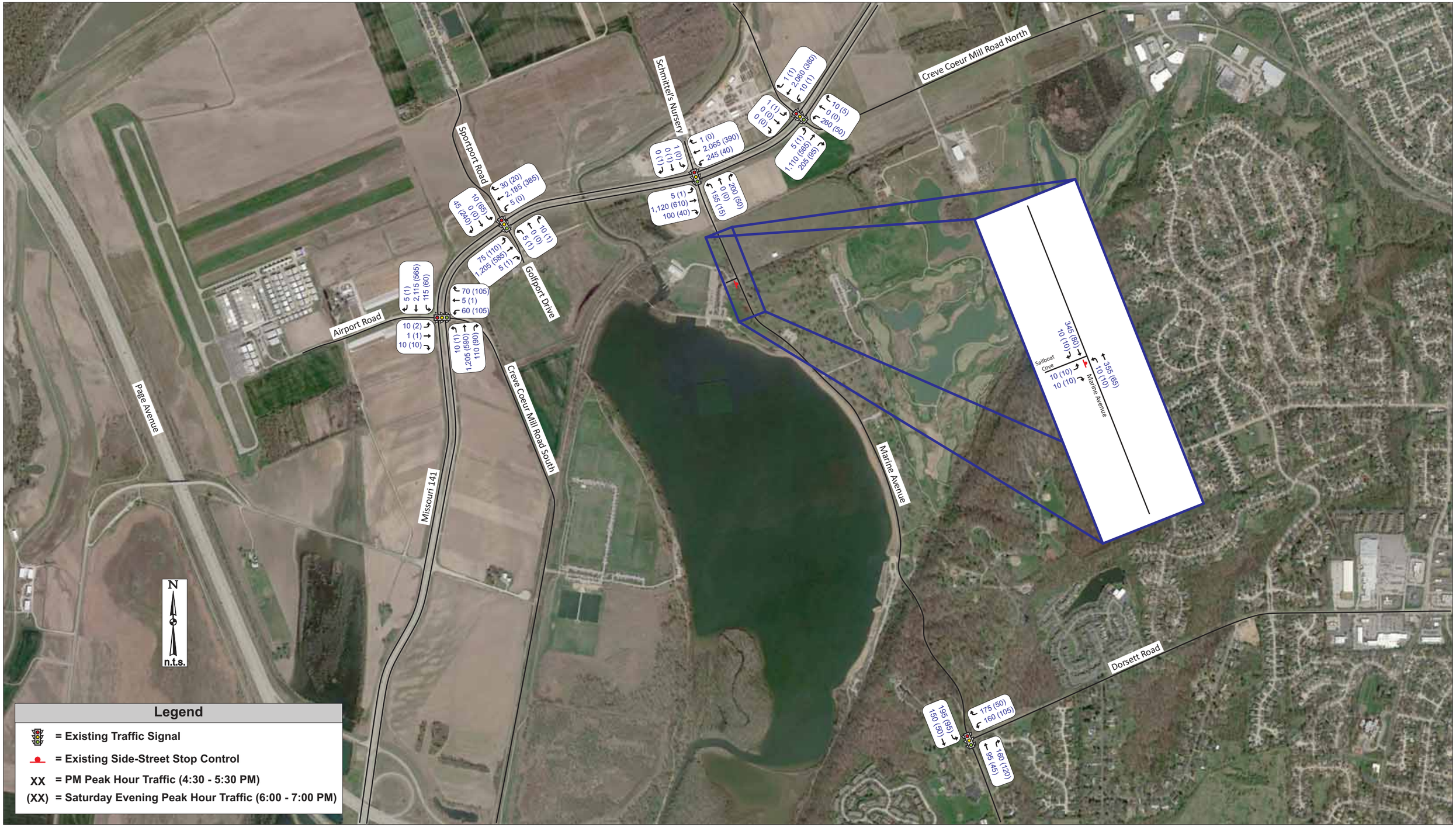

Exhibit 5: 2037 No-Build Traffic Volumes

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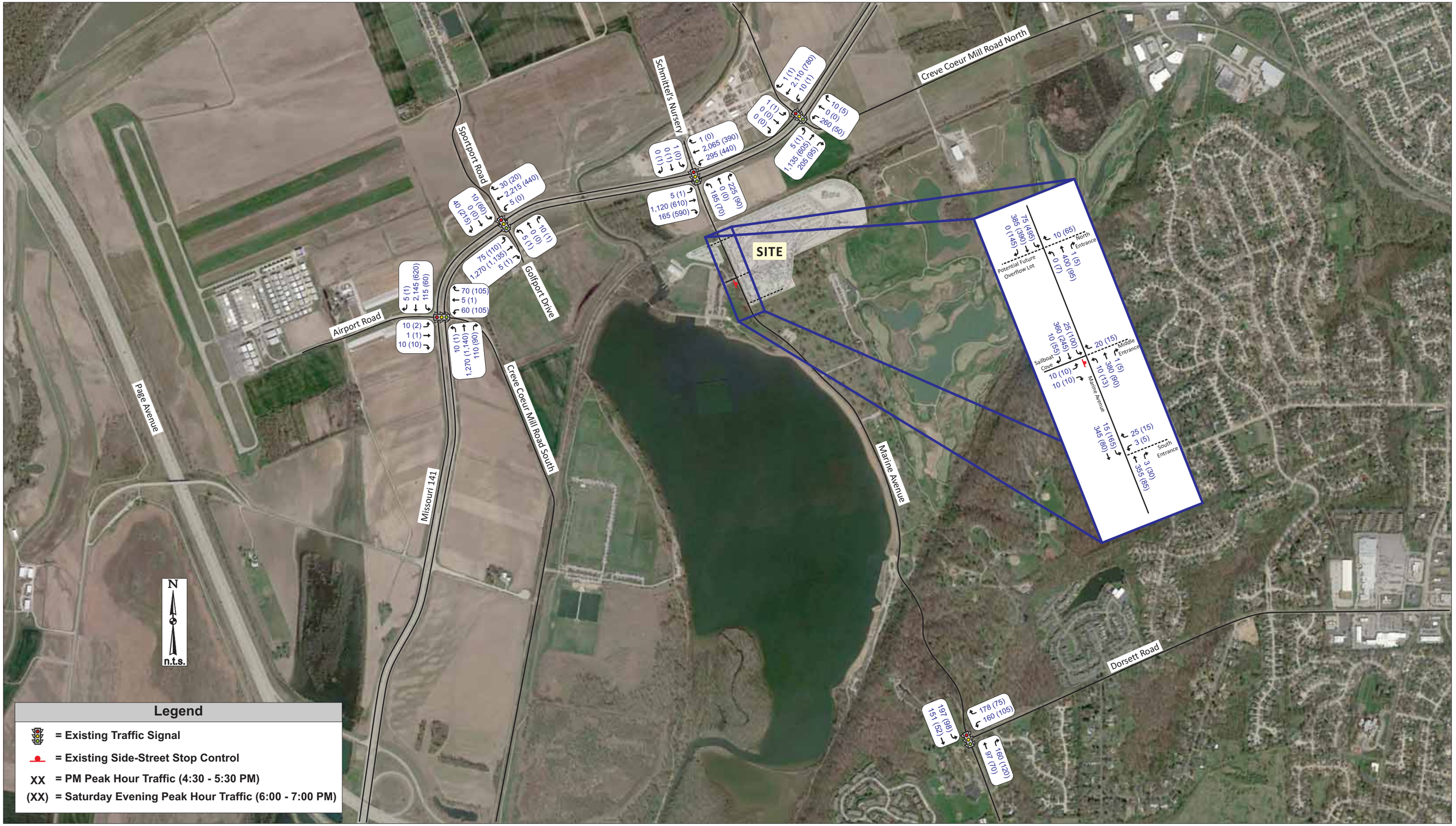

Exhibit 6: 2037 Build Traffic Volumes

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Table 6: 2037 Traffic Operating Conditions

Traffic Movement	*Weekday PM Peak Hour*		*SAT Evening Event Peak Hour*	
	2037 No Build	*2037 Build*	*2037 No Build*	*2037 Build*
Route 141 at Creve Coeur Mill Road North/MSD (Signalized)				
Eastbound MSD Approach	D (43.0)	D (43.0)	C (24.0)	C (27.0)
Westbound Creve Coeur Mill Road North Approach	F (247.1)	F (247.1)	B (20.0)	C (23.8)
Northbound Route 141 – Approach	B (16.0)	B (15.6)	A (8.3)	A (9.4)
Southbound Route 141 – Approach	C (32.7)	C (35.0)	A (8.6)	B (10.0)
Intersection Overall	**D (42.5)**	**D (43.3)**	**A (9.0)**	**B (10.2)**
Route 141 at Marine Avenue/Schmittel's (Signalized)				
Eastbound Schmittel's– Approach	C (35.0)	C (35.0)	B (16.5)	D (47.5)
Westbound Marine Avenue Approach	D (35.2)	D (40.3)	A (6.5)	D (40.8)
Northbound Route 141 – Approach	A (7.0)	A (7.0)	A (9.3)	C (32.9)
Southbound Route 141 – Approach	C (30.0) *Ave Q = 190 LT* *95th Q = 200 LT*	C (24.7) *Ave Q = 260 LT* *95th Q = 265 LT*	A (8.9) *Ave Q = 30 LT* *95th Q = 40 LT*	C (33.7) *Ave Q = 420 LT* *95th Q = 550 LT*
Intersection Overall	**C (23.2)**	**C (30.2)**	**A (9.0)**	**C (33.7)**
Route 141 at Sportport/Golfport (Signalized)				
Eastbound Sportport Approach	A (9.1)	A (9.1)	A (5.5)	A (5.9)
Westbound Golfport Approach	B (14.1)	B (14.2)	A (9.0)	A (9.5)
Northbound Route 141 – Approach	A (2.5)	A (2.5)	A (8.4)	A (9.9)
Southbound Route 141 – Approach	D (35.2)	D (40.7)	B (15.3)	B (14.9)
Intersection Overall	**C (23.6)**	**C (26.1)**	**A (9.8)**	**B (10.4)**
Route 141 at Creve Coeur Mill Road South/Airport Road (Signalized)				
Eastbound – Approach	C (33.7)	C (33.7)	B (12.9)	B (19.2)
Westbound – Approach	D (37.9)	D (37.9)	B (15.6)	C (23.8)
Northbound Route 141 – Approach	A (9.2)	A (9.9)	B (13.3)	B (17.3)
Southbound Route 141 – Approach	A (7.2)	A (7.7)	A (10.6)	B (10.1)
Intersection Overall	**A (9.1)**	**A (9.7)**	**B (12.5)**	**B (15.6)**
Dorsett Road at Marine Avenue (Signalized)				
Westbound Dorsett Road Approach	B (12.3)	B (12.2)	B (12.0)	B (11.2)
Northbound Marine Avenue Approach	B (11.3)	B (11.3)	A (8.4)	A (9.2)
Southbound Marine Avenue Approach	A (7.1)	A (7.1)	A (5.5)	A (5.5)
Intersection Overall	**B (10.1)**	**B (10.1)**	**A (8.7)**	**A (8.9)**
Marine Avenue at Sailboat Cove/Middle Entrance (Unsignalized)				
Eastbound Sailboat Cove Exit	B (13.1)	B (12.0)	A (9.2)	B (11.4)
Westbound Proposed "Middle" Access Exit		B (10.8)		A (8.8)
Marine Avenue at North Entrance/Potential Future Overflow Lot (Unsignalized)				
Eastbound Proposed Lot "B" Exit		A (1.0)		A (1.0)
Westbound Proposed "North" Access Exit		B (11.0)		A (9.2)
Marine Avenue at South Entrance (Unsignalized)				
Westbound Proposed "South" Access Exit		B (10.8)		B (9.7)

X (XX.X) – Level of Service (Vehicular delay in seconds per vehicle)

Sensitivity Analysis

A sensitivity analysis was also performed to evaluate traffic conditions related to traffic exiting an event during the Saturday evening event peak hour. The inbound and outbound traffic flows from Table 3 were reversed, resulting in 1,000 vehicles exiting the complex and 100 vehicles entering. The heavy exiting traffic volumes were then assigned to the study area based on the inbound trip distribution section and added to the existing Saturday evening event traffic volumes and to the 2037 No Build evening event traffic volumes. Again, to account for concentrated traffic exiting an event, the PHF for the westbound left-turn and right-turn from Marine Avenue to Route 141 was modified to 0.75 during the Saturday evening event peak hour.

Table 7 summarizes the operating conditions during the Saturday evening peak hour after an event with the modified PHF at the intersection of Route 141 and Marine Avenue. Table 7 represents the operating conditions during the worst 15-minutes of the analysis hour.

As previously noted, it may be difficult to obtain acceptable these levels of service during the dismissal peak times since the event style traffic floods the intersection for a short time after which demand is significantly reduced.

As can be seen, the left-turns exiting the potential future overflow lot and the westbound left-turns from Marine Avenue to southbound Route 141 would experience poor levels of service after an event. The poor conditions from the potential future overflow lot is related to the heavy flow out of the proposed north entrance. The potential future overflow lot exit is about 20-feet wide, which would allow right-turn vehicles the ability to exit while a vehicle is waiting to turn left onto Marine Avenue.

The poor conditions for the westbound Marine Avenue approach at Route 141 is due to a combination of the heavy exiting volumes and the concentrated traffic flooding the Marine Avenue at the Route 141 intersection.

The westbound queues on Marine Avenue during the exiting peak could briefly extend to about the north entrance after an event. In order to minimize the westbound left-turn queues impacting the ability to leave the site during the Saturday evening event exiting peak hour, a second westbound left-turn could be considered on Marine Avenue at the approach to Route 141, providing one westbound left-turn lane, one westbound shared left-turn/through lane and a separate westbound right-turn lane on the approach to Route 141.

As can be seen in Table 7, if dual left-turns are provided on Marine Avenue at Route 141, the westbound operating conditions and westbound left-turn queues will improve. In addition, the signal will need to operate with split phasing for the east-west approaches.

Table 7: Traffic Operating Conditions – Saturday Evening After an Event

Traffic Movement	***SAT Evening Event Peak Hour – Exiting Traffic***			
	2017 Build	***2017 Build Improved***	***2037 Build***	***2037 Build Improved***
Route 141 at Creve Coeur Mill Road North/MSD (Signalized)				
Eastbound MSD Approach	C (30.0)	C (30.0)	C (31.0)	C (31.0)
Westbound Creve Coeur Mill Road North Approach	C (26.4)	C (26.4)	C (26.9)	C (26.9)
Northbound Route 141 – Approach	A (9.4)	A (9.4)	A (9.5)	A (9.5)
Southbound Route 141 – Approach	A (8.1)	A (8.1)	A (8.1)	A (8.1)
Intersection Overall	**A (9.6)**	**A (9.6)**	**A (9.7)**	**A (9.7)**
Route 141 at Marine Avenue/Schmittel's (Signalized)				
Eastbound Schmittel's– Approach	B (14.5)	C (34.5)	B (15.5)	D (36.0)
Westbound Marine Avenue Approach	F (97.0) *Ave Q = 460 LT* *95th Q = 590 LT*	C (18.6) *Ave Q = 140 LT* *95th Q = 275 LT*	F (106.1) *Ave Q = 490 LT* *95th Q = 620 LT*	B (20.6) *Ave Q = 150 LT* *95th Q = 285 LT*
Northbound Route 141 – Approach	C (26.1)	C (28.2)	C (26.4)	C (29.9)
Southbound Route 141 – Approach	C (22.4)	C (24.6)	C (22.5)	C (24.4)
Intersection Overall	**E (63.3)**	**C (22.4)**	**E (66.6)**	**C (24.0)**
Route 141 at Sportport/Golfport (Signalized)				
Eastbound Sportport Approach	A (8.3)	A (8.3)	A (9.2)	A (9.2)
Westbound Golfport Approach	B (13.5)	B (13.5)	B (14.0)	B (14.0)
Northbound Route 141 – Approach	A (8.5)	A (8.5)	A (8.9)	A (8.9)
Southbound Route 141 – Approach	B (16.8)	B (16.8)	B (17.3)	B (17.3)
Intersection Overall	**B (12.6)**	**B (12.6)**	**B (12.9)**	**B (12.9)**
Route 141 at Creve Coeur Mill Road South/Airport Road (Signalized)				
Eastbound – Approach	B (16.2)	B (16.2)	B (15.7)	B (15.7)
Westbound – Approach	B (17.4)	B (17.4)	B (18.2)	B (18.2)
Northbound Route 141 – Approach	B (12.5)	B (12.5)	B (13.0)	B (13.0)
Southbound Route 141 – Approach	B (11.7)	B (11.7)	A (12.4)	A (12.4)
Intersection Overall	**B (12.6)**	**B (12.6)**	**B (13.2)**	**B (13.2)**
Dorsett Road at Marine Avenue (Signalized)				
Westbound Dorsett Road Approach	B (11.0)	B (11.0)	B (11.2)	B (11.2)
Northbound Marine Avenue Approach	A (9.1)	A (9.1)	A (9.2)	A (9.2)
Southbound Marine Avenue Approach	A (5.3)	A (5.3)	A (5.5)	A (5.5)
Intersection Overall	**A (8.7)**	**A (8.7)**	**A (8.9)**	**A (8.9)**
Marine Avenue at Sailboat Cove/Middle Entrance (Unsignalized)				
Eastbound Sailboat Cove Exit	B (12.3)	B (12.3)	B (12.3)	B (12.3)
Westbound Proposed "Middle" Access Exit	B (10.3)	B (10.3)	B (10.4)	B (10.4)
Marine Avenue at North Entrance/Potential Future Overflow Lot (Unsignalized)				
Eastbound Proposed Lot "B" Exit	F (>200)	F (>200)	F (>200)	F (>200)
Westbound Proposed "North" Access Exit	D (32.9)	D (32.9)	D (34.5)	D (34.5)
Marine Avenue at South Entrance (Unsignalized)				
Westbound Proposed "South" Access Exit	A (9.8)	A (9.8)	B (9.8)	B (9.8)

X (XX.X) – Level of Service (Vehicular delay in seconds per vehicle)

Conclusions

Based upon the preceding discussion, the following may be concluded regarding the traffic impacts of the proposed Ice Complex development in Maryland Heights, Missouri:

1. All study intersections currently operate at overall acceptable levels of service (LOS D or better) during the weekday PM and Saturday evening peak hours. However, the westbound approach of Creve Coeur Mill Road North currently operates at LOS F during the PM peak hour.
    - The westbound approach could operate at acceptable levels if the through/right-turn lane was re-striped/reassigned to accommodate a shared left-turn/through/right-turn lane.
    - Additionally, the southbound left-turn movement from Route 141 to Marine Avenue currently operates at LOS F during the weekday PM peak hour primarily due to the minimal amount of green time provided.

2. The proposed Ice Complex is expected to generate 180 new vehicular trips during the weekday PM peak hour and up to 1,100 new trips during the Saturday evening peak hour when there is an event.

    - The peak volumes for the proposed ice complex are relatively small during the PM peak when traffic volumes along Route 141 are larger. Conversely, the ice complex will generate the most traffic on a Saturday evening event peak hour when the traffic flows along Route 141 and Marine Avenue are significantly lower when compared to the commuter peak hours. Furthermore, the proposed events would occur during the winter season, when the park is utilized the least.

3. The proposed north and middle entrances along Marine Avenue will meet the St. Louis County's access management guidelines for corner clearance and driveway spacing, but the south driveway is a little shy of the driveway spacing guideline. However, based on the site and parking layout and event based traffic characteristics during the Saturday evening event peak hour, the proposed south entrance would help to disperse traffic to multiple access points instead of concentrating the event traffic. The proposed driveway access does not appear to be problematic from a traffic and operations perspective.

4. Separate left-turn lanes are warranted along Marine Avenue at all three proposed entrances. It is recommended that a two-way left-turn lane be provided between the proposed north and south entrances.

5. The poor westbound approach of Creve Coeur Mill Road North at Route 141 is an existing condition and the additional traffic from the proposed ice complex it not expected to have an impact on the westbound approach during the PM peak hour.

6. A minor signal timing adjustment, reallocation of 6 seconds of green time from the northbound Route 141 throughs to the southbound left-turn during the PM peak hour, would improve the southbound left-turn levels of service and queues with negligible impacts to the delays, operation and progression for northbound Route 141.

7. Acceptable operating conditions can be maintained in the 20-year conditions during the weekday PM and Saturday evening peak hours without any additional improvements.

8. A sensitivity analysis was performed to evaluate operating conditions after an event is over on a Saturday evening.

    - The left-turn out of the potential future overflow lot is expect to operate poorly due to the heavy right-turn flow out of the proposed north entrance. However, the potential future overflow lot exit is about 20-feet wide, which would allow right-turn vehicles the ability to exit while a vehicle is waiting to turn left out onto Marine Avenue.

    - The westbound left-turn from Marine Avenue to southbound Route 141 is expected to operate at poor levels on a Saturday evening after an event. The westbound queues on Marine Avenue from Route 141 could briefly extend to about the north entrance after an event on Saturday evening.

        i. To minimize the westbound left-turn queues after a Saturday evening event, a second westbound left-turn could be considered on Marine Avenue at the approach to Route 141, providing one westbound left-turn lane, one westbound shared left-turn/through lane, and a separate westbound right-turn on the Marine Avenue approach at Route 141.

We trust that you will find this report useful in evaluating the traffic impacts associated with the proposed Ice Complex development in Maryland Heights, Missouri. Please contact me in our St. Louis office at (314) 447-9569 or via email at brensing@cbbtraffic.com or Srinivas Yanamanamanda at (314) 449-8240 or via email at syanamanamanda@cbbtraffic.com should you have any questions or comments concerning this material.

Sincerely,

Brian Rensing

Brian Rensing, P.E., PTOE
Transportation Engineer

Appendix C – Soils Report

United States Department of Agriculture

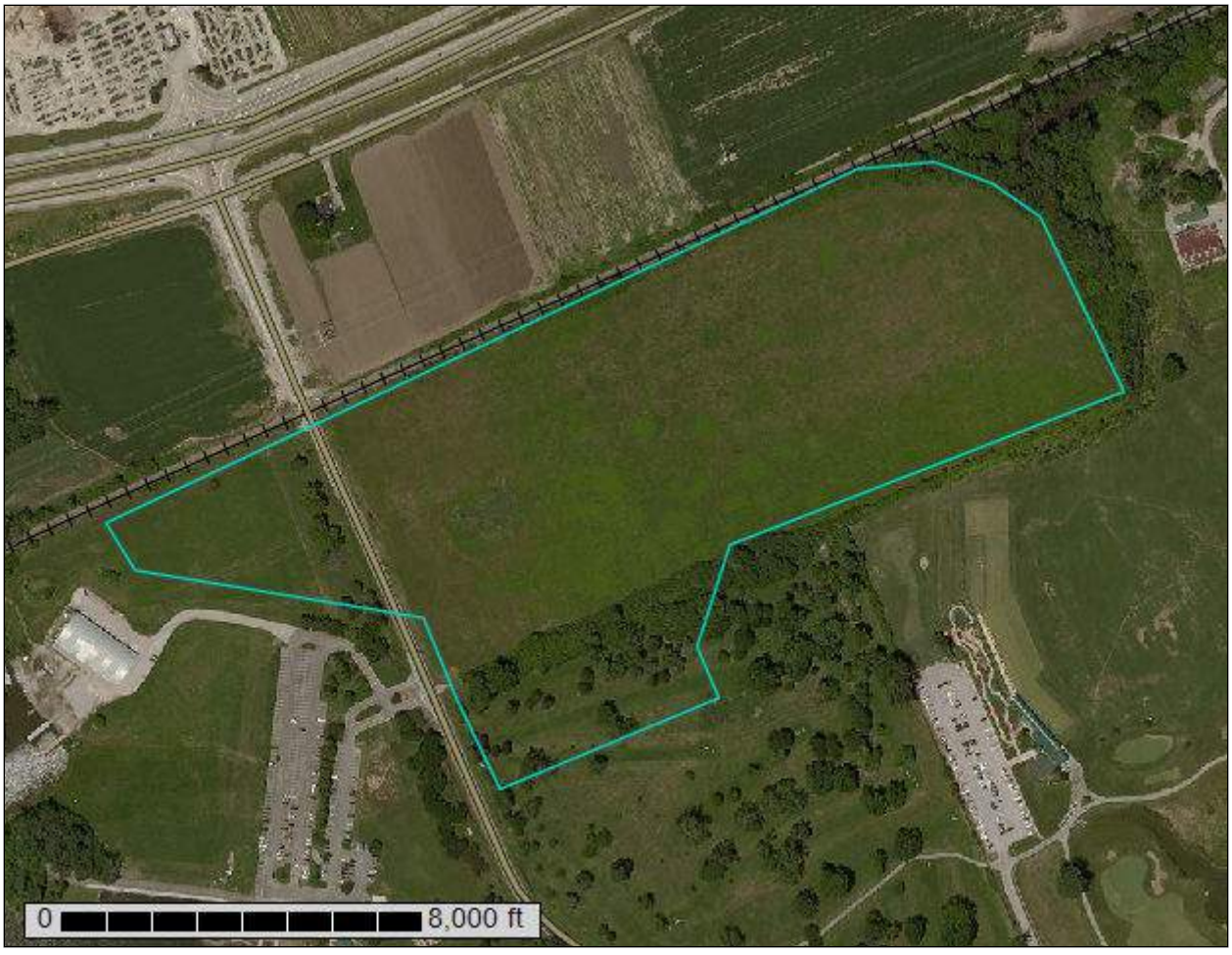
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for St. Louis County and St. Louis City, Missouri

St. Louis Ice Center



May 18, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

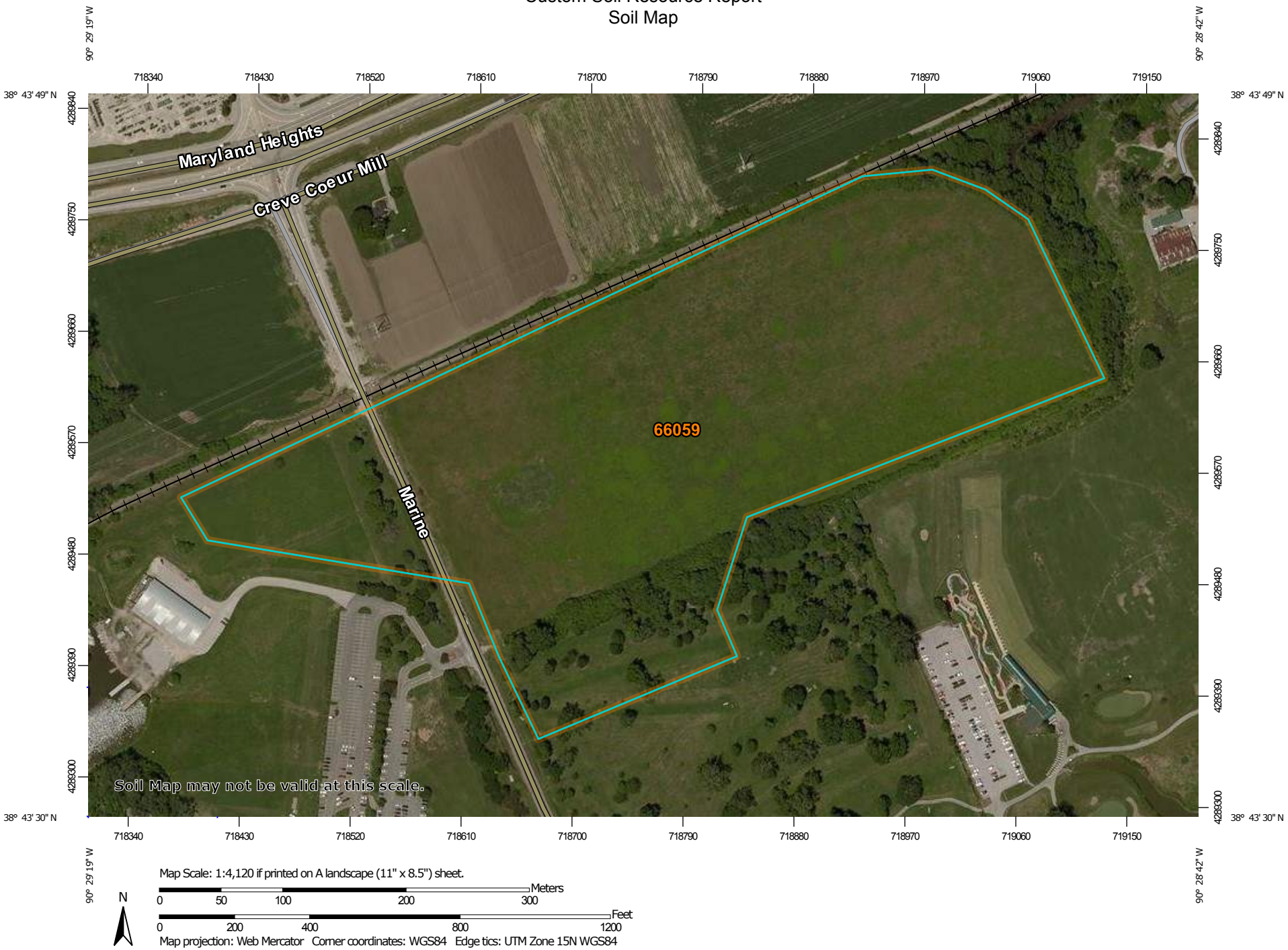
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,120 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Louis County and St. Louis City, Missouri
Survey Area Data: Version 16, Sep 28, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 13, 2014—Jun 25, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

St. Louis County and St. Louis City, Missouri (MO189)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
66059	Peers silty clay loam, 0 to 2 percent slopes, occasionally flooded	36.9	100.0%
Totals for Area of Interest		**36.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

St. Louis County and St. Louis City, Missouri

66059—Peers silty clay loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2qp93
Elevation: 340 to 1,200 feet
Mean annual precipitation: 37 to 47 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 184 to 228 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Peers and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peers

Setting

Landform: Flood-plain steps
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 15 inches: silty clay loam
A - 15 to 22 inches: silty clay loam
Bw - 22 to 50 inches: silt loam
Cg - 50 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 20 to 30 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: Loamy Floodplain Forest (F115BY031MO)
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: No

Minor Components

Sansdessein

Percent of map unit: 10 percent
Landform: Flood-plain steps
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Clayey Floodplain Forest (F115BY041MO)
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: Yes

Lowmo

Percent of map unit: 5 percent
Landform: Flood-plain steps
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy Floodplain Forest (F115BY031MO)
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: No

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Appendix D

Phase I Cultural Resource Investigation

June 8, 2017

June 8, 2017

Ms. Judith Deel
Archaeologist
Missouri State Historic Preservation Office
1101 Riverside Drive
Jefferson City, Missouri 65101

Re: Phase I cultural resource survey for the proposed St. Louis Ice Center Project, St. Louis County, Missouri.

Dear Ms. Deel:

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) conducted a phase I cultural resource survey for the construction of a proposed ice center within St. Louis County, Missouri. The project area (PA) is located within Creve Coeur Lake Memorial County Park in a Land Grant near Section 17, Township 46N, Range 07E. This investigation was undertaken at the request of Janet Wilding, Vice President of Major Projects, St. Louis Economic Development Partnership. The proposed project involves land purchased through the U.S. National Park Service Land and Water Conservation Fund designating it as 6(f) land; therefore, the project is considered a Section 106 undertaking.

The area surveyed for the proposed ice center was about 40 acres. The project area (PA) was located on a flood plain with a mixture of maintained grass, fallow fields, and a grass and wooded park. Ground surface visibility was poor at 0-15 percent. The PA was shovel tested at 20-meter intervals. Three historic isolated finds and one historic site (23SL2406) were identified during the investigation. The historic site is part of the former Creve Coeur Beach Subdivision from the 1930s; it was demolished by 1974 and the area returned to a natural setting. The demolition of the subdivision was part of a federally funded rejuvenation of the area. Amec Foster Wheeler recommends that 23SL2406 is not eligible for listing in the National Register of Historic Places due to a lack of potential for intact, subsurface material. We find no further archaeological work is needed; and project clearance is recommended. If you have any questions regarding this report, please feel free to contact me or Kathy Warner at (573) 659-0615.

Sincerely,

Vincent Warner, MA
Archaeologist

212 East McCarty Street
Jefferson City, Missouri 65101
573 659 0615
amecfw.com

Amec Foster Wheeler Environment & Infrastructure, Inc.

SECTION 106 SURVEY MEMO

Missouri Department of Natural Resources
Historic Preservation Program
P.O. Box 176
Jefferson City, Missouri 65102-0176
(573) 751-7858

1) HPP 106 Project # _____

REVIEWER: _____

Date: _____

_____ **Accepted** _____ **Rejected**

SHPO USE ONLY

Locational Information and Survey Conditions

2) County (s): St. Louis

3) Quadrangles: Creve Coeur, MO 1993 7.5 minute series

4) Project Type/Title: Phase I cultural resource survey for the proposed St. Louis Ice Center Project, St. Louis County, Missouri.

5) Funding and/or Permitting Federal/State Agencies: U.S. National Park Service Land and Water Conservation Fund

6) Section: LG **7) Township:** 46 N **8) Range:** 05E

9) U.T.M.: NAD 83, Zone 15 North; E718772, N4289616

10) Project Description: Systematic shovel testing survey, pedestrian walk over, and soil augering for the proposed ice center.

11) Topography: Flood plain.

12) Soils: Peers silty clay loam (66059), 0-2% slopes, somewhat poorly drained, and occasionally flooded.

13) Drainage: Missouri River.

14) Land Use/Ground Cover (Include % Visibility): Grass and weeds and maintained grass; ground surface visibility 0–15%.

15) Survey Limitations: None.

Historical Background Information

16) HPP – Cultural Resource Inventory X **17) Archaeological Survey of Missouri** _____ **18) GIS Database** X

19) Historic Plats/Atlases/Sources: 1878 Pitzman's New Atlas, 1883 Hopkins Atlas, 1893 Black Atlas (Figure 7), 1933 USGS topo (Figure 11), 1937 Aerial, 1940 USGS topo, 1954 USGS topo (Figure 8), 1955 Aerial (Figure 9), 1966 Aerial (Figure 10), and the 1968 USGS topo (see Table 5 for a complete list).

20) Previously Reported Sites: Previously identified sites within a one-mile radius of the project area include 23: SL14, 18, 20, 738, 739, 740, 741, 768, and 776 (Figure 6).

21) Previous Surveys: Previously reported surveys within a one-mile radius include SC-55, SL-166, SL-171, SL-205, SL-370, SL-487, SL-500, and SL-681 (Figure 6).

22) Regional Sources Utilized: None

23) Master Plan Recommendations: N/A

24) Investigation Techniques: Shovel testing at 20-m intervals; positive delineation at 5-m or 10-m intervals.

25) Time Expended: 200 person hours

26) Sites Located: One historic site (23SL2406) and three Isolated Finds.

27) Cultural Materials: See table below. **28) Curated at:** MU

29) Collection Techniques: All except for a sample of the building material from 23SL2406

30) Area Surveyed (Acres & Square Meters): 40- acres (1,61,874 square meters)

31) Results of Investigation and Recommendations:

☐ a) **No Cultural Resources Located.**

☒ **b) No National Register Eligible Cultural Resources Located.**

☐ **c) National Register Eligible Cultural Resources Located.**

☐ **d) Resources May Meet Requirements For National Register Eligibility; Phase II Testing Is Recommended.**

e) Comments: See attached pages.

Cultural Resource Management Contractor Information:

32) Archaeological Contractor: Amec Foster Wheeler Environment & Infrastructure, Inc.

33) Address/Phone: 212 E. McCarty Street, Jefferson City, MO 65101 / (573) 659-0615

34) Surveyor(s) Vincent Warner, John Bybee, Elise Hargiss, Cortney Black, Eli Schuck, Cody Roush, and John Topi

35) Survey Date(s): May 10 and June 17-18, 2017

36) Report Completed By: Vincent Warner, MA **37) Date:** June 8, 2017

38) Submitted By (Signature and Title):  Vincent Warner, MA, Archaeologist

39) Attachment Check List: **(Required)**

__x__ **1) Relevant Portion of USGS 7.5' Topographic Quadrangle Map(s) Showing Project Location And Any Recorded Sites;**

__x__ **2) Project Map(s) Depicting Survey Limits And, When Applicable, Approximate Site Limits, And Concentrations Of Cultural Materials;**

__x__ **3) Site Form(s): One Copy of Each Form;**

_ ___ **4) All Relevant Project Correspondence;**

__x__ **5) Additional Information Sheets As Necessary.**

40) Address Of Owner/Agent/Agency To Whom SHPO Comment Should Be Mailed:

Janet Wilding, Vice President of Major Projects	Vincent Warner, MA
St. Louis Economic Development Partnership	Amec Foster Wheeler
7733 Forsyth Blvd., Suite 2300	2121 E. McCarty Street
St. Louis, MO 63105	Jefferson City, MO 65101

41) Contact Person: Janet Wilding, Vice President of Major Projects **2) Phone Number:** 314-615-7669

REVIEWER COMMENTS

Comments:

On May 8 and June 17 and 18, 2017, archaeologists from Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) conducted a phase I cultural resource survey for the proposed construction of an ice center located within Creve Coeur Lake Memorial County Park, St. Louis County, Missouri (**Figures 1 and 2**). This investigation was undertaken at the request of Janet Wilding, Vice President of Major Projects, St. Louis Economic Development Partnership. It was also completed in consultation with the Missouri State Historic Preservation Office (SHPO) to ensure compliance with state and federal regulations. This archaeological investigation was conducted in compliance with Public Law 89-665, the National Historic Preservation Act of 1966 (as amended), 16 U.S.C. 470 (f), and Presidential Executive Order 11593. This project complies with established specifications for field investigations and National Register of Historic Places (NRHP) assessment according to the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (Federal Register, Vol. 48, No. 190, 1983) and with guidelines set forth by the Missouri SHPO.

Project Overview:

For field organization purposes, the project area (PA) was divided into three areas (A, B, and C) (**Figures 3-4**). Each area was investigated by means of shovel test probes (STPs) excavated at 20-meter intervals. The total surveyed area is about 1,61,874 m^2 (40 acres). The PA was mostly a fallow agricultural field covered in grass and weeds (Area C). A smaller area, Area A, was maintained grass, while Area B was maintained grass and trees (a park setting). Overall, ground surface visibility was poor at 0-15 percent (**Photographs 1–4**). The PA was located by means of a Trimble sub-meter GPS loaded with spatial information provided by the client. Portions of the PA were significantly disturbed by grading, trail building, impoundment, and an existing road to the pond (**Figure 3, Photographs 8–12**).

Historic Map Review:

Historic plat maps, topo maps, and aerials were reviewed for the presence of historic structures or cultural features; **Table 1** summarizes the findings.

Table 1. Historic resources.

Type	Date	Structures/Features Present?	Notes	Figure #
Plat map	1878	No		NA
Plat map	1883	No		NA
Plat map	1893	Yes- two; one in Area A and one in Area C		7
Topo	1933	Yes- Creve Coeur Beach Subdivision in Area B	Minimal development of subdivision	11
Aerial	1937	Yes- Creve Coeur Beach Subdivision in Area B	Minimal development of subdivision	NA
Topo	1940	Yes- Creve Coeur Beach Subdivision in Area B	Minimal development of subdivision	NA
Topo	1954	Yes- Creve Coeur Beach Subdivision in Area B and one outbuilding in Area C	Expanded development of subdivision	8
Aerial	1955	Yes- Creve Coeur Beach Subdivision in Area B and one outbuilding in Area C	Expanded development of subdivision	9
Aerial	1966	Yes- Creve Coeur Beach Subdivision in Area B and one outbuilding in Area C	Expanded development of subdivision	10
Topo	1968	Yes- Creve Coeur Beach Subdivision in Area B and one outbuilding in Area C	Expanded development of subdivision	NA

Type	Date	Structures/Features Present?	Notes	Figure #
Aerial	1970/72	Yes- Creve Coeur Beach Subdivision in Area B and outbuilding in Area C gone	Similar development of subdivision	12
Topo	1974	Yes- Creve Coeur Beach Subdivision in Area B gone and one outbuilding in Area C	Subdivision gone, but roads remain	NA
Topo	1979	Yes- one outbuilding in Area C	Subdivision gone, but roads remain	13
Aerial	1981	No	No roads present	NA
Topo	1993	Yes- one outbuilding in Area C (contradicts the aerial, may be an error on the topo)	No roads present	1
Aerial	2016	Yes- new outbuilding in Area C (present in 2105, but not 2014)	undeveloped	2

Site File Search:

A site file search was conducted to identify any previously recorded archaeological sites or surveys within a one-mile radius of the PA (**Figure 6**). No previously recorded archaeological sites have been recorded within the PA. Nine previously recorded sites are within the one-mile radius (**Table 2**). Additionally, nine cultural surveys have been conducted within the same distance (**Table 3**), of which, two include the current PA (SC186 and SL500). Both of these surveys were part of large literature reviews and did not include any field work associated with the current PA. No shipwrecks, sites listed on the NRHP, or NRHP Districts have been recorded within the one-mile radius.

Table 2. Previously Recorded Archaeological Sites within a One-mile Radius of the PA.

Site Number	Cultural Affiliation	Site Type	NRHP Recommendation
23LS18	No information available	-	-
23SL14	No information available	-	-
23SL20	Undetermined prehistoric	Habitation	Unevaluated
23SL738	Historic	Habitation	Not reported
23LS739	No information available	-	-
23SL740	Historic	Recreation Facility	Not reported
23SL741	Historic	Habitation	Not reported
23SL738	No information available	-	-
23SL776	No information available	-	-

Table 3. Cultural Resource Surveys Within a One-mile Radius of the PA.

Survey Number	Date	Includes PA?	Investigation Type	Primary Author
SC186	1989	Yes	Literature Search	David Crampton
SL55	1980	No	Phase I	Jonathan Kent
SL166	1993	No	Phase I	Dianna Reinhardt
SL171	1994	No	Phase I	Dennis Naglich
SL205	1996	No	Phase I	David Bowman
SL370	1997	No	Phase I	Mechelle Crisler
SL487	2003	No	Phase I	Sara Hixson
SL500	2004	Yes	Literature Search	Not Reported
SL681	2007	No	Phase I	Cynthia Balek

Summary of Soils:

Soils were consistent within each of the three areas. Overall, Area A had an upper zone 10-25 cm thick, very dark grayish brown (10YR 3/2) ranging between a silty clay loam and a clay loam over a dark grayish brown (10YR 4/2) clay loam. Area A appears to be impacted by earth moving/cutting as there was not a developed A-horizon and the clay soils appeared to be subsoil. Area B typically had an upper zone 20-32 cm thick, very dark grayish brown (10YR3/2) or a very dark brown (10YR2/2) silty loam over a dark grayish brown (10YR 4/2) or a yellowish brown (10YR 5/4) silty loam. Gravel and construction debris was common in this area and relates to the demolition of a subdivision (discussed below). Area C had a 23-42 cm thick upper zone (much looked like a plowzone) dark brown (10YR3/3) silty loam over a brown (10YR4/3) silty clay loam. Four auger probes were excavated in order to test for buried deposits (**Tables 4**–**7**).

Table 4. Soil Profile of Auger 1, located in Area A.

Depth (cmbs)	Color	Texture	Notes
0-40	10YR 4/2	Clay	
40-90	10YR 4/2 mottled with 10YR 3/6	Clay	Manganese inclusions
90-110	10YR 5/2	Clay	Manganese inclusions
110-200	10YR 5/2	Dense clay	Decreasing manganese

Table 5. Soil Profile of Auger 2 Located in the Northwest Part of Area C.

Depth (cmbs)	Color	Texture	Notes
0-30	10YR 3/3	Silty loam	
30-50	10YR 4/4	Silty loam	
50-105	10YR 5/4	Sand clay loam	
105-160	10YR 4/3	Silty loam	Moist
160-185	10YR 4/3	Silty loam	Wet with manganese inclusion
185-205	10YR 4/3	Silty clay	Wet

Table 6. Soil Profile of Auger 3 Located in the Central Part of Area C.

Depth (cmbs)	Color	Texture	Notes
0-45	10YR 3/3	Silty loam	
45-85	10YR 4/2	silty clay loam	
85-160	10YR 4/3	Silty loam	
160-180	10YR 4/3	Silty clay loam	Moist
180-200	10YR 4/3	Silty clay	Wet with manganese inclusion

Table 7. Soil Profile of Auger 4 Located in the Southeastern Part of Area C.

Depth (cmbs)	Color	Texture	Notes
0-60	10YR 4/2	Silty clay	
60-80	10YR 4/3	Silty clay	
80-90	10YR 4/3	Silty clay loam	
90-120	10YR 4/3	Silty clay	
120-150	10YR 4/3	dense clay	

Results:

During the course of the Phase I survey, four new cultural resources were identified (**Figure 5**). The first, located in Area A, is a historic isolated find (IF-1). The next two, located in Area C, were also isolated finds (IF-2 and IF-3). Additionally, one historic site, 23SL2406, was recorded in Area B.

Isolated Finds 1 and 2 (**Figures 4 and 5; Photographs 5 and 6**, respectively) likely were associated with structures identified on the 1893 atlas (**Figure 7**). IF-1 is located near the railroad tracks and the soils appear to be disturbed (as previously discussed), therefore it is unlikely that preserved archaeological deposits remain. For IF-2, the deep plowing that has occurred in the area has likely destroyed any remnants of this structure. In both cases, judgmental STPs were placed on top of the structure location and cultural material was recovered. One wire nail and a piece of coal were located at IF-1, and one small piece of clear glass at IF-2. Delineation for all three Ifs was conducted by means of STPs at 5-meter intervals in each cardinal direction until two positive STPs were reached, but no additional cultural material was recovered. Isolated Find 3 may correspond to an outbuilding identified on the 1954 topo (**Figure 8**), the 1968 topo, the 1955 aerial (**Figure 9**), and the 1966 aerial (**Figure 10**). A push pile (**Photograph 7**) was in this location, so the STPs were excavated as close as possible to the location of the structure. The deep plowing that has occurred in the area has likely destroyed any remnants of this structure. One small piece of clear glass was recovered.

23SL2406 is a broad scatter of historic material identified by means of gridded STPs and is located within Area B (**Figures 4 and 5; Photographs 2 and 3**). The site covers about 4.2 acres, but could include the rest of the historic subdivision, to the south and east. The area is maintained grass and trees, as part of the county park. The area corresponds to the northern portion of the Creve Coeur Beach Subdivision identified on historic aerials and topo maps (**Figures 8–13**). Creve Coeur Lake is to the west, across Marine Drive and has been a recreational attraction since the late 1800s (Creve Coeur Park History 2017). This natural lake increased in recreational appeal once a rail road spur and a street car line were constructed. Dance halls, hotels, and restaurants, as well as a fair, followed. Due to the proximity to the lake, the Creve Coeur Beach Subdivision started in the 1920s. Construction of this subdivision started in the south, and progressed north. The northern portion is the location of 23SL2406. Popularity of the area waned during prohibition as the area became attractive to gangsters. Land around the lake was donated to the county in 1945 and this became the first St. Louis County park. As part of a rehabilitation effort of the area, St. Louis County received funds from a bond issue and purchased land surrounding the lake including the Creve Coeur Beach subdivision in 1969. This included about 150 homes that, as part of the bond requirements, were eventually demolished. Through a review of historic resources, this portion of the subdivision appears on the 1933 topo (**Figure 11**) and the residences are no longer visible on the 1974 and 1979 topos (**Figure 13**) with the roads gone on the 1981 aerial.

The artifacts recovered from 23SL2406 (**Table 8**) are mostly construction debris; diagnostic material was limited, but corresponds to the time frame indicated in the park history and the historic imagery. In particular, a piece of tin-glazed earthenware was recovered and likely represents a piece of Art Nouveau pottery. Most of the STPs had gravely, mixed soil and, in a few locations, large pieces of asphalt and concrete were encountered. Those STPs that penetrated the mixed gravely material did not indicate intact, cultural bearing soils below. It is likely that the residences were removed around 1973 and the roads between 1979 and 1981. Although subsurface features may be expected in association with historic structures, there was no indication on the ground surface (or later aerials) of feature depressions or differential vegetation or moisture retention that would indicate the potential for features. The area was likely heavily dozed and disturbed in order to bring it back to a natural state.

Table 8. Artifacts Recovered from 23SL2406.

STP #	Group	Material	Artifact	Attribute	Dates	Total
A1	Kitchen	Ceramics	Whiteware	Undecorated	1820-1890	1
		Glass	Bottle/Jar	Aqua	1800-1920	1
			Undetermined Glass	Colorless Non-Leaded		1
A3	Architectural	Ceramic/Stone	Brick (Fragment)	-		1
	Kitchen	Glass	Bottle/Jar	Brown	1860-present	1
A6	Kitchen	Glass	Bottle/Jar	Brown	1860-present	1
B1	Architectural	Metal	Wire Nail	-	1880-present	2
	Kitchen	Glass	Bottle/Jar	Brown	1860-present	1
			Undetermined Glass	Green	1860-present	4
				Colorless Non-Leaded		1
B2	Kitchen	Glass	Bottle/Jar	Brown	1860-present	2
B3	Architectural	Ceramic/Stone	Brick (Fragment)	-		1
	Kitchen	Ceramics	Whiteware	Undecorated	1820-1890	1
		Glass	Undetermined Glass	Colorless Non-Leaded		1
B4	Kitchen	Glass	Undetermined Glass	Colorless Non-Leaded		2
B5	Activity	Charcoal	-	-		2
		Coal/Clinker	-	-		2
	Architectural	Ceramic/Stone	Brick (Fragment)	-		1
		Metal	Wire Nail	-	1880-present	1
	Kitchen	Glass	Undetermined Glass	Colorless Leaded		5
		Metal	Crown Bottle Cap	-	1892-present	1
B6	Activity	Metal	Fence Staple	-		1
	Kitchen	Glass	Undetermined Glass	Colorless Leaded		2
B9	Architectural	Synthetic	Floor Tile	-		1
	Kitchen	Ceramics	Tin-Glazed Earthenware	Undecorated	1900-1930	1
C1	Activity	Clinker	-	-		1
		Coal	-	-		1
	Architectural	Metal	Unidentified Architectural Material	-		1
		Metal	Wire Nail	-	1880-present	5
	Kitchen	Glass	Bottle/Jar	Brown	1860-present	8
			Undetermined Glass	Aqua	1800-1920	1
				Colorless Non-Leaded		9

STP #	Group	Material	Artifact	Attribute	Dates	Total
		Metal	Crown Bottle Cap	-	1892-present	1
C2	Kitchen	Glass	Undetermined Glass	Colorless Non-Leaded		1
C4	Kitchen	Glass	Undetermined Glass	Colorless Non-Leaded		2
C6	Architectural	Ceramic/Stone	Brick (Fragment)	-		1
		Metal	Wire Nail	-	1880-present	1
	Kitchen	Glass	Undetermined Glass	Colorless Non-Leaded		4
D1	Activity	Clinker	-	-		6
D2	Activity	Clinker	-	-		1
	Kitchen	Glass	Undetermined Glass	Colorless Non-Leaded		1
	Other	Plastic/Synthetic	Unidentified	-		2
D6	Architectural	Ceramic/Stone	Brick (Fragment)	-		3
			Mortar	-		1
		Metal	Wire Nail	-	1880-present	1
	Other	Plastic/Synthetic	Unidentified	-		1
D8	Architectural	Ceramic/Stone	Brick (Fragment)	-		1
		Synthetic	Asphalt Shingle	-		1
E4	Kitchen	Glass	Undetermined Glass	Colorless Non-Leaded		2
E8	Kitchen	Glass	Bottle/Jar	Brown	1860-present	1
E9	Kitchen	Glass	Undetermined Glass	Colorless Non-Leaded		1
Grand Total						96

Recommendations:

Amec Foster Wheeler completed a Phase I cultural resource survey for the proposed St. Louis Ice Center located within Creve Coeur Lake Memorial County Park in St. Louis County. A systematic shovel test survey and a visual inspection of the area was conducted and supplemented by judgmental STPs in the location of structures identified on historic imagery. No previously recorded archaeological sites are within or adjacent to the PA. Three historic IFs were recorded (based on the judgmental STPs) as well as a historic site (23SL2406). The three IFs l do not meet the criteria for an archaeological site and are recommended not eligible for listing on the NRHP. 23SL2406 is part of the former Creve Coeur Beach Subdivision that existed from the 1930s and was demolished by 1981. This area does not appear to have intact soils or the likelihood of intact subsurface features. Amec Foster Wheeler recommends that 23SL2406 is not eligible for listing on the NRHP and no additional archaeological work is necessary.

Bibliography:

Black, C.R.
1893 *An Atlas of St. Louis County, in the State of Missouri*.

Creve Coeur Park History
2017 Electronic document, http://www.stlouisco.com/Portals/8/docs/Document%20Library/parks/PDFs/ParkHistory/CreveCoeurHistory.pdf, accessed May 9, 2017.

St. Louis County, Missouri Historical Aerial Viewer
2017 Electronic document, https://www.arcgis.com/home/item.html?id=be830565f4f34d32882962f788f560db, accessed on May1, 2017

United States Department of Agriculture, Web Soil Survey
2017 Electronic document, https://websoilsurvey.nrcs.usda.gov/app/, accessed May 1, 2017.

United States Geological Survey Historic Topographic Map Explorer
2017 Electronic document, http://historicalmaps.arcgis.com/usgs/, accessed May 1, 2017.

Figures:

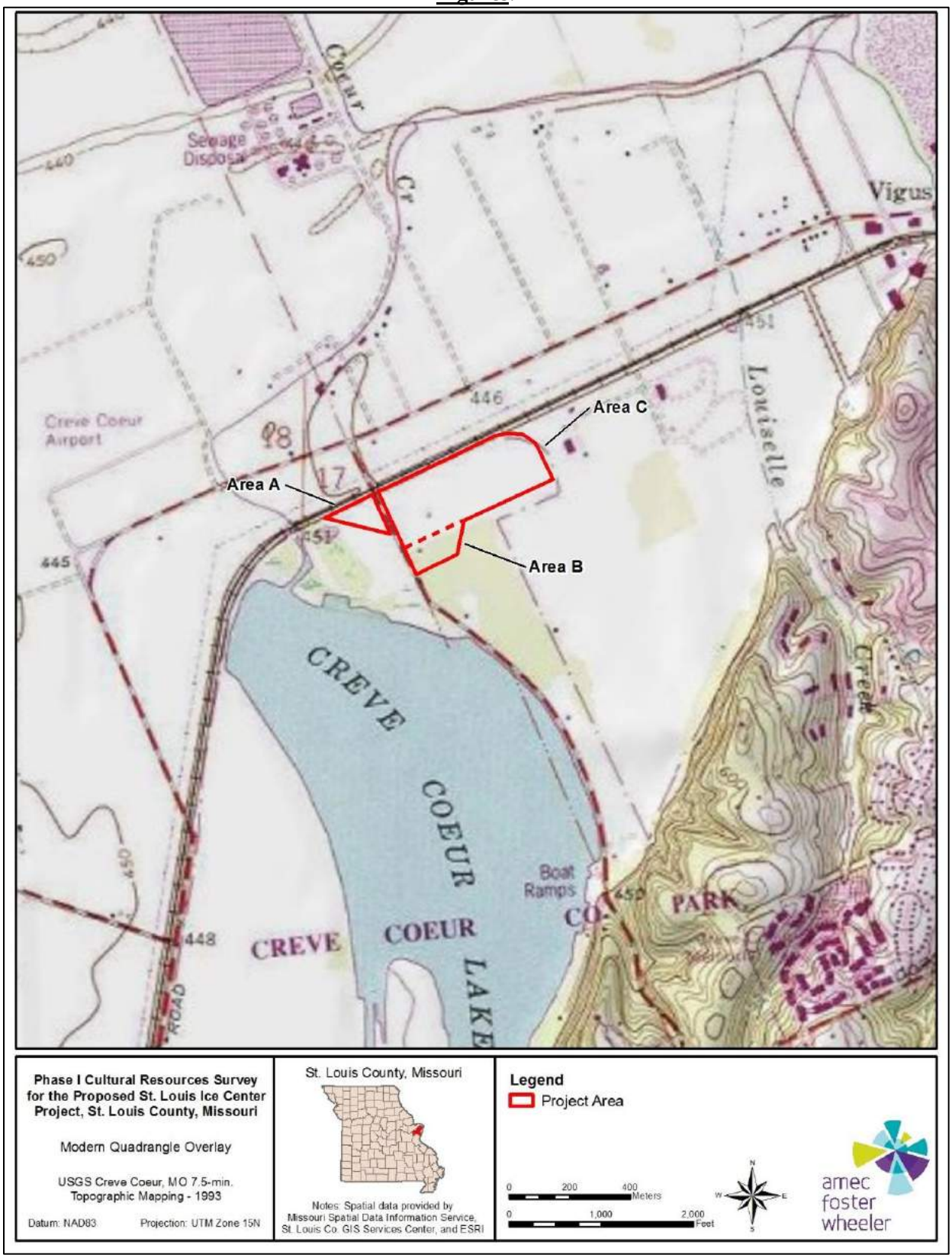


Figure 1. Location of PA depicted on the modern topographic map.

Figure 2. Location of PA depicted on the modern aerial image.

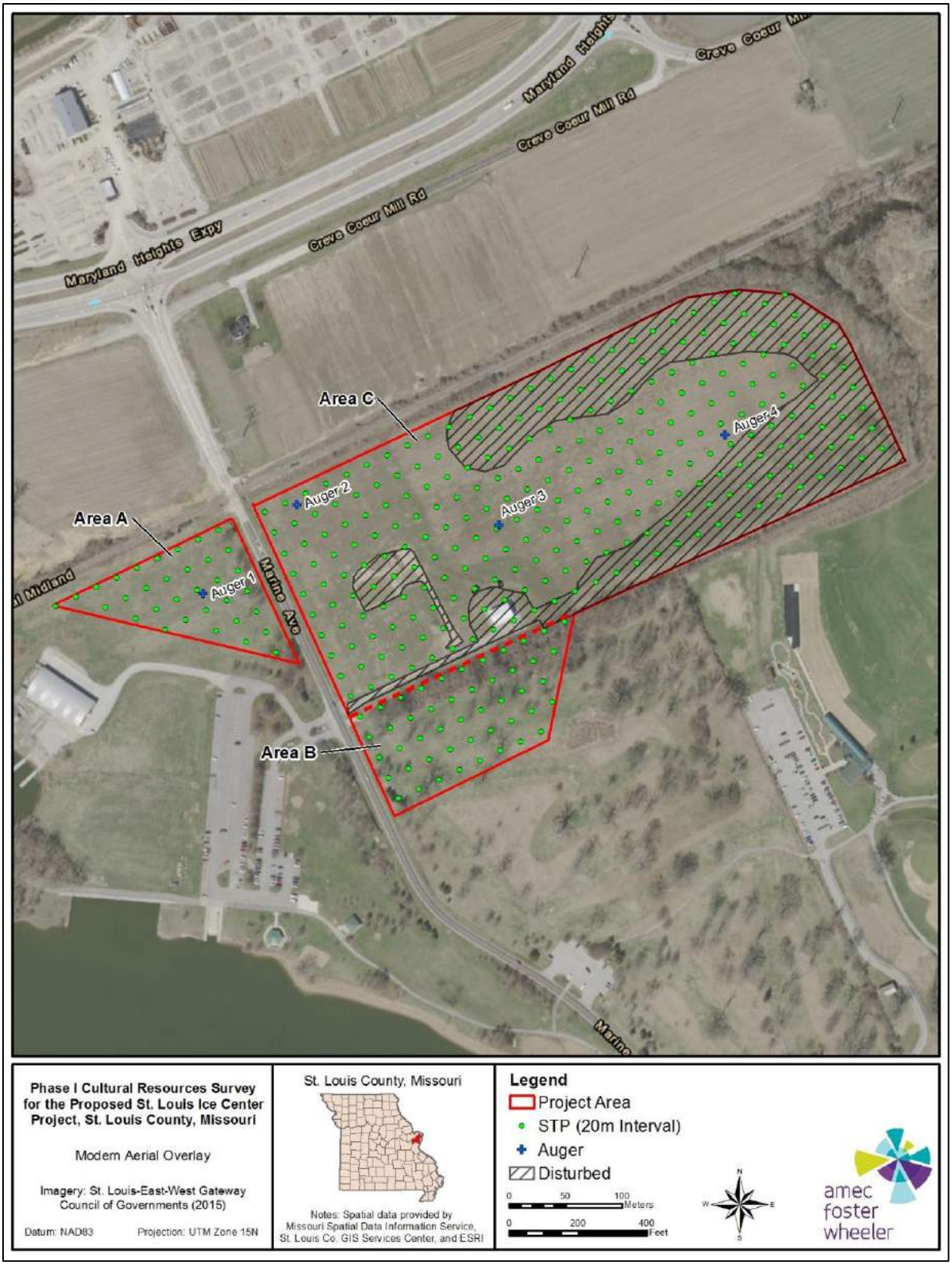


Figure 3. Project area, STPs, Augers, and recorded disturbances depicted on the modern aerial image.

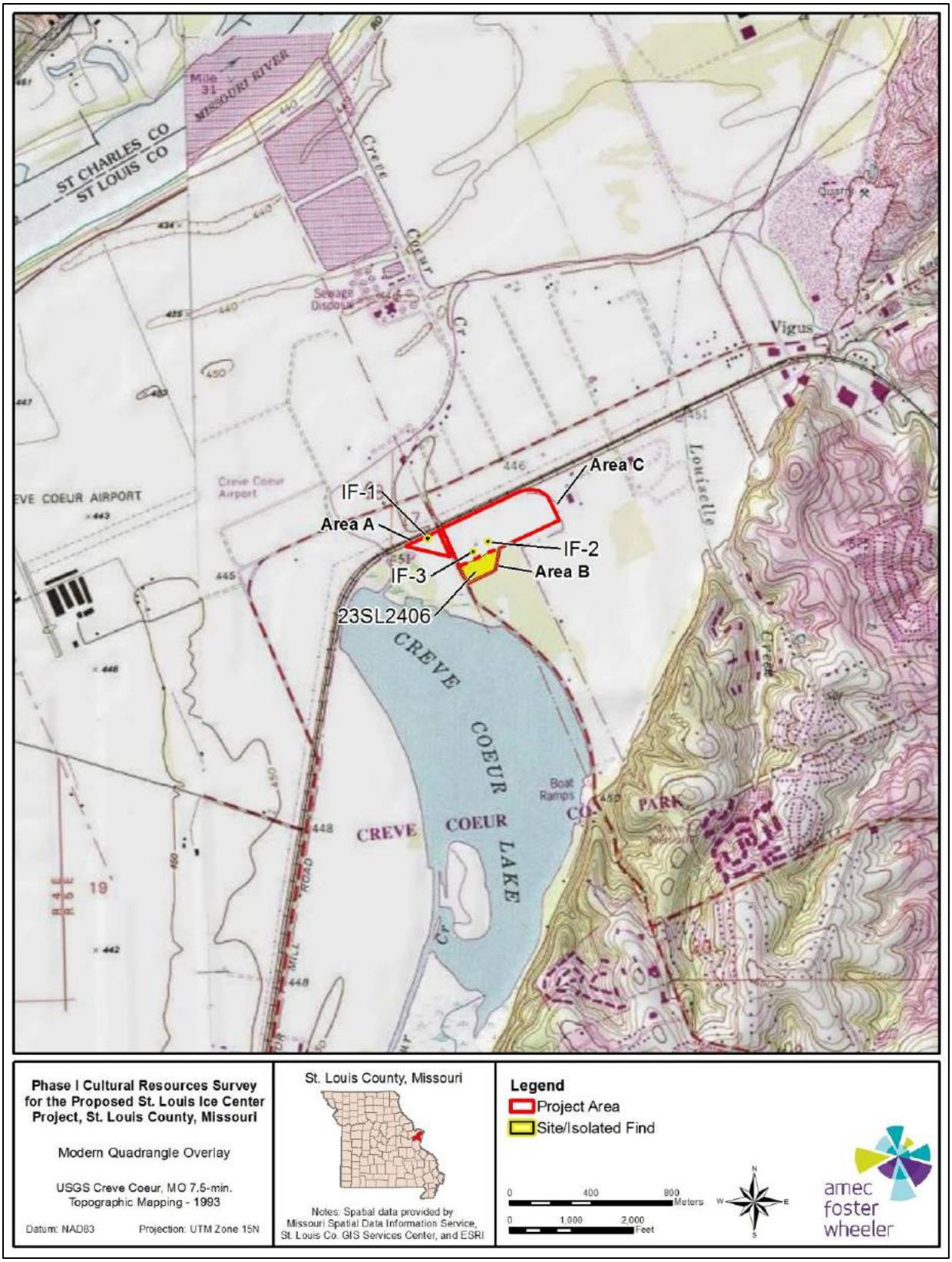


Figure 4. Location of PA, IFs, and site 23SL2406 depicted on the modern topographic map.

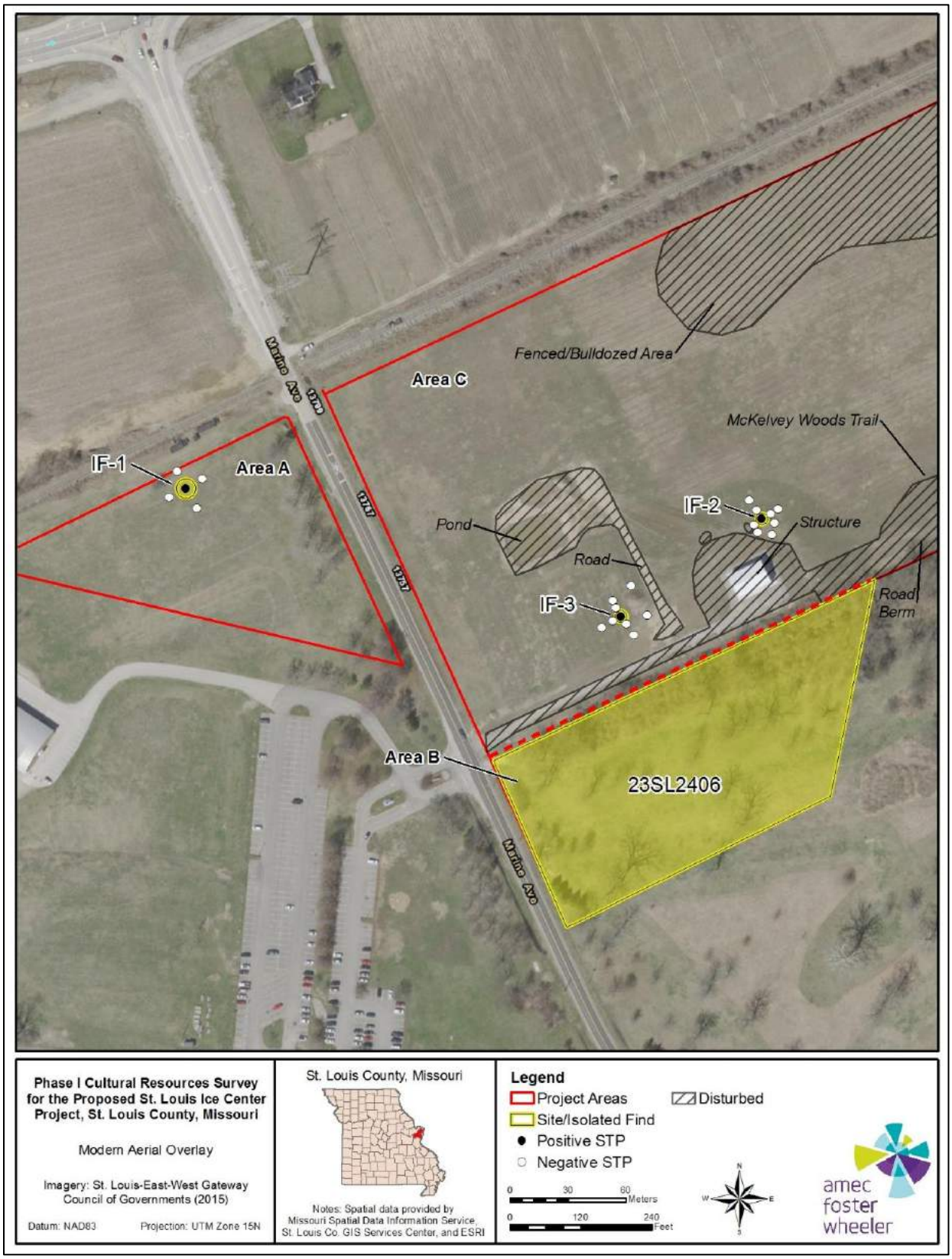


Figure 5. Project area sketch map depicted on the modern aerial image.

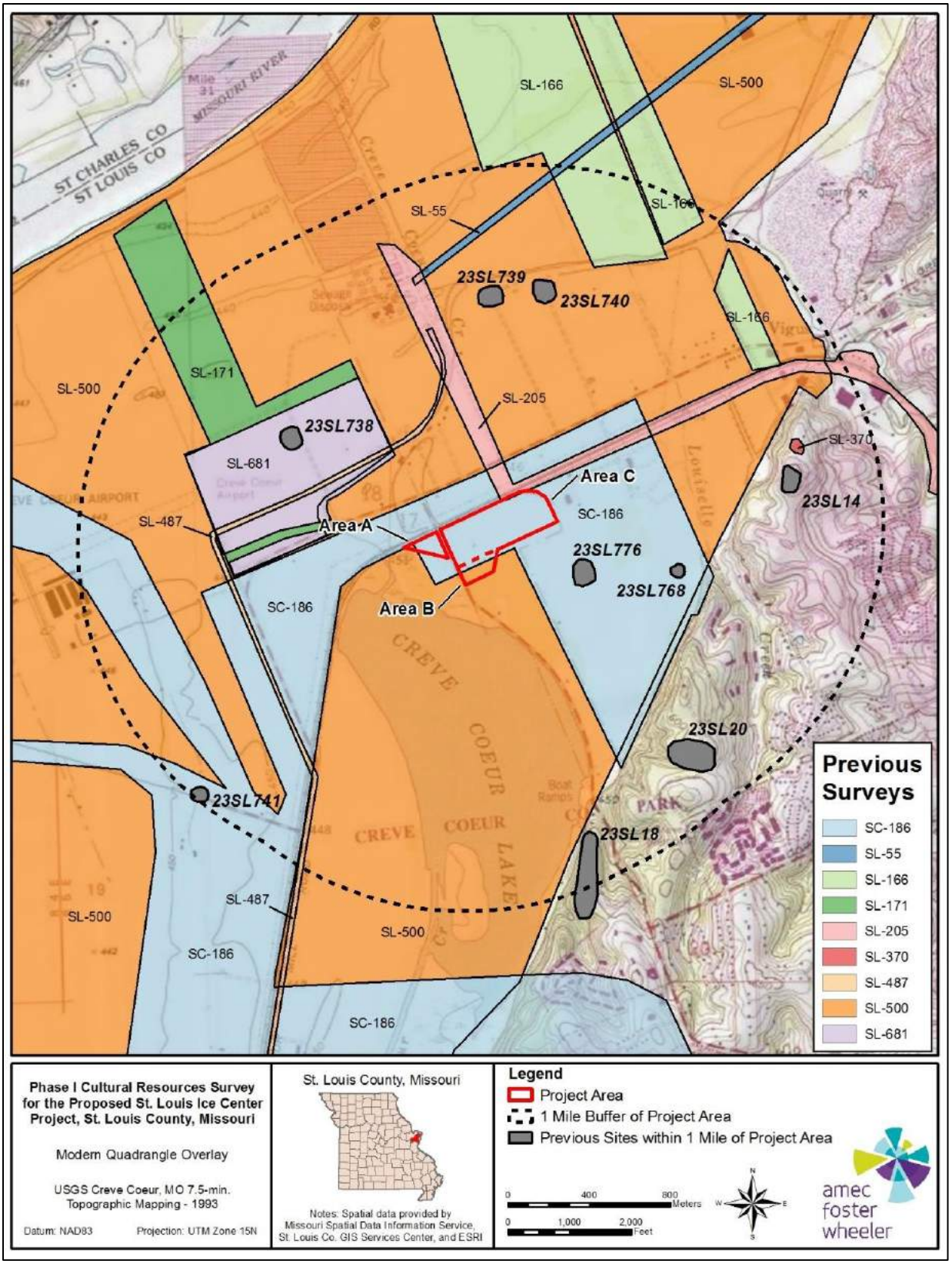


Figure 6. Previously recorded sites and surveys within a one-mile radius of the PA depicted on the modern topographic map.

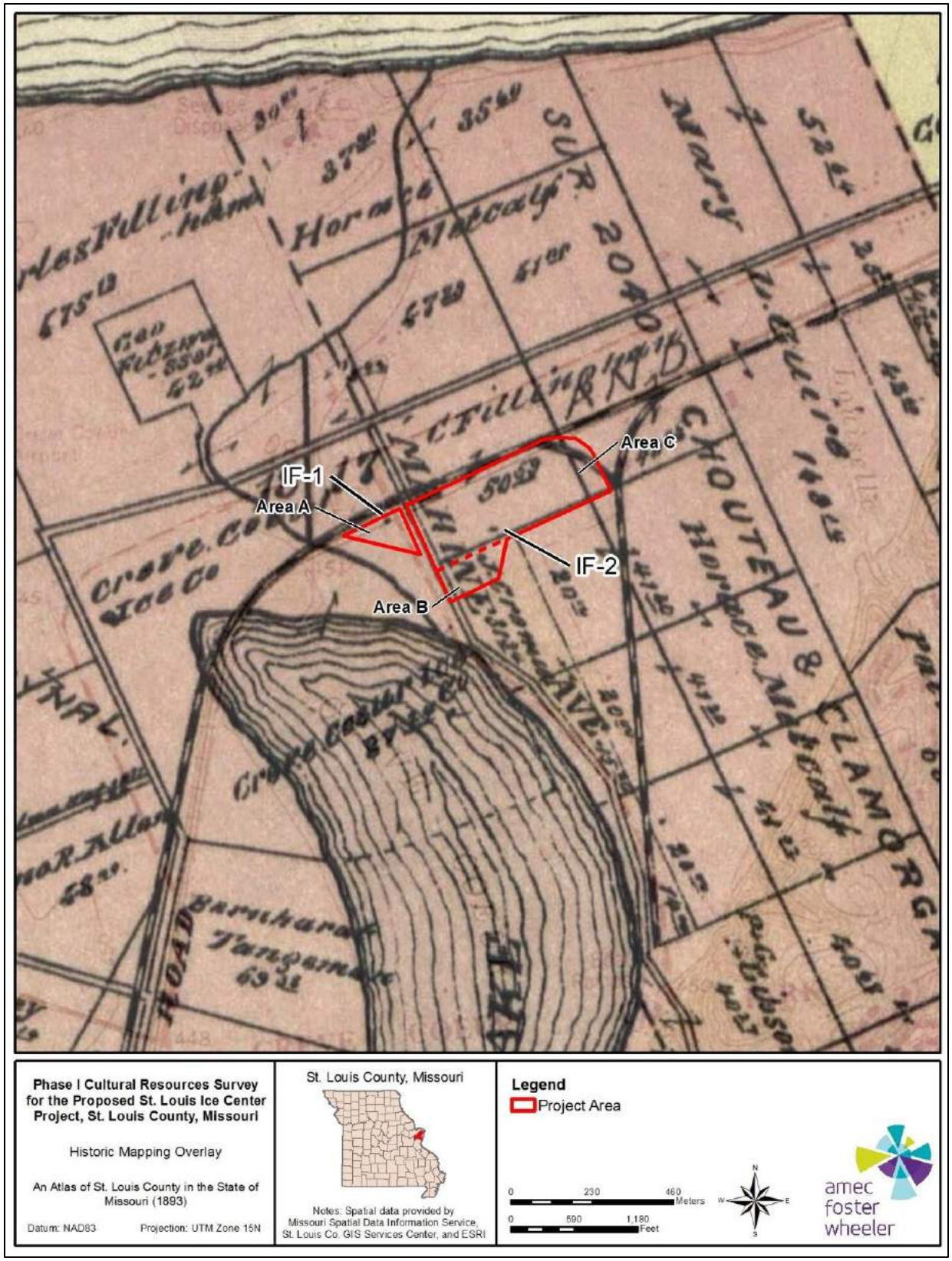


Figure 7. Location of PA depicted on the 1893 Atlas of St. Louis County, MO.

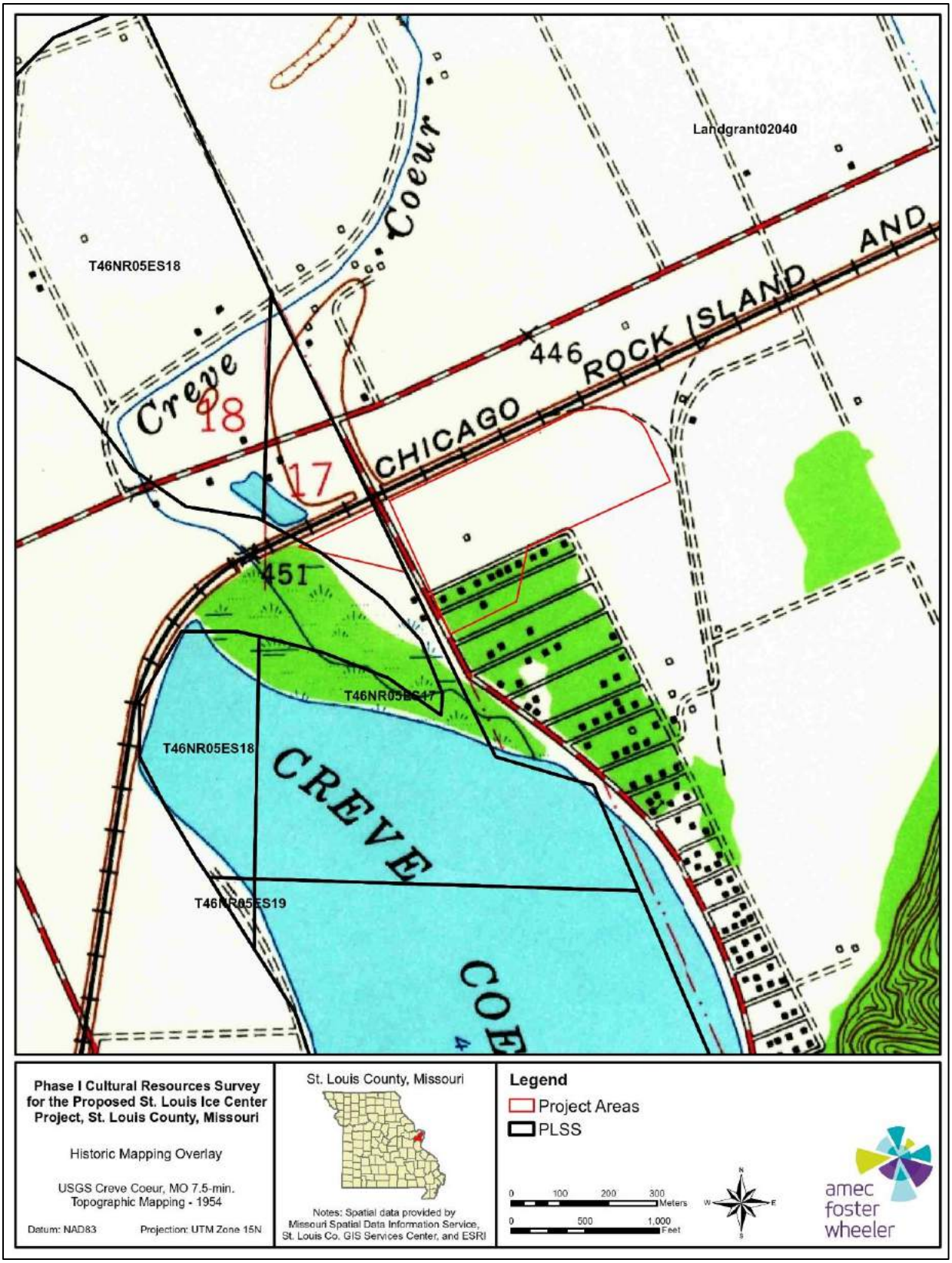


Figure 8. Project area depicted on the 1954 topographic map. Note development in the southern portion of the PA.

Figure 9. Project area depicted on the 1955 aerial image. Note development in the southern portion of the PA.

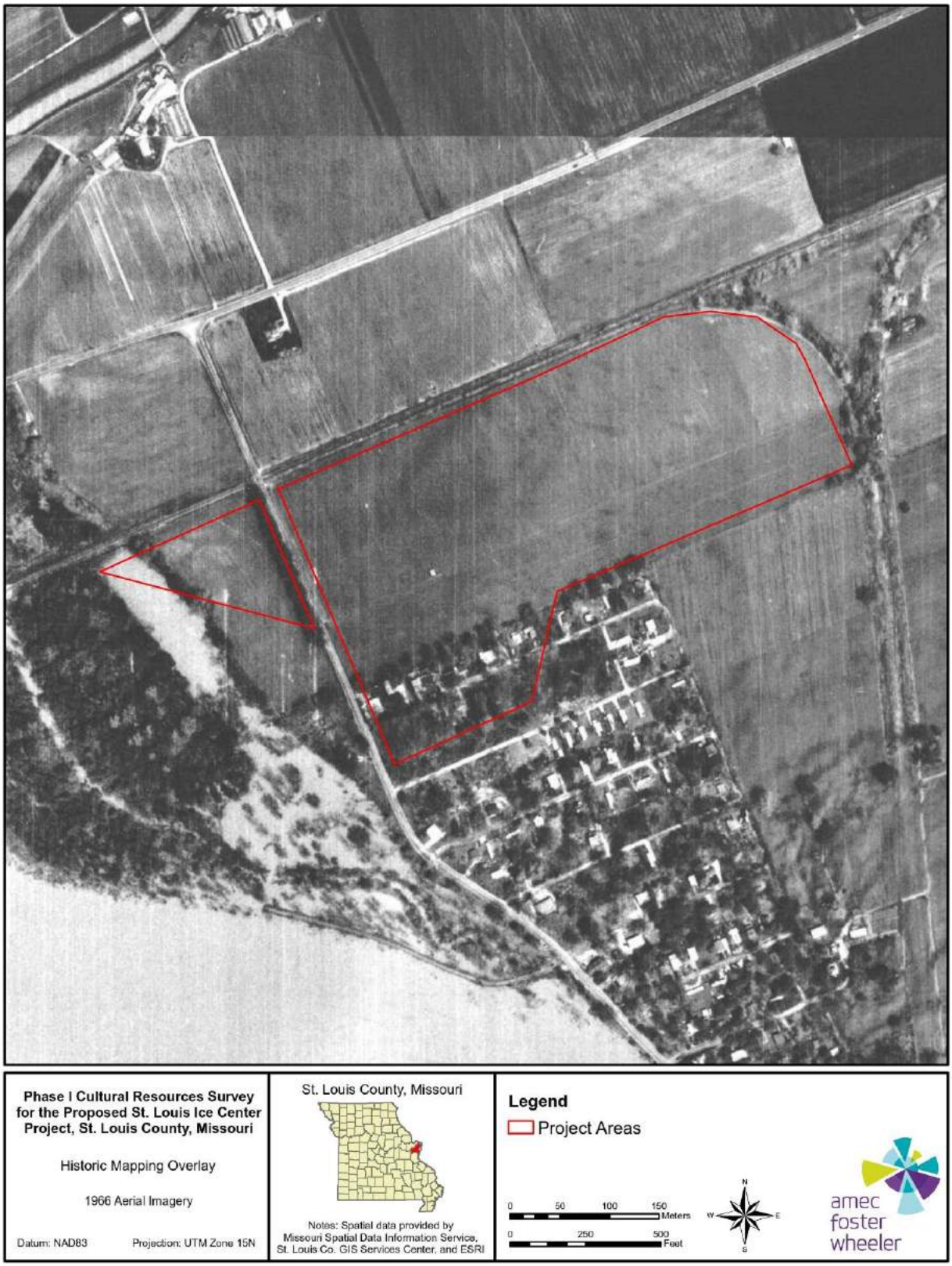


Figure 10. Project area depicted on the 1966 aerial image. Note development in the southern portion of the PA.

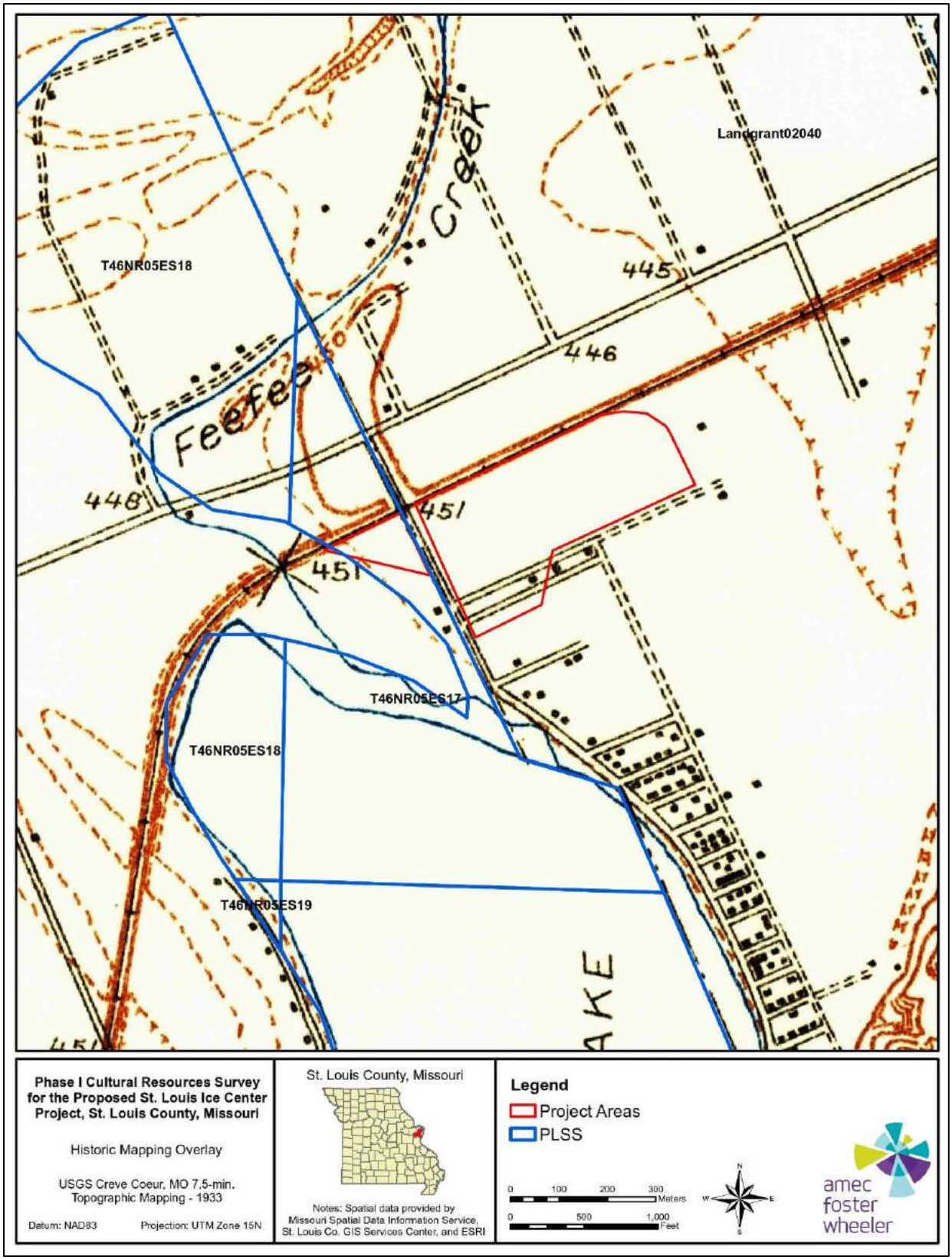


Figure 11. Project area depicted on the 1933 topographic map. Note development in the southern portion of the PA.

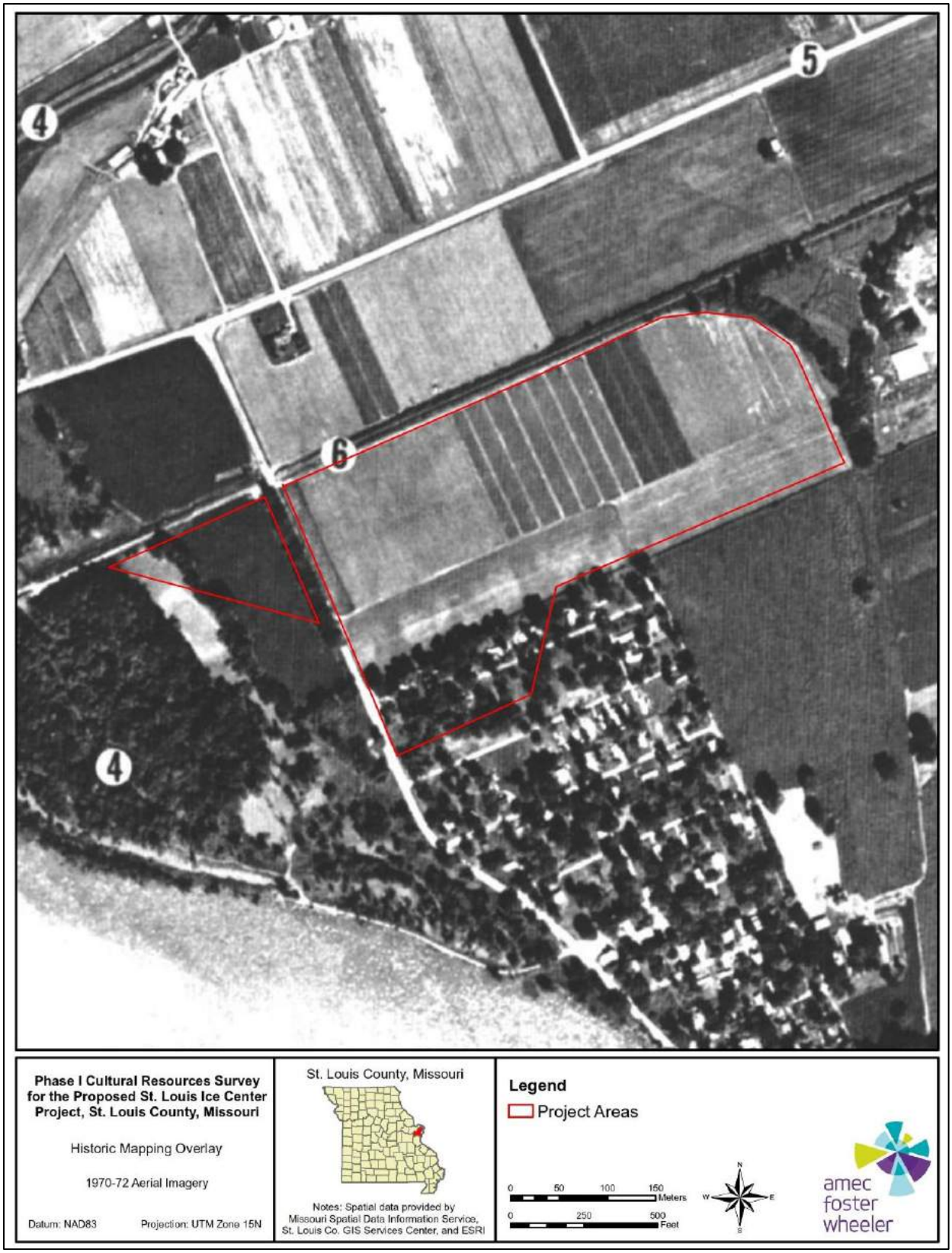


Figure 12. Project area depicted on the 1970/72 aerial image. Note development in the southern portion of the PA.

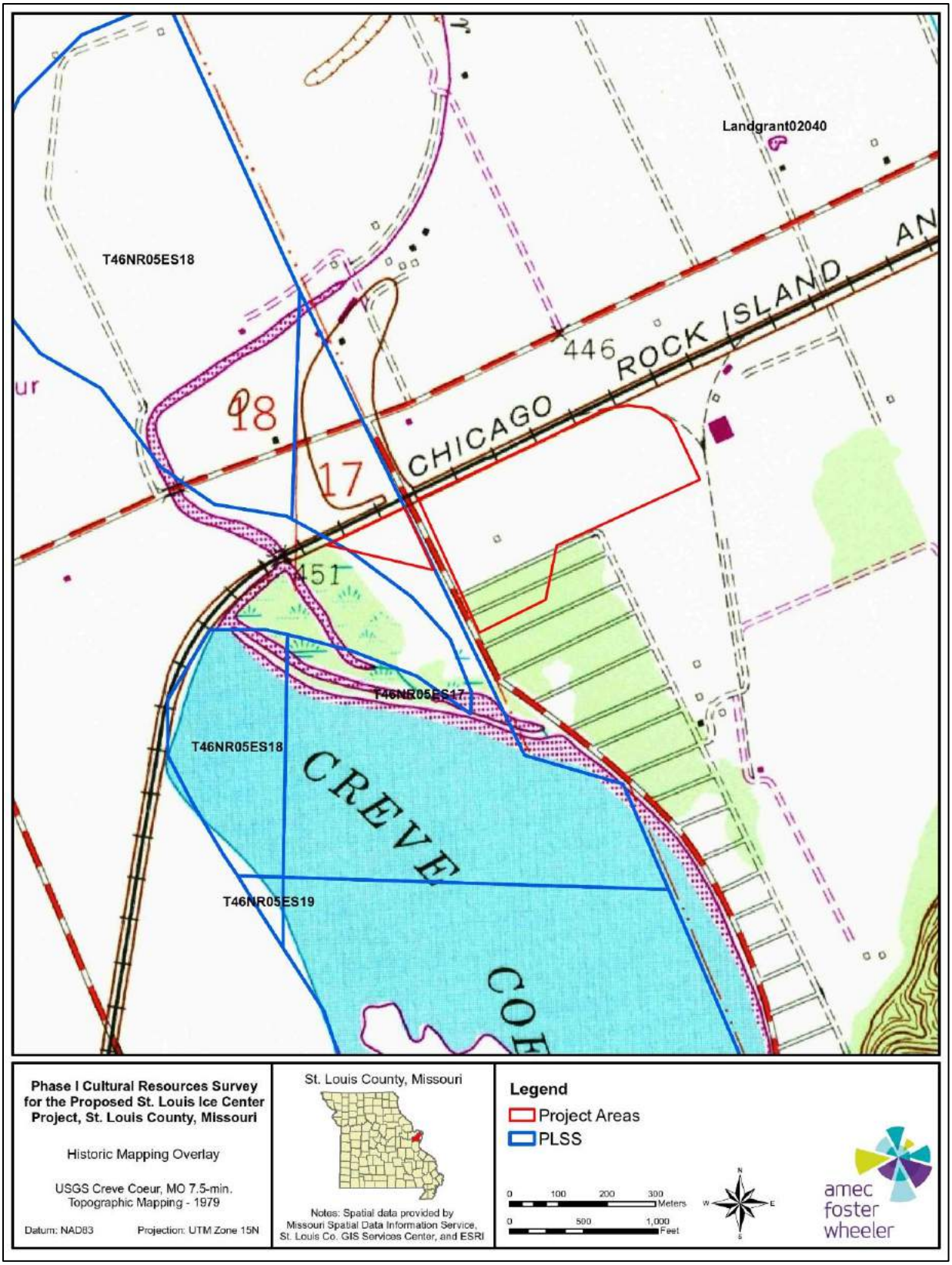


Figure 13. Project area depicted on the 1979 topographic map. Note development in the southern portion of the PA.

Photographs:

Photograph 1. Overview of Area A. View to the southwest.

Photograph 2. Overview of Area B, site 23SL2406. View to the south. Note modern park amenities.

Photograph 3. Overview of Area B, site 23SL2406. View to the east.

Photograph 4. Overview of Area C. View to the east.

Photograph 5. Overview of IF-1 area. View to the west.

Photograph 6. Overview of IF-2 area. View to the south.

Photograph 7. Overview of IF-3 area, push pile. View to the northwest.

Photograph 8. Overview of disturbed area, pond. View to the southwest.

Photograph 9. Overview of disturbed area - old road bed. View to the southeast.

Photograph 10. Overview of disturbed area, new building. View to the south.

Photograph 11. Overview of disturbed area, new trail system. View to the east.

Photograph 12. Overview of disturbed area, graded area. View to the northeast.

Appendix E

Habitat Evaluation Memo

May 8, 2017

Project Technical Memorandum

Project Name:	**St. Louis Ice Center Project**
Project Number:	**325217037**
Date:	**May 8, 2017**
To:	**Steve Coates**
Subject:	**Evaluation of Project Area for Potentially Suitable Bat Habitat**

Prepared by:	Stephanie Miller
Checked by:	Joel Budnik

1.0 Introduction and Purpose

This technical memorandum provides the results of the bat habitat suitability assessments performed by Amec Foster Wheeler personnel (Joel Budnik and Stephanie Miller) on April 27, 2017 in support of the proposed St. Louis Ice Center Project in Maryland Heights, St. Louis County, Missouri. The St. Louis County Department of Parks and Recreation (SLCDPR) manages Creve Coeur Lake Memorial County Park (Park) in the municipality of Maryland Heights in St. Louis County, Missouri. A proposal has been submitted to develop the St. Louis Ice Center (Ice Center) on a piece of land designated as Section 6(f) land within the park. The project is proposed to be constructed on 40 acres of land within the park protected under Section 6(f). As a result, the SLCDPR is preparing an Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) to assess the impacts of the proposed project. The EA serves to provide information to the Missouri Department of Natural Resources (MDNR) and National Park Service (NPS) to evaluate the proposed project with regard to the environmental consequences of the proposed action and any impacts to the human environment.

As part of the environmental analysis for the EA, habitat for the federally threatened northern long-eared bat (*Myotis septentrionalis*) and the federally endangered Indiana bat (*Myotis sodalis*) was evaluated. This technical memorandum provides the results of the habitat evaluation for those species within the proposed project area.

2.0 Methods

The *2016 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS, 2016) served as the basis for determining the methods in identifying suitable bat habitat. As specified in the *2016 Range-Wide Indiana Bat Summer Survey Guidelines*, summer survey guidelines for the northern-long-eared bat are the same as the Indiana bat. The only difference is the definition of summer suitable habitat for each species, with the primary variance being the minimum (diameter at breast height (DBH) of potentially suitable roost trees (those with exfoliating bark, cracks, crevices, and/or hollows), ≥ 5 inches DBH for the Indiana bat and ≥ 3 inches DBH for the northern long-eared bat (USFWS, 2016a). Survey methods consisted of a pedestrian survey to identify potentially suitable roost trees within woodlots within the 40 acres of the proposed Ice Center project area.

In order to characterize the woodlots within each area, Amec Foster Wheeler initially performed a desktop review via aerial photography. The desktop review was used as a planning tool to establish forested woodlots for field evaluations. Once the woodlots were identified, forest stand field evaluations were performed within each woodlot. Forested areas were characterized by filling out the information within the U.S. Fish and Wildlife Service (USFWS) Phase I Summer Habitat Assessment form (USFWS, 2016). The information for the forest community included:

- Dominant species of mature trees,
- DBH,
- Number of trees with exfoliating bark,
- Size composition of live trees (%) for small trees (3-8”), medium trees (9-15”), and large trees (>15”), and
- Canopy cover estimated by stratum (canopy, mid-story, understory).

In addition to characterizing the representative forest community, Amec Foster Wheeler biologists walked each study area where wooded areas existed and recorded any potentially suitable bat roost trees. Potentially suitable bat roost trees were identified as live, dead, or declining trees of appropriate size that have exfoliating bark, cracks, crevices, and/or hollows. If a tree was identified as a potentially suitable bat roost tree, the following information was collected:

- Species,
- Condition (live, dead, or declining),
- DBH,
- Global positioning system (GPS) coordinates, and
- Photographs.

3.0 Results

The woodlots within the surveyed areas were evaluated for presence of potential bat roost habitat and were characterized by the information within the USFWS Phase I Summer Habitat Assessment form (USFWS, 2016). Representative photographs of the project area are located in Appendix A. A datasheet for the project area can be found in Appendix B. Data collection methods are discussed in Section 2.0.

The majority of the project area was comprised of open, grassy/herbaceous fields that appear to be mowed occasionally. The southernmost portion of the project area contained some scattered trees including elms (*Ulmus americana*), hackberry (*Celtis occidentalis*), and various planted oaks (*Quercus spp*.). This area had an open understory comprising of various grasses and herbaceous vegetation that is mowed regularly. The small fencerow bordering the southeastern portion of the project area was dominated by small hackberry trees (*Celtis occidentalis*), honeysuckle shrubs (*Lonicera maackii*), and grape vines (*Vitus sp.*). This fencerow extended westward toward Marine Road where it transitioned into a narrow linear woodlot with larger hackberry trees, honeysuckle shrubs, and grape vines. This small woodlot separates area of scattered trees to the south from the open grassland/herbaceous area in the main part of the project area to the north. The far

eastern edge of the project area borders a stream and the associated wooded riparian area includes larger cottonwood (*Populus deltoides*) and hackberry trees. This woodlot bordering the eastern edge of the site was characterized by overgrown shrubs and vines and a very dense understory. The western portion of the project area, west of Marine Road, was mostly an open mowed field with a few scattered sycamores (*Platanus occidentalis*) and bald cypress (*Taxodium distichum*) near the road. Trees in this area appear to have all been planted during park development.

One tree within the project area exhibited features that would make it a potentially suitable bat roost tree including exfoliating bark, crevices, and hollow cavities. This tree is a large declining American elm (*Ulmus americana;* 121.5 cm DBH) located in the southern portion of the project area just east of Marine Road. The attached Figure 1 shows the general layout of the habitats within the project area, and the location of the one potentially suitable bat roost tree. Figure 2 shows the conceptual site plan indicating areas to be developed and areas where detention basins and tree plantings would be considered.

4.0 Discussion

According to the 2016 Range-Wide Indiana Bat Summer Survey Guidelines (USFWS, 2016a) and the Threatened Species Status for the Northern Long-eared Bat (USFWS, 2016b), suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags greater than 5 inches DBH (12.7 centimeters) for Indiana bats and 3 inches DBH (7.6 centimeters) for northern long-eared bats. A woodlot would be considered potentially suitable based on a number of factors, including: presence of potentially suitable bat roost trees, canopy cover (density of understory and midstory), density of potentially suitable bat roost trees, forest community composition, habitat contiguity and size, and association with water resources. While isolated roost trees, such as the one tree identified in the project area, may offer potential support as habitat, the potential for woodlots containing a higher incidence of roost trees is considered a key factor in evaluation of overall habitat suitability. Forests with a dense understory or midstory would not be considered suitable habitat since they do not provide a space to forage and accessibility to roost trees. Forests with a distinct canopy layer, and either a relatively open understory or midstory, create a space between the canopy and subcanopy for foraging and flight access to potentially suitable roost trees.

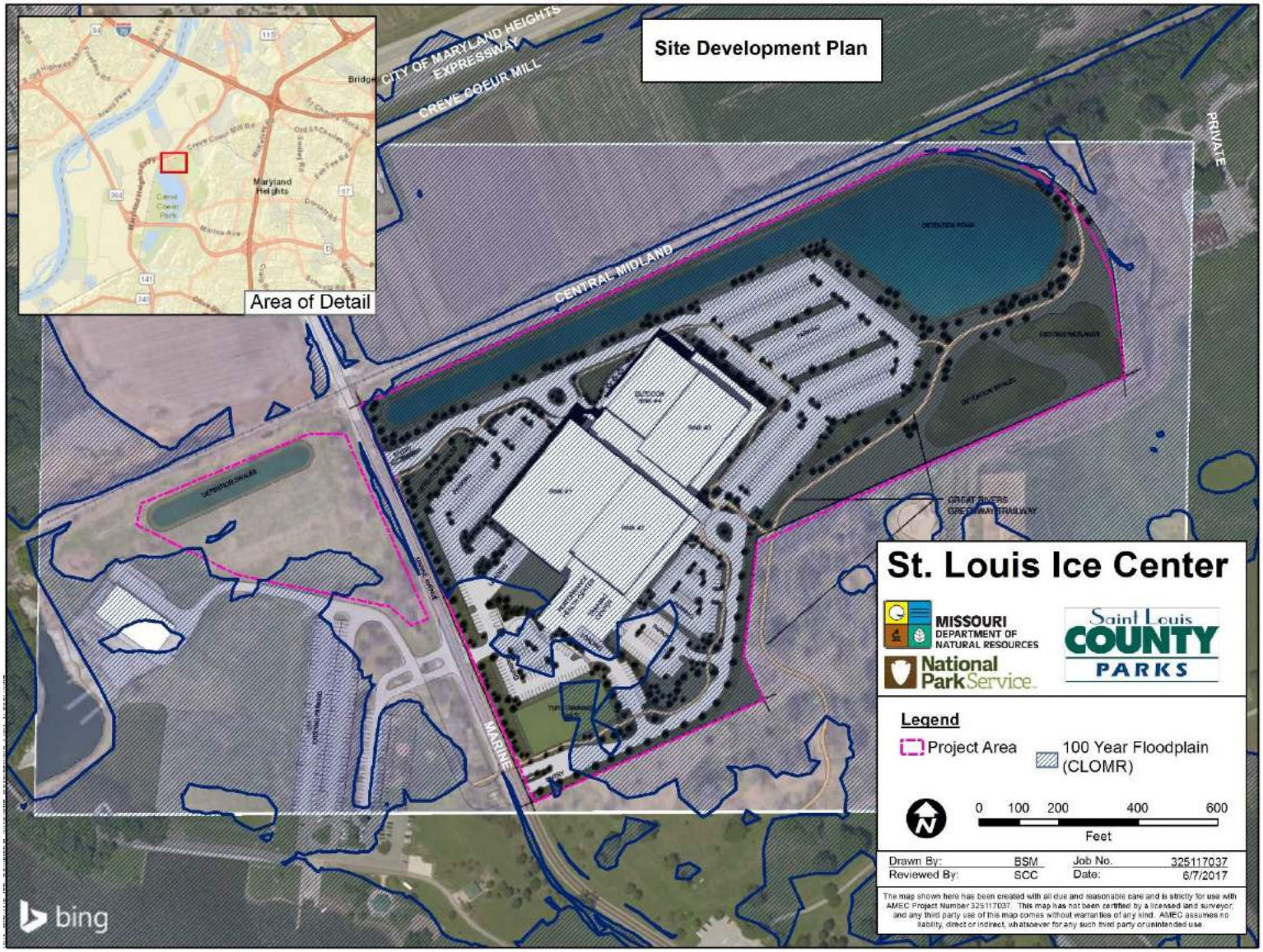
Of the woodlots identified within the areas surveyed as part of the St. Louis Ice Center EA, no woodlots were designated as potentially suitable bat habitat based on the presence of potentially suitable roost trees and the forest community composition. The existing woodlots contained too dense of an understory to allow bats to move through the forest for foraging. While there was one potentially suitable bat roost tree located in the area of scattered trees in the southern portion of the project area, the overall community composition in the area did not have suitable tree species and community structure to support suitable summer bat habitat (trees with exfoliating bark,

cracks, crevices, and/or hollows). The nearest larger blocks of forest are located approximately 1.6 miles to the southeast of the project area along the hillsides.

Based on the lack of available potentially suitable bat habitat and less favorable forest community structures (as described above), tree clearing for the St. Louis Ice Center project should have no effect on roosting or foraging habitat for the Indiana and northern long-eared bats.

Figure 1. General habitat map of the proposed St. Louis Ice Center project area.

Figure 2. Conceptual site plan for the proposed St. Louis Ice Center project area.



5.0 References

U.S. Fish and Wildlife Service (USFWS). 2016a. 2016 Range-Wide Indiana Bat Summer Survey Guidelines. Available at: https://www.fws.gov/Midwest/endangered/mammals/inba/surveys/pdf/2016IndianaBatSummerSurveyGuidelines11April2016. Date Accessed: October 24, 2016.

U.S. Fish and Wildlife Service (USFWS). 2016b. 4(d) Rule for the Northern Long-eared Bat. Final Rule, Federal Register Volume 81, No. 9. January 14, 2016. Available at: https://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/FRnlebFinal4dRule14Jan2016.pdf. Date Accessed: October 24, 2016.

Appendix A

Photo Log

1. Scattered trees in southern portion of project area, facing north toward small, dense woodlot (4-27-17)

2. Scattered trees in southern portion of project area, facing southwest toward Marine Road and Creve Coeur Lake (4-27-17)

3. Grassy/herbaceous area in the main portion of the project area, facing southeast toward small, dense woodlot and fencerow (4-27-17)

4. View of a large cottonwood tree within the dense woodlot/riparian area bordering the east end of project area, facing northeast. (4-27-17)

5. Grassland/herbaceous area in main portion of project area, facing east near center of area (4-27-17)

6. Grassland/herbaceous area in main portion of project area, facing northwest toward Marine Road and railroad crossing (4-27-17)

7. Scattered trees and maintain grass area within the western portion of project area west of Marine Road, facing north along Marine Road toward SR-141 (4-27-17)

8. Potential bat roost tree located in scattered tree area within the southern portion of the project area near Marine Road, facing north (4-27-2017).

9. Crown of potential bat roost tree within the southern portion of the project area showing exfoliating bark (4-27-2017).

10. Trunk of potential bat roost tree showing large section of exfoliating bark (4-27-2017).

11. Stream located just east of the project area, facing south. Stream has limited flight path for use as bat foraging habitat (4-27-2017).

12. Photo of Creve Coeur Lake located just southwest of the project area. Open areas over and adjacent to water may provide bat foraging habitat (4-27-2017).

Appendix B

Phase I Summer Habitat Assessment Forms

PHASE I SUMMER HABITAT ASSESSMENTS

INDIANA BAT HABITAT ASSESSMENT DATASHEET

Project Name:	St. Louis Ice Center	Date:	4-27-17
Township/Range/Section:			
Lat Long/UTM/Zone:		Surveyor:	J. Budnik, S. Miller

Brief Project Description

The primary purpose of the proposed action is to construct a public indoor/outdoor recreational ice complex to accommodate current and anticipated future ice-related recreational opportunities.

Project Area

	Total Acres	Forest Acres	Open Acres
Project	39.41	2.60	36.81

Tree Removal (ac)	Completely Cleared	Partially cleared (with leave trees)	Reserve acres – no clearing
	2.50	0.10	0

Vegetation Cover Types

Pre-Project	Post-Project
Mostly open grassy fields and fields with scattered trees. Some bordering wooded areas comprised of hackberry, honeysuckle, and cottonwood.	Mostly developed areas, some trees planted as landscaping around parking areas. A large detention pond will be constructed along north boundary and northeast corner of site. Trees will be planted around this area. Detention swales and small wetland in southeast corner to provide some emergent vegetation. The detention pond, swale, and wetland areas may provide continued foraging habitat for bats.

Landscape within 5 mile radius

Flight corridors to other forested areas?

No. Mostly developed urban areas, golf courses, parks, and open agricultural lands surrounding project. The nearest forest blocks are located approximately 1.6 miles to the southeast.

Describe Adjacent Properties (e.g. forested, grassland, commercial or residential development, water sources)

Project area is located in a county park that includes a large lake. Other adjacent properties are mostly used for agricultural practices. A golf course is located to the southeast and a four-lane highway (SR-141) to the north. Project area is approximately 1.5 miles from the Missouri River and 1.6 miles to the nearest mature forest blocks.

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (i.e., national or state forests, national or state parks, conservation areas, wildlife management areas)?

Weldon Springs Conservation Area: 10 miles

Babler State Park: 12 miles

Use additional sheets to assess discrete habitat at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area

A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): Project Area 01

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial
	0	0	0
Pools/Ponds (# and size)	0	Open and accessible to bats? Creve Coeur Lake is adjacent	
Wetlands (approx. ac)	Permanent	Seasonal	
	0.13		

Describe existing condition of water sources:
Nearby lake approximately 0.2 miles away. Perennial stream located just outside eastern edge of project area

Forest Resources at Sample Site

Closure/Density	Canopy (>50')	Midstory (20-50')	Understory (<20')	1 = 1-10%; 2 = 11-20%; 3 = 21-40%; 4 = 41-60%; 5 = 61-80%; 6 = 81-100%
	1	5	6	
Dominant Species of Mature Trees	Hackberry, white oak, juniper, red oak, sycamore, elm. The main woodlot contains primarily hackberry trees. The Canopy, Midstory, and Understory estimates above represent the main area of the woodlot and not the area of scattered trees to its south. The Canopy, Midstory, and Understory of the scattered tree area would be a score of "1" for each.			
% Trees with Exfoliating Bark	1	0	0	Note this tree is isolated, but is in proximity to the small linear unsuitable woodlot to its north.
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	15	8	4	
No. of Suitable Snags	1	0	0	Note this tree is isolated, but is in proximity to the small linear unsuitable woodlot to its north.

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? No

Additional Comments:

The one isolated potentially suitable bat roost tree is located away from any known suitable forested areas. The project area is surrounded by a golf course, park, lake, and agricultural areas. A highway and landscape nursery are located to the north.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat.

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources.

Appendix F

Stormwater Management Facilities Report:

Detention Volume – Howard Bend Levee District

March 27, 2017

STOCK & ASSOCIATES
Consulting Engineers, Inc.

St. Louis Ice Center

Located within the Lake Sub-Area of the Hoards Bend Levee District

(Stock Project No. 215-5826.1) – April 7, 2017

A.) Site is Flood Protected from the Missouri River by The Howard Bend Levee District.

B.) Site is located on Flood Insurance Rate Map 29189CO176K dated 2/4/15. It is designated as Zone "AE" – Ponding Area 12 (El. 449) and 31 (El. 450).

C.) "ICPR" – Interconnector Pond Model routing was utilized to design the Wetlake System.

D.) The property is subject to shallow localized flooding from internal drainage (separate from Missouri River water). This is due to the existing topography and lack of a developed drainage system on the site. The Project thru the proposed land development which includes grading of lakes and a drainage canal connection to the Creve Coeur Lake/Creek creates an effective Drainage System including both "Compensatory Storage of Stormwater to replace the

257 CHESTERFIELD BUSINESS PARKWAY •ST. LOUIS, MO 63005 •(636) 530-9100
Fax (636) 530-9130 • E-MAIL ADDRESS: general@stockassoc.com

existing shallow ponding that occurs on the site, plus it provides additional on-site storage/water quality and volume reduction for the increase runoff generated by the building and parking lots, and lastly it provides conveyance to the lake/creek which ultimately discharges to the Missouri River. The net result of this project will be a decrease of .04 feet for the 100-year-10-year flood event for the Lake Sub-Area.

HORNER SHIFRIN

THE POWER HOUSE AT UNION STATION • 401 S. 18th ST., STE. 400 • SAINT LOUIS, MISSOURI 63103-2296
314-531-4321 • FAX 844-339-2910 • www.HornerShifrin.com

March 28, 2017

George Stock
Stock & Associates
257 Chesterfield Business Parkway
St. Louis, MO 63005

RE: St. Louis Ice Center
Stormwater Management Facilities Report: Detention Volume

Dear Mr. Stock:

On behalf of the Howard Bend Levee District, the above-referenced report, dated February 24, 2017 and a revision dated March 27, 2017, have been reviewed for compliance with the levee district's floodplain development policy and master stormwater plan.

Compensatory storage is provided to offset the volume of water displaced by filling. This compensatory storage is stated in the report to be provided within the retention lakes between elevations 449.00 and 442.75 (elevation 442.75 is the historic high groundwater table).

The report cites the use of an ICPR model provided to Stock by Horner & Shifrin on August 5, 2016. Recognizing that this model was provided to you for a different project in a different part of the levee district, Horner & Shifrin does not retain any ownership of the modeling product or results as changes have been made by others. The narrative states that the model was modified to include the ice rink & soccer projects and their detention storage volume elements. The results show the water surface elevations decrease in the LAKE subarea by a nominal 0.04 feet when comparing the pre-development to the post-development for a 100yr-10yr scenario.

The levee district has designed the interior drainage system and flank levee improvements for the 100-year event. This is the higher of these two scenarios: either a 100-year rain event with the river at a low stage or a 10-year rain event with the river at a high stage such that the gate is in the lowered position preventing the river from backing into the levee district. The flank levee system is not designed to contain a 100-year rain event with the gate in a lowered position due to river conditions.

The Howard Bend Levee District is granting approval of the hydraulics of the project as it relates to compensatory storage and compliance with the stormwater master plan. The levee district requests the opportunity to review the site improvement plans when they become available. The permit will be issued based upon review of those documents.

The Howard Bend Levee District does not assume responsibility for performance or maintenance of the drainage system. Maintenance shall remain the responsibility of the property owner and its successors.

Please contact me with any comments or questions.

Sincerely,
HORNER & SHIFRIN, INC.

Karen Frederich

Karen Frederich, P.E., CFM
Project manager

c: Dan Human & Warren Stemme (via email)

STOCK & ASSOCIATES
Consulting Engineers, Inc.

STORMWATER MANAGEMENT FACILITIES REPORT: DETENTION VOLUME – HOWARD BEND LEVEE DISTRICT

St. Louis Ice Center
Maryland Heights, Missouri

Prepared For:

ARCO Construction Company, Inc.
900 North Rock Hill Road
St. Louis, MO 63119
(314) 963-0715

Prepared By:

STOCK AND ASSOCIATES
CONSULTING ENGINEERS, INC.
257 Chesterfield Business Parkway
St. Louis, Missouri 63005
Phone: (636) 530-9100
Fax: (636) 530-9130

Date: February 24, 2017
REVISED: March 27, 2017

Stock Project No. 216-5826.1
MSD P No. xx-xx

Prepared By:

Jacob Buening

Jacob Buening, P.E.
Civil Engineer
License No. PE-2009018698

Under Direct Supervision of:

STATE OF MISSOURI
GEORGE MICHAEL STOCK
NUMBER PE-25116
PROFESSIONAL ENGINEER

3/27/17

George M. Stock, P.E.
Civil Engineer
License No. E-25116

TABLE OF CONTENTS

I. Executive Summary

This report was prepared by Stock & Associates, for ARCO Construction Company, for an recreational ice rink complex located at 13750 Marine Avenue, Maryland Heights Missouri, within the Missouri River watershed.

The proposed site includes the construction of 3 indoor ice rinks, 1 open air ice rink, an outdoor synthetic training field and associated parking lot facilities. Drainage from the proposed site will utilize sheet flow, grass channels and private culverts to discharge runoff to the adjacent Creve Coeur Creek, immediately downstream of Creve Coeur Lake.

The proposed site will be divided into multiple sub-basin watersheds, each tributary to a bio-retention basin BMP and then to a retention lake.

All drainage calculations were done in accordance with MSD's "Rules and Regulations and Engineering Design Requirements for Sanitary Sewers and Stormwater Drainage Facilities dated February 2009" and the Howard Bend Levee District (HBLD) requirements.

II. Introduction

A. Evaluation of Existing Conditions

The existing site consists of un-developed grass fields within Creve Coeur Memorial Park, located immediately east of Marine Avenue and south of the Southern Pacific railroad. An existing maintenance building operated by St. Louis County Park department will be removed as part of this project.

The soil survey map indicates that the site is composed predominantly of Peers silty clay loam, with a Hydrologic Soil Group of 'C'. A copy of the soil survey map and summary table from the soil survey is included in the Appendix for reference.

B. Evaluation of Proposed Conditions

The proposed project consists of the construction of a recreational facility that includes 3 indoor ice rinks and 1 open air ice rink, an outdoor synthetic training field and associated parking lot facilities.

The proposed development will be a single phased project. The total project limits include approximately 40.00 acres, of which approximately 35.5 acres will be disturbed.

For the proposed development, a wet retention lake will be utilized to provide Flood Protection Detention (Fp) and Channel Protection Storage (Cpv). The main retention lake will be interconnected to a secondary "finger lake" immediately west of Marine Avenue. From the second retention lake, an enclosed storm sewer discharge pipe will convey runoff to Creve Coeur Creek. Upstream of the on-site retention lake bio-

retention basins will be utilized to provide Water Quality Treatment (WQv) and Volume Reduction (Volr) for the proposed impervious surfaces. Additional information and calculations for Water Quality are addressed in a separate report to be reviewed and approved by MSD.

The site will be designed such that parking lots will sheet flow into bio-retention basins along their perimeter and roof drains will "bubble up" into bio-retention basins as well. Private sewers will then convey stormwater from the bio-retention BMPs to the on-site retention lake for detention storage.

The existing site is comprised of 0.09 acres of impervious coverage which equates to +/- 0.20% of the project area. The 15-year/20-minute pre-developed runoff rate is:

$$Q(15) = (0.09 \text{ ac.})(3.54) + (39.01 \text{ ac.})(1.70) = 66.64 \text{ cfs}$$

The proposed site will have approximately 20.00 acres of impervious which equates to +/-50.00%. The outdoor synthetic turf field is considered as "impervious" due to the lime stabilized base. The 15-year/20-minute post-developed runoff rate is:

$$Q(15) = (20.00 \text{ ac.})(3.54) + (20.00 \text{ ac.})(1.70) = 104.8 \text{ cfs}$$

The proposed site will have a runoff differential of:

$$Q(15) = 104.8 \text{ cfs} - 66.64 \text{ cfs} = \underline{+38.16 \text{ cfs}}$$

III. Detention Design Approach & Calculations

Flood Protection Detention

For the proposed development, a series of wet retention lakes will be utilized to provide Flood Protection Detention (Qp). Detention volumes provided within the project site are outlined in the attached spreadsheet in Appendix B.

Compensatory Storage

The existing site lies within Flood Zone 'X' Shaded per Flood Insurance Rate Map 29189C0176K with effective date February 4, 2015. Per the FIRM map, the project site has a published base flood elevation of 450.00. A portion of the existing site lies below elevation 450 and will be "filled" as part of the proposed development. This quantity of "fill" is required to be offset by providing an equivalent Compensatory Storage volume in order to maintain the current level of storage provided within the entire watershed. The Compensatory Storage volume will be provided within the retention lakes between elevations 449.00 and 442.75. Elevation 442.75 is historical high ground water table elevation identified on readings from Piezometers #9 and #10 from the Howard Bend Levee District. The required & provided compensatory storage volume is 1,400,000 CF.

Howard Bend Levee District Flood Modelling

As part of the stormwater analysis the Inter-connect Pond Model (ICPR) provided by Horner & Shifrin on 8/05/2016 was updated to include the proposed Ice Rink project (35.7 acres located East of Marine Ave.) as well as the Soccer Complex project.

The ICPR Model was modified to include the Ice Rink project area (35.7 Ac.) into the LAKE subarea (Creve Coeur Lake). The detention storage volumes for the Ice Rink and the Soccer field projects were also added into the model to account for the additional storage. This resulted in the 100yr-10yr. elevations to decrease by 0.04 ft. within the LAKE subarea. All other subareas within the model either remained unchanged or decreased slightly. The model results can be found on the attached 100yr-10yr table in Appendix C.

Summary

Wet retention lakes provide Flood Protection Detention for the proposed development. These retention lakes will be interconnected via storm sewer pipes and discharge into the Creve Coeur Creek, just downstream of the Creve Coeur Lake spillway. The retention lakes will also be sized to provide the Compensatory Storage Volume. In the Appendix that follows are backup data, supporting calculations, and work sheets for the HBLD Detention volumes provided for this project.

IV. Appendices

Appendix A – SITE AND GRADING PLAN (C4.0)

PARKING:

PROPOSED SITE (EAST OF MARINE)	= 880 SPACES
PROPOSED LOT "B" (WEST OF MARINE)	= 257 SPACES
TOTAL	= 1,137 SPACES

COMPENSATORY STORAGE:

REQUIRED FOR MAIN SITE (448.7 TO EX. GRADE)	= 994,313 c.f. OF VOLUME
REQUIRED FOR LOT B (450.4 TO EX. GRADE)	= 78,975 c.f. OF VOLUME
REQUIRED FOR TRAIL (BY OTHERS)	= 426,195 c.f. OF VOLUME

SITE DETENTION:

REQUIRED FOR SITE/PARKING:	= 300,000 c.f. OF VOLUME

TOTAL REQUIRED VOLUME:

COMPENSATORY STORAGE/DETENTION	= 1,799,483 c.f. OF VOLUME
TOTAL PROVIDED (ELEV. 449-442.75)	= 1,851,434 c.f. OF VOLUME

- ELEV. 442.75 IS BASED ON PIEZOMETER #9 AND #10 (HISTORICAL HIGH GROUND WATER ELEVATION)

MARYLAND HEIGHTS EXPRESSWAY

CREVE COEUR MILL ROAD (VARIABLE WIDTH) PUBLIC

N/F
THE HILDA COHEN FAMILY PARTNERSHIP LP
2001 CREVE COEUR MILL RD
DB. 12457, PG. 538

MARINE AVENUE (VARIABLE WIDTH) PUBLIC

MARINE AVENUE (60' w.) PUBLIC

UNION PACIFIC R.R. (formerly ST. LOUIS SOUTHWESTERN R.R.) (100' w.)

LAKE "B"
202,980 c.f. STORAGE VOLUME
(ELEV. 449.00 TO ELEV. 442.75)

STORM DISCHARGE PIPE SUBJECT TO HELD APPROVAL

EXISTING LOT LINE

LAKE "A"
1,466,734 c.f. STORAGE VOLUME
(ELEV. 449.00 TO ELEV. 442.75)
(NORMAL POOL ELEV. = 442.75)
(BTM ELEV. = 431)

AREA "C"
89,191 c.f. STORAGE VOLUME
(2.0'-3.0' DEEP)

WETLANDS TO REMAIN

'ST. LOUIS ICE CENTER'
TOTAL LOT AREA = 35.73 AC.
TOTAL PARKING EAST SIDE
MARINE AVE. = 875 SPACES

FF=453.50

FUTURE OUTDOOR ATHLETIC FIELD (SYNTHETIC TURF)

FUTURE PARKING LOT B (257 Spaces)

ADDRESS: 13777 MARINE AVE
ST. LOUIS, MO 63146

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

GENERAL NOTES:

1) Subject property lies within Flood Zone AE (Base flood elevations determined, Eelev.=449 & 450), Floodway areas within Zone AE, and Zone Shaded X (areas of 0.2% annual chance flood, areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas of less than 1 square mile, and areas protected by levees from the 1% annual chance flood) according to the National Flood Insurance Rate Map Number 29189C0176K with an effective date of February 4, 2015.

PLAN NOTES:

SITE IMPROVEMENTS ARE SHOWN FOR CONCEPTUAL PURPOSES ONLY. APPROVAL OF THIS GRADING PLAN DOES NOT CONSTITUTE APPROVAL OF PROPOSED SITE IMPROVEMENTS IN ANY FORM. PLANS TO BE SUBMITTED TO THE CITY OF MARYLAND HEIGHTS FOR REVIEW, APPROVAL AND PERMITTING PRIOR TO CONSTRUCTION OF ANY SITE IMPROVEMENTS SHOWN.

PROPOSED GRADING MAY NEED TO BE REVISED WITH FURTHER SITE IMPROVEMENT PLAN REVIEW. THIS IS INCLUSIVE OF ANY SITE WORK THAT IS PROPOSED WITHIN RIGHT-OF-WAY.

CONTRACTOR TO ADD TEMPORARY SAFETY FENCING AND SIGNAGE WHERE NECESSARY, OR REQUIRED BY ST. LOUIS COUNTY OR CITY OF MARYLAND HEIGHTS, TO PREVENT ACCESS FROM THE MCKELVEY WOODS TRAIL TO ST. LOUIS ICE CENTER SITE, OR VICE VERSA, UNTIL PROJECTS ARE COMPLETED AND OPEN FOR USAGE.

CONTRACTOR TO PROVIDE 48 HOURS ADVANCED NOTICE TO MATT MCGRATH WITH THE CITY OF MARYLAND HEIGHTS (mmcgrath@marylandheights.com) OR 314-738-2257 PRIOR TO COMMENCING ANY WORK ADJACENT TO, WITHIN OR THAT MAY IMPACT THE CITY'S MCKELVEY WOODS TRAIL - PHASE 2 PROJECT.

PREPARED BY:
STOCK & ASSOCIATES Consulting Engineers, Inc.
257 Chesterfield Business Parkway
St. Louis, MO. 63005 PH. (636) 530-9100 FAX (636) 530-9130
e-mail: general@stockassoc.com
Web: www.stockassoc.com

PROPOSED PLAN FOR:

ST. LOUIS ICE CENTER

13750 MARINE AVENUE
MARYLAND HEIGHTS, MISSOURI 63043

05/10/2017

GEORGE M. STOCK E-25116
CIVIL ENGINEER
CERTIFICATE OF AUTHORITY
NUMBER: 000996

REVISIONS:

1	4-14-2017 GRADING
1	5-10-2017 I-PLANS

DRAWN BY: T.P.S./J.M.B.	CHECKED BY: G.M.S.
DATE: 4-14-2017	JOB NO.: 216-5826.1
M.S.D. P #: ---	BASE MAP #: 13-P
S.L.C. H&T #:	H&T S.U.P. #:
M.D.N.R. #:	

SHEET TITLE:
OVERALL SITE PLAN

SHEET NO.:
C4.0

Appendix B – DETENTION VOLUME SPREADSHEET

PROJECT: Ice Rink

PROJ. NO: 216-5826

Bio Volumes

Detention Area

Elevation	Area	Volume
447.50	2,123	0
448.00	2,867	1,248
449.00	4,396	4,879
449.25	5,080	6,064

Volume 6,064 *CF*

Detention Area

Elevation	Area	Volume
447.00	14,186	0
448.00	23,625	18,906
449.00	33,189	47,313

Volume 47,313 *CF*

Detention Area

Elevation	Area	Volume
446.00	8,901	0
447.00	11,065	9,983
448.00	16,063	23,547
449.00	21,175	42,166

Volume 42,166 *CF*

Detention Area

Elevation	Area	Volume
450.00	2,437	0
451.00	3,334	2,886
452.00	4,435	6,770

Volume 6,770 *CF*

All Bios

Total Volume 102,312 *CF*

Detention Pond Volumes

Lake A

Detention Area

Elevation	Area	Volume
442.75	202,988	0
444.00	217,281	262,668
446.00	240,334	720,283
448.00	263,613	1,224,230
449.00	275,337	1,493,705

Volume 1,493,705 *CF*

Lake B

Detention Area

Elevation	Area	Volume
442.75	17,957	0
444.00	21,290	24,529
446.00	26,806	72,625
448.00	32,549	131,980

Volume 131,980 *CF*

Lake C

Detention Area

Elevation	Area	Volume
443.00	41,922	0
444.00	44,584	43,253
446.00	50,076	137,913

Volume 137,913 *CF*

All Lakes

Detention Area

Elevation	Area	Volume
442.75	220,945	0
444.00	283,155	315,063
446.00	317,216	915,434
448.00	296,162	1,528,812
449.00	275,337	1,814,561

all lakes 1,814,561 *CF*

Appendix C –HOWARD BEND LEVEE DISTRICT MODELLING RESULTS

Current ICPR Model Results From Horner and Shifrin Model received 08/05/2016:	Proposed ICPR Model Results: 02/20/2017 (Ice rink property into LAKE) CN 86 Increase in elevation from current model Increase in elevation from current model 0.25' or greater Decrease in elevation from current model

Name	Simulation	Max Stage E1 (ft.)	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs	Name	Simulation	Max Stage E2 ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs	Rise (E2-E1) ft
AIRPORT E	100Yr-10Yr	443.88	454	0.0077	3118415	1027.03	19.65	AIRPORT E	100Yr-10Yr	443.880	454.000	0.0077	3118415	1027.03	19.65	0.000
AIRPORT W	100Yr-10Yr	446.47	460	0.0031	1696182	389.53	9.1	AIRPORT W	100Yr-10Yr	446.470	460.000	0.0031	1696182	389.53	9.1	0.000
ARROWHEAD	100Yr-10Yr	448.16	452	0.0023	1881822	444.1	0	ARROWHEAD	100Yr-10Yr	448.16	452.000	0.0023	1881822	444.1	0	0.000
BAYNE	100Yr-10Yr	443.25	454	0.0042	167160	40.71	0	BAYNE	100Yr-10Yr	443.25	454.000	0.0042	167160	40.71	0	0.000
BOGGS	100Yr-10Yr	437.87	454	0.0051	425836	178.71	0	BOGGS	100Yr-10Yr	437.87	454.000	0.0051	425836	178.71	0	0.000
CCC-RR	100Yr-10Yr	430	454	*********	113	0	0	CCC-RR	100Yr-10Yr	430.000	454.000	*********	113	0	0	0.000
CCMRBR	100Yr-10Yr	458.53	454	-9.5	91707	8990.91	8945.44	CCMRBR	100Yr-10Yr	458.530	454.000	-9.5000	91707	8990.91	8945.44	0.000
CREVE	100Yr-10Yr	459.84	460	0.0173	65325	8265	8264.53	CREVE	100Yr-10Yr	459.840	460.000	0.0173	65325	8265	8264.53	0.000
CSNO-A	100Yr-10Yr	443.08	454	0.0073	837473	194.34	0	CSNO-A	100Yr-10Yr	443.080	454.000	0.0073	837473	194.34	0	0.000
CSNO-AM	100Yr-10Yr	443.62	454	0.0024	430852	65.92	230.12	CSNO-AM	100Yr-10Yr	443.620	454.000	0.0024	430852	65.92	230.12	0.000
CSNO-AS	100Yr-10Yr	443.9	454	0.0018	173586	33.99	0	CSNO-AS	100Yr-10Yr	443.900	454.000	0.0018	173586	33.99	0	0.000
DE SILT	100Yr-10Yr	452.49	460	-0.0324	6298172	7910.2	7500.31	DE SILT	100Yr-10Yr	452.440	460.000	-0.0324	6275974	7910.32	7497	-0.050
FEESP	100Yr-10Yr	457.81	454	-1.3	1037639	11026.17	7280.21	FEESP	100Yr-10Yr	457.810	454.000	-1.3000	1037639	11034.29	7280.21	0.000
FI	100Yr-10Yr	442.76	454	0.006	833318	226.12	0	FI	100Yr-10Yr	442.760	454.000	0.0060	833318	226.12	0	0.000
FI W	100Yr-10Yr	442.59	454	0.0059	776211	106.37	0.26	FI W	100Yr-10Yr	442.590	454.000	0.0059	776211	106.37	0.26	0.000
FLE	100Yr-10Yr	442.76	454	0.0054	782435	158.85	81.61	FLE	100Yr-10Yr	442.760	454.000	0.0054	782435	158.85	81.61	0.000
FUSZ	100Yr-10Yr	448.14	454	0.0036	532958	310.32	151.55	FUSZ	100Yr-10Yr	448.130	454.000	0.0036	530731	310.32	151.55	-0.010
GLF EST	100Yr-10Yr	452.4	454	0.0036	562553	52.73	36.64	GLF EST	100Yr-10Yr	452.370	454.000	0.0034	561244	52.73	34.95	-0.030
GLF WST	100Yr-10Yr	452.41	454	0.0092	1958304	1044.56	378.36	GLF WST	100Yr-10Yr	452.370	454.000	0.0092	1956833	1017.42	314.64	-0.040
HAFWAY	100Yr-10Yr	458.05	454	-8.8	159888	8945.44	8999.42	HAFWAY	100Yr-10Yr	458.050	454.000	-8.8000	159888	8945.44	8999.43	0.000
JNC-B	100Yr-10Yr	452.5	454	-3.2	193038	2342.65	505.46	JNC-B	100Yr-10Yr	452.460	454.000	-3.2000	190852	2227.15	509	-0.040
JOIN	100Yr-10Yr	457.66	454	0.0135	2300328	6125.39	2327.38	JOIN	100Yr-10Yr	457.660	454.000	0.0135	2300328	6092.49	2327.38	0.000
KNOBBE E	100Yr-10Yr	440.73	460	0.0078	442579	354.86	0	KNOBBE E	100Yr-10Yr	440.730	460.000	0.0078	442579	354.86	0	0.000
KNOBBE W	100Yr-10Yr	441.31	460	0.0079	748543	596.53	0	KNOBBE W	100Yr-10Yr	441.31	460.000	0.0079	748543	596.53	0	0.000
LAKE	100Yr-10Yr	452.48	454	-0.0154	26884157	7710.33	5193.57	LAKE	100Yr-10Yr	452.44	454.000	-0.0154	30043964	7717.12	5180.77	-0.040
LEACH	100Yr-10Yr	450.32	454	0.0024	221059	34.34	0	LEACH	100Yr-10Yr	450.32	454.000	0.0024	221059	34.34	0	0.000
LITZ	100Yr-10Yr	443	460	0.0057	364702	115.39	0	LITZ	100Yr-10Yr	443.000	460.000	0.0057	364702	115.39	0	0.000
LKNE	100Yr-10Yr	452.48	454	0.0064	10955181	7650.97	0	LKNE	100Yr-10Yr	452.430	454.000	0.0064	10945171	7637.54	0	-0.050
LTLDS E	100Yr-10Yr	441.07	460	0.0081	442844	380.48	0	LTLDS E	100Yr-10Yr	441.070	460.000	0.0081	442844	380.48	0	0.000
LTLDS W	100Yr-10Yr	440.06	460	0.0086	723157	416.24	0	LTLDS W	100Yr-10Yr	440.060	460.000	0.0086	723157	416.24	0	0.000
LTLUS M	100Yr-10Yr	447.41	460	0.8155	8817178	1053.86	8039.98	LTLUS M	100Yr-10Yr	447.400	460.000	0.8155	8816752	1053.86	8039.98	-0.010
LTLUS N	100Yr-10Yr	447.41	460	0.0025	3760920	8039.98	0	LTLUS N	100Yr-10Yr	447.400	460.000	0.0025	3759814	8039.98	0	-0.010
LTLUS S	100Yr-10Yr	447.41	460	0.0036	8203367	1121.46	370.78	LTLUS S	100Yr-10Yr	447.410	460.000	0.0036	8199046	1121.46	370.36	0.000
M WN	100Yr-10Yr	448.68	460	0.0039	644357	203.8	46.99	M WN	100Yr-10Yr	448.680	460.000	0.0039	644357	203.8	46.99	0.000
M WS	100Yr-10Yr	447.33	460	0.2656	1002483	630.61	517.43	M WS	100Yr-10Yr	447.330	460.000	0.2656	1000831	630.61	517.43	0.000

Current ICPR Model Results From Horner and Shifrin Model received 08/05/2016:

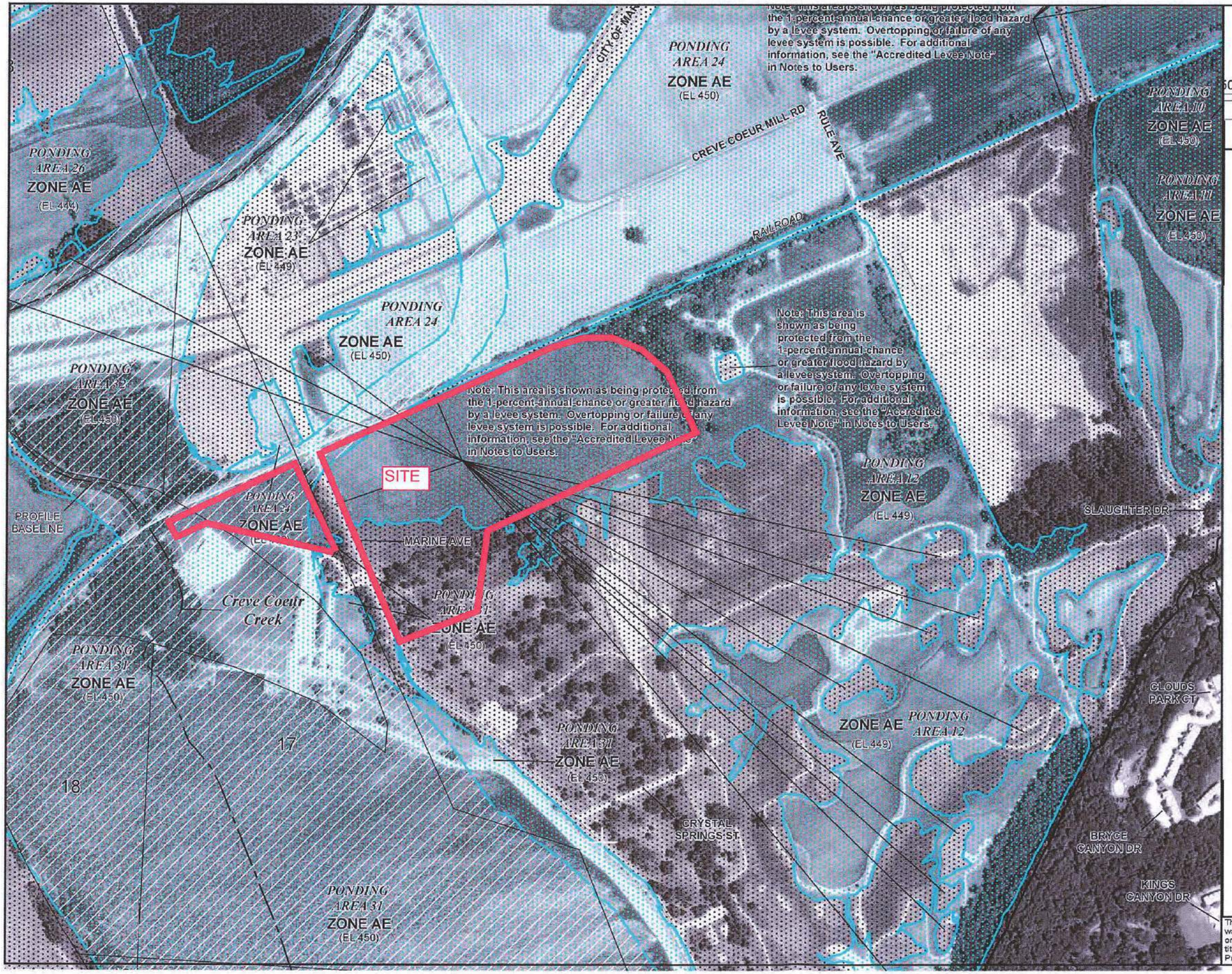
Proposed ICPR Model Results: 02/20/2017 (Ice rink property into LAKE) CN 86

Increase in elevation from current model
Increase in elevation from current model 0.25' or greater
Decrease in elevation from current model

Name	Simulation	Max Stage E1 (ft.)	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs
MAWC N	100Yr-10Yr	449.74	460	0.0049	1408644	392.58	0
MAWC_E	100Yr-10Yr	450.91	460	0.0008	99991	179.48	177.53
MAWC_W	100Yr-10Yr	450.63	460	0.0103	386426	243.06	0
McBridePumpPt	100Yr-10Yr	442.55	460	0.0001	43560000	315.39	0
MEET	100Yr-10Yr	452.5	454	-3.2	242065	1816.4	2342.65
MIT	100Yr-10Yr	452.06	460	0.0018	1287935	338.61	301.01
MORV	100Yr-10Yr	456	471	0	663	2142.17	0
MSD	100Yr-10Yr	457.6	454	-3.2	188809	505.46	5268.47
MSD S	100Yr-10Yr	442.76	454	0.0047	665399	301.05	0
OrtmannChannel	100Yr-10Yr	439.09	460	0.0679	7498	89.56	135.92
P_NW	100Yr-10Yr	448.34	454	0.0034	866298	246.05	5.08
PFR	100Yr-10Yr	457.95	454	-6.2	159183	8999.42	18093.79
PFREST	100Yr-10Yr	452.38	454	-0.0266	675655	62.46	26.91
PFRWST	100Yr-10Yr	452.38	454	-1	675649	59.61	59.46
PumpDischargePt	100Yr-10Yr	439.04	0	0	43560000	135.92	0
RPCSNO	100Yr-10Yr	443.62	454	0.2414	3889571	680.81	0
SALVAGE	100Yr-10Yr	452.47	454	0.0026	2080321	171.41	186.23
SUB AN	100Yr-10Yr	452.38	454	0.0037	2035054	488.41	0
SUB AS	100Yr-10Yr	452.38	454	0.0017	666615	748.97	678.02
SUB BNE	100Yr-10Yr	452.48	454	0.0035	4186646	1111.27	0
SUB BNW	100Yr-10Yr	448.85	454	0.0022	149256	30.02	0
SUB BSN	100Yr-10Yr	452.48	454	0.0022	3216850	2528.24	1251.17
SUB BSS E	100Yr-10Yr	452.48	454	0.0061	721062	1349.16	0
SUB BSS W	100Yr-10Yr	452.48	454	0.0021	1675379	138.63	170.75
SUB C	100Yr-10Yr	444.27	454	-0.0144	370271	115.07	2.2
SUB C8	100Yr-10Yr	443.28	454	0.0058	646804	309.58	8.35
SUB C8N	100Yr-10Yr	441.25	455	0.0083	879135	592.35	0.01
SUB C8S	100Yr-10Yr	445.21	454	0.0047	460370	210.32	116.74
SUB-A	100Yr-10Yr	457.85	454	-2.2	186754	18093.79	11021.58
UP2BOX	100Yr-10Yr	457.65	454	0.0135	1292144	2331.45	2142.17

Name	Simulation	Max Stage E2 ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Inflow cfs	Max Outflow cfs	Rise (E2-E1) ft
MAWC N	100Yr-10Yr	449.740	460.000	0.0049	1408644	392.58	0	0.000
MAWC_E	100Yr-10Yr	450.910	460.000	0.0008	99991	179.48	177.53	0.000
MAWC_W	100Yr-10Yr	450.630	460.000	0.0103	386426	243.06	0	0.000
McBridePumpPt	100Yr-10Yr	442.540	460.000	0.0001	43560000	314.79	0	-0.010
MEET	100Yr-10Yr	452.450	454.000	-3.2000	240004	1816.4	2227.15	-0.050
MIT	100Yr-10Yr	452.060	460.000	0.0018	1287933	338.61	300.91	0.000
MORV	100Yr-10Yr	456.000	471.000	0.0000	663	2142.17	0	0.000
MSD	100Yr-10Yr	457.600	454.000	-3.2000	188809	509	5258.78	0.000
MSD S	100Yr-10Yr	442.760	454.000	0.0047	665399	301.05	0	0.000
OrtmannChannel	100Yr-10Yr	439.090	460.000	0.0679	7498	89.56	135.92	0.000
P_NW	100Yr-10Yr	448.340	454.000	0.0034	866298	246.05	5.08	0.000
PFR	100Yr-10Yr	457.950	454.000	-6.2000	159183	8999.43	18093.39	0.000
PFREST	100Yr-10Yr	452.300	454.000	-0.0266	674635	62.46	26.91	-0.080
PFRWST	100Yr-10Yr	452.300	454.000	-1.0000	674628	59.61	59.46	-0.080
PumpDischargePt	100Yr-10Yr	439.040	0.000	0.0000	43560000	135.92	0	0.000
RPCSNO	100Yr-10Yr	443.620	454.000	0.2414	3889571	680.81	0	0.000
SALVAGE	100Yr-10Yr	452.430	454.000	0.0025	2079099	171.41	176.52	-0.040
SUB AN	100Yr-10Yr	452.300	454.000	0.0037	2033964	431.11	0	-0.080
SUB AS	100Yr-10Yr	452.300	454.000	0.0017	664924	644.14	581.29	-0.080
SUB BNE	100Yr-10Yr	452.430	454.000	0.0035	4176623	1091.9	0	-0.050
SUB BNW	100Yr-10Yr	448.850	454.000	0.0022	149256	30.02	0	0.000
SUB BSN	100Yr-10Yr	452.430	454.000	0.0022	3212456	2448.76	1199.97	-0.050
SUB BSS E	100Yr-10Yr	452.430	454.000	0.0057	720930	1269.26	0	-0.050
SUB BSS W	100Yr-10Yr	452.430	454.000	0.0021	1674697	138.63	172.14	-0.050
SUB C	100Yr-10Yr	444.270	454.000	-0.0144	370271	115.07	2.2	0.000
SUB C8	100Yr-10Yr	443.28	454.000	0.0058	646804	309.58	8.35	0.000
SUB C8N	100Yr-10Yr	441.25	455.000	0.0083	879135	592.35	0.01	0.000
SUB C8S	100Yr-10Yr	445.21	454.000	0.0047	460370	210.32	116.74	0.000
SUB-A	100Yr-10Yr	457.85	454.000	-2.2000	186754	18093.39	11029.7	0.000
UP2BOX	100Yr-10Yr	457.65	454.000	0.0135	1292144	2331.45	2142.17	0.000

Appendix D – FLOOD INSURANCE RATE MAPS



MAP SCALE 1" = 500'

0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0176K

FIRM

FLOOD INSURANCE RATE MAP

ST. LOUIS COUNTY, MISSOURI
AND INCORPORATED AREAS

PANEL 176 OF 445
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHAMP, VILLAGE OF	290609	0176	K
MARYLAND HEIGHTS, CITY OF	290669	0176	K

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
29189C0176K

MAP REVISED
FEBRUARY 4, 2015

Federal Emergency Management Agency

Appendix F –SOIL SURVEY MAP

Hydrologic Soil Group—St. Louis County and St. Louis City, Missouri
(Ice Complex)

Map Scale: 1:4,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: St. Louis County and St. Louis City, Missouri
Survey Area Data: Version 16, Sep 28, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 13, 2014—Jun 25, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — St. Louis County and St. Louis City, Missouri (MO189)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
66059	Peers silty clay loam, 0 to 2 percent slopes, occasionally flooded	C/D	46.5	100.0%
Totals for Area of Interest			46.5	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix G

Form AD-1006

Farmland Conversion Impact Rating

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request May 18, 2017	
Name of Project St. Louis Ice Center		Federal Agency Involved Natl. Park Service	
Proposed Land Use Recreation		County and State St. Louis County, Missouri	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS 5/18/17	Person Completing Form: D. SKAGER
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES [X] NO [ ]	Acres Irrigated	Average Farm Size
Major Crop(s) CORN	Farmable Land In Govt. Jurisdiction Acres: 29.9 % 94,618	Amount of Farmland As Defined in FPPA Acres: 30.7 % 97,224	
Name of Land Evaluation System Used LESA	Name of State or Local Site Assessment System None	Date Land Evaluation Returned by NRCS 5/18/17	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	39.91			
B. Total Acres To Be Converted Indirectly	-			
C. Total Acres In Site	39.91			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	39.91			
B. Total Acres Statewide Important or Local Important Farmland	0			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	0.0001			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	12.7			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	83			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	15			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	0			
4. Protection Provided By State and Local Government	(20)	0			
5. Distance From Urban Built-up Area	(15)	4			
6. Distance To Urban Support Services	(15)	0			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	10			
9. Availability Of Farm Support Services	(5)	1			
10. On-Farm Investments	(20)	0			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	40	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	83	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	40	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	123	0	0	0

Site Selected: SITE A	Date Of Selection	Was A Local Site Assessment Used? YES [ ] NO [ ]

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side)

Form AD-1006 (03-02)

Appendix H

Marine Ave. – Road Widening Plan

CBB TRANSPORTATION ENGINEERS+PLANNERS SINCE 1973

Meeting Summary

Date:	June 16, 2017
To:	Mr. Scott Vogelsang, P.E., LEED-AP – ARCO Construction Company Mr. Patrick Quinn, St. Louis Legacy Ice Foundation
From:	Mr. Brian Rensing, P.E., PTOE
CBB Job Number:	027-17
Project:	The Maryland Heights Ice Complex Marine Avenue near Missouri 141 Maryland Heights, Missouri

---

A meeting was held on June 15, 2017 to discuss the results of the traffic impact study (TIS) generated by CBB for the proposed Ice Complex along Marine Avenue near Missouri Route 141 in the City of Maryland Heights, Missouri. The meeting included representatives from the development team (ARCO and Legacy Ice Foundation), the site civil engineer (Stock & Associates Consulting Engineers, Inc.), the City of Maryland Heights, St. Louis County Department of Transportation (SLCDOT), the Missouri Department of Transportation (MoDOT), and CBB.

At the conclusion of this meeting, all three review agencies identified above provided their verbal concurrence with the findings and the recommendations of the TIS. The following is a brief summary of action items and next steps:

- All agencies concurred with the recommended improvements along Marine Avenue as shown in the attached 'conceptual' drawing. The development team will start the process of generating final design plans and any associated permit applications.
- MoDOT requires that the development team retain a qualified traffic engineer to develop optimized signal timing plans based on field observations at the intersections of Marine Avenue and Creve Coeur Mill North along Route 141 after the facility is in operation.
- City of Maryland Heights indicated that the pedestrian crossings as shown on the revised layout (at both the north and south entrances) are acceptable at this time. Pedestrian flows and vehicular conflicts would be monitored by the development team after the facility is in operation to ensure safe pedestrian crossing of Marine Avenue.

Please contact Brian Rensing via email at brensing@cbbtraffic.com or by phone at 314-449-9569 should you have any questions.

CREVE COEUR MILL ROAD (VARIAE

MARINE AVENUE (VARIABLE WIDTH) PUBLIC

SURVEY 3094

SURVEY 2040

SHADED ZONE X

ZONE AE (EL 450)

ZONE AE (EL 449)

N72° 47' 44"E 554.28'

S65° 51' 58"W 539.00'

S65° 51' 58"W 678.88'

S65° 48' 28"W 798.40'

N18° 31' 50"W 119.23'

N18° 30' 26"W 307.27'

N24° 00' 57"W 373.71'

N23° 59' 45"W 182.17'

S 23°58'02" W 224.84'

N 23°59'04" W 724.80'

S 23°56'16" E 532.06'

S 23°56'16" E 532.06'

240.96'

153.84'

RE-STRIPE FOR DUAL LEFT TURN LANES

EXIST. 12'w SHOULDER

SANITARY M.H. "F" TOP=454.25 ± FL=436.33

140'~10" PVC. SAN. SEWER @ 0.44 %

PROPOSED SHOULDER WIDENING

DUAL LEFT TURN LANES (300' L)

POTENTIAL OFF-SITE GRADING WITH FILL OVER FORCE MAIN

EXIST. 8'w WATER MAIN TO BE LOCATED UNDER NEW PVMT.

EXIST. 8'w SHOULDER

EXTEND EXIST. CULVERT (± 12')

PROPOSED SHOULDER WIDENING

EXISTING SHOULDER

TAPER PROPOSED SHOULDER BACK TO EXISTING

BEGIN CONTINUOUS LEFT TURN LANE (33'w SECTION)

EXIST. 42" FORCE MAIN

SANITARY M.H. "G" TOP=455.50 ± FL=436.95

EXISTING RIGHT TURN LANE (UIP)

48'

165' TAPER

320'~10" PVC SAN. SEWER @ 0.44 %

EXISTING SHOULDER

SANITARY M.H. "H" TOP=451.75 ± FL=438.36

180'~10" PVC SAN. SEWER @ 0.44 %

EXISTING 3'w SHOULDER

UTILITY POLE RELOCATION

EXISTING RAILROAD RIGHT-OF-WAY

PROPOSED PAVEMENT WIDENING

SANITARY M.H. "I" TOP=450.25 ± FL=439.02

RELOCATED SANITARY SEWER BORED & CASED UNDER RAIL

RELOCATED SIGNAL POLE

STOP BAR

33' PVMT

PR. 10' WIDE SEW. ESMT.

UTILITY POLE RELOCATION

2.1 EOP FL=438.75

2.1A FES FL=442.75

2.2 FES FL=438.75

2.2A FES FL=442.75

3.1 FES FL=442.75

4.1 EOP FL=439.00

4.2 4-WAY A.I. TOP=450.42 SILL=449.50 FL=442.00

3.2 FES FL=447.00

4.3 DBL. A.I. TOP=448.17 SILL=447.25 FL=442.50

4.4 FES TOP=446.00

4.5 G.I. TOP=450.40 FL=446.06

4.6 G.I. TOP=450.40 FL=446.40

4.7 BUBBLER FL=446.00

4.8 MANHOLE TOP=453.25 FL=447.50

4.9 FES FL=447.80

4.10 FES FL=448.10

5.5 MANHOLE TOP=453.25 FL=448.25 BIKE RACK

7.6 4-WAY A.I. TOP=449.67 SILL=448.75 FL=444.00

7.7 FES FL=448.00

7.10 MANHOLE TOP=451.50 FL=447.67

7.11 FES FL=448.00

7.12 BUBBLER FL=445.5

7.9 FES FL=447.50

14.1 FES FL=448.50

14.2 FES FL=448.70

SAN. M.H. TOP=450.2 FL=440.00

SAN. M.H. TOP=453.12 TOP PIPE=451.32 BOT=447.37

SAN. M.H. TOP=452.21 TOP PIPE=447.82 BOT=446.46

EX. POLE (TBR & R)

UTILITY POLE & PHONE BOX RELOCATION

UTILITY POLE RELOCATION

UTILITY POLE RELOCATION

UTILITY POLE RELOCATION

UTILITY POLE RELOCATION

2-WAY LEFT TURN LANE (33'w SECTION)

END CONTINUOUS LEFT TURN LANE (33'w SECTION)

TIE TO EXISTING 2-LANE ROAD SECTION

POTENTIAL UTILITY POLE RELOCATION

ADDRESS: 13777 MARINE AVE. ST. LOUIS, MO 63146

FUTURE PARKING LOT B (257 Spaces)

BIO E

BIO F

BIO G

157 SPACES

106 SPACES

61 SPACES

FUTURE OUTDOOR ATHLETIC FIELD SPACE (120' x 225')

"ST. LOUIS ICE CE

TOTAL LOT AREA

TOTAL PARKING E

MARINE AVE. = 87

FF.=453.50

RINK #1

RINK #2

F.F.=4

8"ø COMBO FIRE/DOMESTIC SERVICE

FDC

MECHANICAL YARD

CONC. PVMT.

HVY DUTY PVMT.

STD DUTY PVMT.

SLOTTED CURB

8'w WALK

6" PERF. PVC

6" PERF. PVC SURF. ELEV. 445.75

STOP SIGN (TYP.)

H.C. SIGN (TYP.)

PARKING BLOCK (TYP.)

SANITARY TS=444.50

MANHOLE TOP=453.25 FL=447.50

MANHOLE TOP=453.25 FL=447.00

DROP OFF CIRCLE

TRASH

VAULT

FULL FLOW METER VAULT

8" WATER TAP PER MO. AMERICAN WATER CO.

WATER SERVICE TO BE BORED UNDER MARINE AVE.

PR. 10' WIDE DRAINAGE ESMT.

ROAD DITCH

PONDING AREA 24

PONDING AREA 31

EXIST. 42" FORCE MAIN

N/F V&S RAILWAY, LLC

R.R. CROSSING SIGNAL

275'w EASEMENT TO UNION ELEC. CO. DB. 6403, PG. 227.

30' EASEMENT TO ST. LOUIS COUNTY WATER CO. DB. 12509, PG. 2085

10'w FEE, TRUNK SEWER EASEMENT DB. 6359, PG. 1254

15'w EASEMENT TO MSD DB. 7588, PG. 1484

15'w EASEMENT TO MSD DB. 7564, PG. 998

30' EASEMENT TO ST. LOUIS COUNTY WATER CO. DB. 12509, PG. 2069

EASEMENT TO UNION ELEC. CO. DB. 1206, PG. 79

10'w EASEMENT DB. 185 AGRE DB. 189371

APPRX. LOCATION TEMPORARY SLOPE CONSTRUCTION LICENSE DB. 22460, PG. 1837

POTENTIAL WETLAND AREA AS DESIGNATED IN EMAIL DATED 12/09/2016 BY TONY [illegible], PE., GEOTECHNOLOGY, INC. PHONE: 314-997-7440

ASPHALT

GRAVEL

"B"

0 c.f. STORAGE VOLUME

. 449.00 TO ELEV. 442.75)

Appendix I

Correspondence

DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT CORPS OF ENGINEERS
1222 SPRUCE STREET
ST. LOUIS, MISSOURI 63103-2833

REPLY TO
ATTENTION OF:

May 15, 2017

Regulatory Branch
File Number: MVS-2016-983

St. Louis County Industrial Development Authority
c/o Sheila Sweeney
Chief Executive Officer
St. Louis Economic Development Partnership
7733 Forsyth Blvd., 23rd Floor
Clayton, MO 63105

Dear Mrs. Sweeney:

We have reviewed your project, known as *St. Louis Ice Center in Maryland Heights*. The submitted plans include the construction of a new building, with associated infrastructure, within the City of Maryland Heights. More specifically, the project occurs in Section 17, Township 46 North, Range 05 East, St. Louis County, Missouri.

Section 404 of the Clean Water Act assigns responsibility to the Secretary of the Army to administer a permit program to regulate the excavation or placement of dredged or fill material in waters of the United States. The excavation or placement of any dredged or fill material in waters of the United States below ordinary high water elevation or in wetlands, must be authorized by a Section 404 permit.

Based upon a review of the U.S. Geological Survey 7.5-minute topographical map, soil survey, National Wetland Inventory maps, the wetland delineation dated 9 January 2017, and a site visit on April 13, 2017 to verify wetland boundaries, the proposed activity does not appear to directly impact the delineated wetland area or Creve Coeur Creek, therefore a **Department of the Army, Section 404 permit is not required** for this project**.**

This determination is applicable only to the permit program administered by the Corps of Engineers. It does not eliminate the need to obtain other Federal, state or local approvals before beginning work.

You are reminded that although your proposal does not need a Section 404 permit, based on your submitted plans, dated 2 May 2017, any revisions to your proposal may be subject to Section 404. Any impacts to waters of the United States are to be avoided and would require subsequent authorization from this office.

If you have any questions, please contact Chad LaMontagne at (314) 331-8044. Please refer to file number **MVS-2016-983**. The St. Louis District Regulatory Branch is committed to providing quality and timely service to our customers. In an effort to improve customer service, please take a moment to go to our Customer Service Survey found on our web site at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

Sincerely,

Rob Gramke
Missouri Section Chief
Regulatory Branch

CC:
St. Louis County, Missouri
c/o Jeff Wagener – Special Assistant, St. Louis County Executive

Legacy Ice Foundation
c/o Patrick Quinn – Chairman

Summit Family of Companies
c/o Peter Kinsella – Vice President, Development

Stock & Associates Consulting Engineers, Inc.
c/o George Stock, P.E. - President

CBB TRANSPORTATION ENGINEERS+PLANNERS SINCE 1973

Meeting Summary

Date:	June 16, 2017
To:	Mr. Scott Vogelsang, P.E., LEED-AP – ARCO Construction Company Mr. Patrick Quinn, St. Louis Legacy Ice Foundation
From:	Mr. Brian Rensing, P.E., PTOE
CBB Job Number:	027-17
Project:	The Maryland Heights Ice Complex Marine Avenue near Missouri 141 Maryland Heights, Missouri

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Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Eric R. Greitens, Governor
Carol S. Comer, Director

June 20, 2017

Janet Wilding
Vice President of Major Projects
St. Louis Economic Development Partnership
7733 Forsyth Blvd., Suite 2300
St. Louis, Missouri 63105

Re: Proposed St. Louis Ice Center Project, Creve Coeur Lake Memorial County Park (LWCF) St. Louis County, Missouri

Dear Ms. Wilding:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which requires identification and evaluation of cultural resources.

We have reviewed the June 2017 report entitled *Phase I Cultural Resource Survey for the Proposed St. Louis Ice Complex, St. Louis County, Missouri* by Amec Foster Wheeler Environment & Infrastructure, Inc. Based on this review it is evident that a thorough and adequate cultural resources survey has been conducted of the project area. We concur with the investigator's recommendation that archaeological site 23SL2406 is not eligible for inclusion in the National Register of Historic Places. There will be **no historic properties affected** and, therefore, we have no objection to the initiation of project activities.

Please be advised that, should project plans change, information documenting the revisions should be submitted to this office for further review. In the event that cultural materials are encountered during project activities, all construction should be halted, and this office notified as soon as possible in order to determine the appropriate course of action.

If you have any questions, please write Judith Deel at State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102 or call 573/751-7862. Please be sure to include the SHPO Log Number (**146-SL-17**) on all future correspondence or inquiries relating to this project.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE

Judith Deel

Toni M. Prawl, Ph.D.
Director and Deputy State
Historic Preservation Officer

TMP:jd

c Andrea Messam NPS-Omaha
Dawn Fredrickson, DNR/MSP
Kathryn Warner, AFW