



AGENDA
CITY OF CREVE COEUR
FACILITIES TASK FORCE
CITY OF CREVE COEUR, MISSOURI
JANUARY 9, 2023
10:30 AM

CALL TO ORDER

ROLL CALL

APPROVAL OF MINUTES

1. Approval of November 7, 2022 Facilities Task Force Meeting Minutes

DISCUSSION ITEMS

2. B32 Kick-off Meeting
3. Government Center Building Needs Assessment Report- Final

NEXT MEETING DATE

ADJOURNMENT

Posted by: _____

Date/Time posted: _____

If you need special accommodations to attend a meeting, services may be arranged by contacting the Office of the City Administrator in advance.



**MINUTES
CITY OF CREVE COEUR
FACILITIES TASK FORCE
300 NORTH NEW BALLAS RD
COUNCIL CHAMBERS
NOVEMBER 7, 2022
9:00 AM**

CALL TO ORDER

A regular meeting of the Facilities Task Force of the City of Creve Coeur was called to order by Chair, City Council Member Joseph Martinich at the City Council Chamber, 300 North New Ballas Rd, City of Creve Coeur Government Center, Creve Coeur, MO 63141 on Monday, November 7, 2022 at 9:03 AM.

ROLL CALL

Mayor Robert Hoffman
Chair, City Council Member Joseph Martinich
Vice- Chair, City Council Member Tim Carney
Member Marjorie Richter
Member Richard Darrow
Member Barry Glantz
Member Richard Kutta

Staff Present City Administrator Mark Perkins, Director of Public Works Jim Heines, Director of Recreation Jason Valvero, Assistant Director of Public Works/City Engineer Sinan Alpaslan, Chief Building Official Gregory Tate, Senior Plans Examiner Brad Holmes and City Clerk Kellie Henke.

APPROVAL OF MINUTES

1. Approval of June 13, 2022 Facilities Task Force Meeting Minutes

RESULT:APPROVED (UNANIMOUS)

MOVER: Robert Hoffman

SECONDER: Tim Carney

AYES: Carney, Martinich, Hoffman, Richter, Darrow, Glantz, Kutta

The vote on the motion being 7 ayes and 0 nays, motion carried.

DISCUSSION ITEMS

2. Discussion of Ice Arena Structure

Chair Joeseeph Martinich stated the focus of the meeting is to review the B32



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Engineering Group's recommendation for the R-22 refrigerant replacement at the ice arena and determine whether or not to make a recommendation to the City Council for approval.

Richard Kutta stated he is concerned that a significant amount of money will be spent on the replacement of the refrigerant without structural analysis of the building. Mr. Kutta recommended a structural analysis so that any potential building issues can be addressed. Mr. Kutta stated he does not have building code concerns at this time.

Chair Martinich asked if there were any significant building issues that have already been identified, to which City Administrator Mark Perkins stated yes. Mr. Perkins stated the ice floor will need to be replaced within the next five to ten years and HVAC's within the building may need upgrading; replacement of the Dielmann East HVAC is a current project with an estimated cost between \$50,000 - \$75,000.

Director of Public Works Jim Heines confirmed a storm damage claim for the roof is still open; replacement costs are estimated between \$400,000- \$450,000.

Marjorie Richter asked what the average capital expenditure is for the ice arena, to which Mr. Valvero stated typically unforeseen expenditures come from the operating fund. Mr. Perkins stated there is no standing item in the Capital Improvement Program for unforeseen expenditures; these typically are an operating cost covered by the general fund. Repairs and replacements that have been identified are included in the city's five-year plan. Mr. Kutta stated creating a separate annual fund for these types of expenditures may be beneficial and restated a structural analysis of the building should be completed.

Mr. Kutta suggested not proceeding with the design phase of the refrigerant system replacement until a structural analysis has been completed.

Mr. Perkins stated an area of vulnerability remains the use of the R-22 refrigerant as it is becoming scarce and cost is high. Mayor Hoffman stated the replacement of the refrigerant system should not be delayed.

Mr. Valvero provided an overview of the timeline for services as provided in the city's Request for Qualifications; part one includes evaluation and recommendations and part two is the design and bidding of the replacement system.



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Chair Martinich made a motion, seconded by Mayor Hoffman, to continue with part one of the consultation, but not proceed to part two until a structural analysis is completed and reviewed.

RESULT: APPROVED (UNANIMOUS)

MOVER: Joseph Martinich

SECONDER: Robert Hoffman

AYES: Carney, Martinich, Hoffman, Richter, Darrow, Glantz, Kutta

The vote on the motion being 7 ayes and 0 nays, motion carried.

Mr. Valvero provided an overview of the B32 Engineering Group proposal for the refrigeration system design and construction observation phase services, including project steps and cost of services. Mr. Valvero stated the bid also included an option for construction administration which staff recommends proceeding with as it is a specialized type of work.

Senior Plans Examiner Brad Holmes stated building upgrades will be necessary if ammonia refrigerant is the approved replacement and will increase costs.

Tim Carney made a motion, seconded by Mayor Hoffman to recommend approval of the B32 Engineering Group proposal and send it to the City Council for review.

RESULT: APPROVED (UNANIMOUS)

MOVER: Joseph Martinich

SECONDER: Robert Hoffman

AYES: Carney, Martinich, Hoffman, Richter, Darrow, Glantz, Kutta

ADJOURNMENT

The meeting adjourned at 9:55 AM.

REQUEST FOR QUALIFICATIONS ENGINEERING SERVICES

CREVE COEUR ICE ARENA ICE ARENA REFRIGERANT SYSTEM REPLACEMENT

City of Creve Coeur
Creve Coeur, MO
September 2022



Contact:

Mr. Scott Ward, P.E.
Owner
P. 651.256.3090
scott.ward@b32eng.com
www.b32eng.com



September 21, 2022

Government Center
City of Creve Coeur
300 N New Ballas Rd
Creve Coeur, MO 63141



Re: **Request for Qualifications for Professional Engineering Services: Ice Arena Refrigerant System Replacement**

Dear Purchasing Department:

B32 Engineering Group, Inc. is pleased to present our specialized experience to you and the City of Creve Coeur for professional engineering services for the proposed replacement of the refrigeration system at the Creve Coeur Ice Arena at the Dielmann Recreational Complex. We are very excited to reintroduce our firm's qualifications to you. We know you will find that our team possesses the depth and specialty experience required to ensure that the City receives the most comprehensive, detailed, and accurate information required to make informed decisions for this specialized ice rink project. As you know, we are very familiar with the facility through the completion of the Ice Arena Refrigerant Change Feasibility Study dated April, 2022.

B32 Engineering Group, Inc. has assembled an outstanding team of consultants experienced in evaluations, programming, concept design, and design and construction services for ice rink projects with collective experience of over 325 different ice rink projects. Individually and collectively the team brings to this project successful public, community-based planning and design principles and applications. We are currently working on or have recently completed local ice system designs for the Centene Community Ice Center, The Enterprise Center, Maryville University Hockey Center, St. Peters Rec Plex, Steinberg Skating Rink, Affton Ice Rink, Greensfelder Recreation Complex at Queeny Park, RP Lumber Center Edwardsville IL, and studies for the Brentwood Ice Rink, and Lindenwood Ice Arena.

I will be serving as the project manager and team leader, as well as the ice system consultant, on this project. I will also be the primary contact for the City. Our architectural design partner and local design professional will be Michael Chiodini with Chiodini Architects in St. Louis. G&W Engineering will be our MEP/HVAC partner and is also located in St. Louis. B32 Engineering Group, Inc. is a leader in the ice rink industry providing some of the most innovative, cost-effective and energy-efficient design solutions in ice arena facilities. We have extensive public, community-based ice rink experience as well as a large number of ice rink evaluation and renovation projects. We know these types of facilities very well and have thorough understanding of their needs and performance requirements.

We are confident you will find our qualifications, experience and reputation at the top of the industry. We are very enthusiastic about this exciting opportunity, and we look forward to personally sharing our experiences and knowledge of ice rinks with you and the City of Creve Coeur. If you have any questions, please feel free to call me at our office at 651.256.3090 or on my mobile at 651.492.1376.

Sincerely,
B32 ENGINEERING GROUP, INC.

A handwritten signature in blue ink, appearing to read "S.A. Ward", is written over the company name.

Scott A. Ward, P.E.
Principal/President
Enclosure: Proposal

Contact Person with legal authorization for contracting:
Scott A. Ward, P.E. President
B32 Engineering Group, Inc.
2211 O'Neil Road
Hudson, WI 54016
O. 651.256.3090
C. 651.492.1376
Scott.ward@b32eng.com



Our Firm

B32 Engineering Group, Inc.
2211 O'Neil Road
Hudson, WI 54016

Legal Status:
S Corporation

Owner:
Scott Ward, PE
(AK, AL, AZ, CO, CT, FL, IA, IL, MA, MD, ME, MI, MN, MO, NC, ND, NE, NH, NJ, NM, NY, NV, OH, OR, PA, RI, SD, TN, TX, VT, WA, WV, WI, WY)

Services Offered:

Ice System Design
Ice Arena Consultation
Feasibility Studies
Planning
Evaluation Studies
Energy and Operation Studies
Construction Administration
Post Construction
Funding Assistance

B32 Engineering Group specializes in the planning, consultation, design, and construction administration of the ice systems for ice arena facilities. As a nationally recognized leader in the ice rink industry we have completed over 325 very successful ice rink projects ranging from community-based facilities, outdoor skating surfaces, curling facilities, Division 1 College facilities to NHL facilities. A few of our recent projects include Solar4America (NHLs San Jose Sharks), War Memorial (NHLs Florida Panthers), Xcel Energy Center (NHL MN Wild), UCONN New Arena, Sacred Heart University New Arena, St. Peters Rec Plex MO, FP Lumber Center Edwardsville IL, Taft School CT, and Olympic Center Lake Placid NY.

We embrace the use of renewable and sustainable materials and techniques in our standard design practices. We place them front and center during our continuous efforts to research and find new approaches, technologies, and environmentally-friendly materials and refrigerants. A few examples include: our on-going evaluation, analysis and application of CO₂ as a refrigerant and the first applications of CO₂ in the United States (B32 was the first in the United States to use CO₂ in an ice rink application); our continued new applications for using waste heat in the facility; and our very successful application using a municipal water source as a geothermal source of energy. We strongly believe that ice systems designed for longevity and minimal operation and maintenance costs will use less energy, require fewer repairs, and will play a key role in the facility's success.

Our on-going success is attributed to the passion we have for these unique facilities, ice sports in general, and the personal attention we provide for each and every project. Our involvement in the industry not only includes the professional services we provide, but the many hours we have spent as users of these facilities as hockey players, volunteer coaches, coaching coordinators, etc. and overall long term supporters of the volunteer organizations that grow and support these sports. The combination of personal and professional experiences has proven invaluable to the success of our design projects.

We look forward to sharing our knowledge and experiences with you.



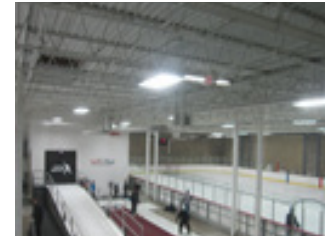
Division I College Facilities



NHL Training Facilities



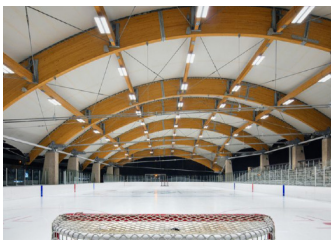
Community Facilities



Training Centers



Multi-sheet Facilities



Outdoor Facilities



Renovation Projects



Geothermal Systems

B32 is focused on developing long-term relationships with our clients by providing a combination of innovative and traditional design solutions that provide long-term value. Client satisfaction and trust are keys to maintaining these relationships and defining a successful project.

We approach each ice rink project with honest, open communication, taking the time to listen and understand our client's needs. After gaining a solid understanding of the project, we recommend quality solutions that best fit the project and address our client's long-term goals, needs and budget. We continue with a hands-on approach as the project progresses through completion. The success of a project is not only measured by its function, value, and cost-effectiveness; but through our client's satisfaction. We strive to be a key partner in the project.

COMMITMENT TO THE INDUSTRY

We believe in sharing our knowledge for the good of the industry and being an active member in industry organizations such as the National Ice Skating Institute (ISI) and Serving the American Rinks (STAR). We look forward to sharing our experiences through annual presentations and seminars at the local level including the Minnesota and the Wisconsin Ice Arena Managers Associations conferences. Our staff actively volunteers in youth hockey associations through coaching, refereeing, clinics, fundraising, and other essential activities that support hockey at the most basic levels.

CONSULTANT RELATIONSHIPS

A comprehensive design solution for the Ice Arena Refrigerant System Replacement at the Creve Coeur Ice Arena requires a thoughtful selection of consultants. For this very important project, B32 has assembled a project team of talented and experienced architects and engineers developed through years of experience and collaboration to deliver a highly successful project to the City of Creve Coeur. Our team is rich in ice rink experience, collectively completing more than 325 ice rink projects. Below are some recent, local examples of our teams work.

B32 ENGINEERING GROUP | CHIODINI ARCHITECTS | G&W ENGINEERING GROUP:
 Greensfelder Recreation Complex at Queeny Park – St. Louis County
 Edwardsville New Ice + Fitness Complex- Edwardsville, Illinois
 Maryville University Hockey Center - New Complex- 2-sheet Ice Facility
 Clayton- Shaw Park Ice Rink (4 Season Recreational Facility) SPARC
 Affton Ice Rink – Ice System Replacement, Affton MO
 Icemen Igloo - Jacksonville, Florida

TEAM MEMBERS AND QUALIFICATIONS



Scott Ward, P.E.
Owner/Project Engineer

Registration

Registered Professional Engineer in AK, AL, AZ, CO, CT, FL, IA, IL, MA, MD, ME, MI, MN, MO, NC, ND, NE, NJ, NH, NM, NY, OH, PA, RI, SD, TN, TX, VT, WA, WI, WV, WY

Education

University of Minnesota
Master of Science in Mechanical Engineering
Bachelor of Civil Engineering

Professional Affiliations

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

Minnesota Ice Arena Managers Association (MI-AMA)

Wisconsin Ice Arena Managers Association (WIA-MA)

Ice Skating Institute (ISI)
U.S. Ice Rink Association (formerly STAR)
USA Hockey

North East Ice Skating Managers Association (NEISMA)

Minnesota Recreation & Park Association (MRPA)

Amery Youth Hockey Association -
Association Coaching and Education Director 2007-2014, Coach 2001-2015

Achievements

2001 National ASHRAE Award for Design of the Super Rink's Sheet, Dual Fuel, Refrigeration System

Lectures and Presentations

"Schwan's Super Rink - Operation Evaluation Study"
2000 University of Minnesota Mechanical Engineering Department Faculty - MSME Thesis

"The Schwan's Super Rink" January 1999 Rink

"Alternative Refrigerants" Research and author 1999 in depth Study on alternative refrigerants Numerous presentations for MIAMA conferences

Mr. Ward has over 26 years experience in civil and mechanical engineering fields. His education and engineering experience uniquely qualifies him for the specialized design requirements of ice systems. With his experience in fluid hydraulics, pumping and piping systems, heat transfer, refrigeration, thermodynamics, structures and materials, Scott has developed a specialty in designing ice systems.

He has been involved in over 325 ice rink projects since 1997, including: professional venues, professional training facilities, Division 1 college venues, multi-sheet community arenas, curling facilities, outdoor ice rinks, and skating trails. Scott is integrally involved in each ice rink and curling project.

Scott brings first-hand experience to this project both as a professional designer and as a user of these facilities. As an avid life-long hockey player, fan, supporter or youth hockey, coaching coordinator, and 15 years as coach of youth hockey programs; Scott has visited and used countless ice arena facilities. This experience has proven instrumental in applying practical insight to ensure system and spaces are designed to meet the specific needs of each facility and their performance and operational goals.

REPRESENTATIVE PROJECTS

AFTON ICE RINK

City of Concord, MO
• Ice System Design & Construction, 2020

BRENTWOOD ICE ARENA

City of Brentwood, MO
• Ice System Evaluation, 2017, 2020

CENTENE COMMUNITY ICE CENTER (4 SHEETS)

NHLs St. Louis Blues Practice Facility, St. Louis, MO
• Ice System Design and Construction, 2017-2019

CLASS OF 1965 ARENA

Colgate University, Hamilton, NY
• Ice System Design and Construction, 2014-16

COLUMBIA ICE RINK

City of Columbia, MD
• Ice System Design and Construction, 2016-17

CROWN COLISEUM COMPLEX

Cumberland County, Fayetteville, NC
• Ice System Design and Construction, 2018-19

DEERFIELD ACADEMY

City of Deerfield, MA
• Ice System Design & Construction, 2017-2018

EDWARDSVILLE ICE ARENA

City of Edwardsville, IL
• Ice System Design, 2020-2022

ENTERPRISE CENTER

NHLs St. Louis Blues Game Facility, St. Louis, MO
• Ice System Design & Construction, 2017-2018

GREENSFELDER RECREATION COMPLEX

Edger M. Queeny County Park, County of St. Louis, Ballwin, MO
• Ice System Design, 2020-2022

JMC ARENA

Erie Zoo, Erie, PA
• Ice System Design & Construction, 2018-2019

LAKE PLACID OLYMPIC CENTER

Lake Placid, NY
• Refrigeration System Replacement, 2019-2022
• Speed Skating Oval Replacement, 2019-2022

MARYVILLE UNIVERSITY HOCKEY CENTER

St. Louis, MO
• Ice System Design & Construction, 2018-2019

NORTH BUFFALO ICE RINK

Buffalo, NY
• Ice System Design & Construction, 2015-2016

PALMER ARENA

Danville, IL
• Ice System Design & Construction, 2019-2020

SHAKOPEE ICE CENTER ARENA (2 SHEETS)

City of Shakopee, MN
• Feasibility & Concept Study, 2015
• Ice System Design & Construction, 2015-2016

SHAW PARK ICE RINK

City of Clayton, MO
• Ice System Design, 2019-2022

SOLAR4AMERICA - SAN JOSE (6 SHEETS)

NHLs San Jose Sharks New Practice Facility, San Jose, CA
• Rinks 1&2 Ice System Replacement, 2017-18
• New Rinks 3,5-6 Ice System Design & Const., 2018-22

SLATER FAMILY ICE ARENA (2 SHEETS)

Bowling Green State University, OH
• Ice Rink Floor Renovation and Replacement, 2016-2017
• Ice Rink Refrigeration System and Rink Floor Replacement, 2019-20

ST. LOUIS PARK RECREATION CENTER

City of St. Louis Park, MN
• Ice System Evaluation, 2012
• Ice System Design & Construction, 2015-2016

ST. PETERS REC PLEX ARENA

City of St. Peters, MO
• Ice System Design & Construction, 2007
• North Rink Ice System Study, 2017
• North Rink Ice System Replacement, 2020-2022

SULLIVAN ARENA

University of Alaska-Anchorage and Alaska Aces, Anchorage, AK
• CO2 Ice System Design and Construction, 2014-15

THE BENTLEY ARENA

Bentley University, Waltham, MA
• Ice System Design and Construction, 2014-2016

WENTZVILLE ICE ARENA

Wentzville, MO
• Ice System Evaluation, 2018

TEAM MEMBERS AND QUALIFICATIONS



Michael Chiodini, AIA
Principal/Director of Recreational Architecture

Education

University of Kansas

Bachelor of Architecture

Experience

30 Years

Michael brings strong leadership in Project Management. Offering more than 30 years of extensive experience, Michael directs his team's efforts from early planning through construction to exceed his clients' goals and needs. He understands the requirements for recreational facilities and particularly, ice rinks, including the desire for open and inviting spaces and the need for efficient and seamless circulation of staff, users and visitors.

REPRESENTATIVE PROJECTS

JACKSONVILLE ICEMEN IGLOO ICE COMPLEX

Jacksonville, FL

- Renovated two-sheet ice facility

GREENSFELDER REC CENTER & ICE COMPLEX

Ballwin, MO

- Renovation, Queeny Park

FOREST PARK FOREVER

St. Louis, MO

- Steinberg Pavilion Feasibility Study

AFFTON ATHLETIC ASSOCIATION ICE RINK

St. Louis, MO

- New ammonia system, flooring, boards & glass

COURTZ ATHLETIC COMPLEX

St. Charles, MO

BLOOMFIELD R-XIV SCHOOL DISTRICT

Bloomfield, MO

- Gymnasium Expansion

SHAW PARK COMMUNITY ICE RINK

Clayton, MO

MARYVILLE UNIVERSITY HOCKEY COMPLEX

St. Louis, MO

- New two sheet ice rink- premier rink (seating 1200), practice rink, community rooms, restaurant and bar

CITY OF EDWARDSVILLE, IL

Edwardsville, IL

- R.P. Lumber Center Recreation Complex, Track, Fitness + Ice Complex

PALM BEACH NORTH ATHLETIC FACILITY

Palm Beach, FL

CITY OF BRENTWOOD RECREATION COMPLEX

Brentwood, MO

- Ice Rink Renovation

MISSOURI S & T ROLLA - GALE BULLMAN

Rolla, MO

- Renovation + Addition

CENTENE COMMUNITY ICE CENTER - ST. LOUIS

Blues Practice Facility

Maryland Heights, MO

- Sun Study

The B32Team is the BEST VALUE for the City of Creve Coeur.

The consultants on this team are among the most experienced and knowledgeable ice arena design specialists in the nation with well over 325 different ice rink projects completed collectively. In addition, we bring:

- Extensive ice rink experience providing a clear understanding, in very simple terms of “what works and what doesn’t work”.
- Extensive government experience. Over 95% of our ice rink project clients are municipalities and government agencies or park and recreation departments. We are very familiar with the required processes and procedures.
- Design and renovation experience for ice arenas constructed with all types of building systems
- Design experience for some of the newest community based and college ice arenas.
- Experience with codes, regulations, statutes and ordinances applicable to indoor ice arena facilities.
- Responsiveness and personal attention. The primary team members selected for this project are Owners of their respective firms. This project will be a priority for the B32 Team.

We continue to strive for improvements and have recently designed some of the most energy efficient, top performing ice systems in the industry.



Experience and passion fosters innovation.

B32 was the first in the ice rink industry to:

- Application of using waste heat to regenerate the desiccant system in place of traditional natural gas. (Northfield Ice Arena)
- Re-use of existing Holmsten Ice Rink’s direct system equipment in converting systems to indirect to minimize costs with little or no loss in operating efficiency providing the Owner with the widest range of options available. (Lund Arena - Gustavus Adolphus College)
- Design a geothermal-based ice system that uses industrial grade maximize efficiency and reduce greenhouse gas emissions. (Burnsville Ice Center)
- Design a geothermal-based ice system, without a well field, using a city water source to maximize waste heat recovery and provide superior efficiency and reliability without losing performance (Brooklyn Park Activity Center)
- We designed the first CO2-based ice system in the United States in 2014. As of today, we have designed a total of six CO2 ice systems in the United States.
- Design ice systems for LEED certified ice arena facilities including Bentley University MA (Platinum), Amsoil Arena Duluth MN (Gold), Great Park Ice & Sport Anaheim CA (Silver) and others. B32 Engineering Group, Inc. is always striving to apply sustainable practices including waste heat recovery, water reuse, using recycled water to make the ice sheet, geothermal, natural light, etc.



TEAM MEMBER REFERENCES



B32 (In addition to the references listed in the Projects section)

Mr. Burt Benesek

Manager - Transportation & Develop.
City of St. Peters
One St. Peters Centre Blvd
St. Peters, MO
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Email: bbenesek@stpetersmo.net

Mr. Mick Stibor

Ice Arena Facility Manager
Affton Ice Rink
10300 Gravois Road
St. Louis, MO 63123
Office: 314.606.7617
Email: afftonrinkmanager@gmail.com

Mr. Travis Larson

Ice Operations and Event Manager
Xcel Energy Center (NHL MN Wild)
199 W Kellogg Blvd
St. Paul, MN 55102
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Email: tlarson@wild.com

Mr. Alex Sveda

Associate Engineer
City of Casper
200 North David Street
Casper, WY 82601
Office: 307.235.8341
Email: asveda@cityofcasperwy.com

Mr. Michael Ross

Chief Executive Officer
Pasadena Ice Skating Center
300 E. Green Street
Pasadena, CA 91101
Office: 626.793.2122
Email: mross@pasadenacenter.com

Mr. Craig Flor

Mariucci/Ridder Arena Facilities Director
Intercollegiate Athletics, University of MN
1901 4th St SE Room 137 MarA
Minneapolis, MN 55455
Office: 612.625.8365
Email: florx003@umn.edu

Chiodini Architects

Mr. Mike Croghan

President of the Affton Hockey
Association
Office: 314.210.2738
Email: mike@croghancpa.com
Re: Affton Hockey Rinks

Mr. Tobin Moriarty

St. Louis County Parks & Recreation
Office: 314.615.0157
Email: tmoriarty@stlouisco.com
Re: Greensfelder Ice + Recreation
Complex - Queeny Park

Mr. Tim Lowe

The Staenberg Group
Office: 314.513.0018
Email: tlowe@tsgproperties.com
Re: Maryville University Ice Complex/
Multiple Project

Mr. Patrick M. Quinn

Chairman, St. Louis Legacy Ice
Foundation
Office: 314-619-9929
Email: pq@legacyice.org
Re: The Centene Ice Center

Mr. Ryan T. Zwijsack, PE

City of Edwardsville, Illinois - City
Engineer
Office: 618.692.7535
Email: rzwijsack@cityofedwardsville.com
Re: R.P. Lumber Center - Ice and
Sports Complex

Partial Ice Rink Project List (Since 2012)

Project No.	Facility	Project Name	Project Owner / Client	Address	Year
900-12-155	New Hope Arena	Interior Improvement Project	New Hope, City of	New Hope, MN	2012
900-12-156	St. Louis Park Recreation Center	Ice System Evaluation	St. Louis, City of	St. Louis Park, MN	2012
900-12-157	Newberry Ice Rink	Synthetic ice	Village of Newberry / Tim Wade	Newberry, MI	2012
900-12-158	Aldrich Arena	Ice System Evaluation	Ramsey County	White Bear Lake, MN	2012
900-12-159	Elk River Ice Arena	System Evaluation	Elk River, City of	Elk River, MN	2011
900-12-160	Lansing Chapman Arena	Energy and Architectural Improvement Project	Williams College, MA	Williamstown, MA	2012
900-12-161	Eden Prairie Community Center	Rink 2 Floor Replacement & Ice system upgrade	Eden Prairie, City of	Eden Prairie, MN	2013
900-12-162	Ozaukee County Ice Arena	Curling Rink	Ozaukee County / Arena Systems	Cedarburg, WI	2012
900-12-163	Braemar Ice Arena	2012 CIP	City of Edina	Edina, MN	2012
900-12-164	White Bear Lake Sports Center	Ice System Replacement Evaluation	City of White Bear Lake	White Bear Lake, MN	2012
900-12-165	Calumet Colosseum	Ice Rink Refrigeration	Township of Calumet	Calumet, MI	2013
900-12-166	Rock Springs Family Recreation Center	Evaporative Condenser Replacement	City of Rock Springs	Rock Springs, WY	2012
900-12-167	Drake Arena	Evaluation Study	St. Paul Academy	St. Paul, MN	2012
900-12-168	Watertown Ice Arena	Renovation & Expansion	City of Watertown / 292 Design Group	Watertown, NY	2012
900-12-169	Moose Lake Riverside Arena	Arena Evaluation	City of Moose Lake	Moose Lake, MN	2012
900-12-170	Mitchell Ice Arena	Ice System Design	City of Mitchell / Putz Corp	Mitchell, SD	2013
900-12-171	Munn Ice Arena	Michigan State University Munn Ice Arena	Michigan State University / TowerPinkster	East Lansing, MI	2012
900-12-172	Yost Arena	Arena Study and Ice System Replacement	University of Michigan	Ann Arbor, MI	2012
900-12-173	Lawson Ice Arena	Ice System Replacement	Western Michigan University	Kalamazoo, MI	2012
900-12-174	Bowie Indoor Sports Facility	Feasibility Study	Thomas Marks Architects	Bowie, MD	2012
900-12-175	Franklin Park Ice Arena	Franklin Park Ice Arena	Franklin Park District	Chicago, IL	2013
900-12-176	Braemar Arena	West Arena Chiller Repair	City of Edina	Edina, MN	2012
900-12-177	NA	Ice System Evaluation / MOA Ice Rink Survey	RSA Engineering	Anchorage, AK	2012
900-13-178	Casper Ice Arena	Ice System Replacement	City of Casper / Commercial Refrigeration Systems	Casper, WY	2013
900-13-179	Burich Arena	Evaluation and Feasibility Study (Phases 1 & 2)	City of Hutchinson	Hutchinson, MN	2013
900-13-180	Minnesota Amateur Sports Commission	R-Funding	Stevens Engineers	Blaine, MN	2013
900-13-181	Marshall Ice Arena	Marshall Ice Arena	City of Marshall	Marshall, MN	2013
900-13-182	Wilmette Park District Centennial Ice and Tenn	Ice System Design/Ventilation System Design/Seismic Restraint Design	Wilmette Park District	Wilmette, IL	2013
900-13-183	Scheels IcePlex	Ice System Design/Dasher Board System Design/Scoring System for Bids	Ice Sports Association / Banner	Sioux Falls, SD	2013/14
900-13-184	Hibbing Curling Club	Design	City of Hibbing	Hibbing, MN	2012
900-13-185	Windom Ice Arena	Ice System Study	City of Windom	Windom, MN	2013
900-13-186	LaCrosse - Green Island Arena	Design	City of La Crosse / 292	La Crosse, WI	2013
900-13-187	St. Paul Curling Club	Curling Rink Floor Design	St. Paul Curling Club	St. Paul, MN	2013
900-13-188	Ice Den	Ice System Replacement	Coyotes Ice, LLC / 292	Scottsdale, AZ	2011
900-13-189	Alexandria Ice Arena	Arena Expansion (3rd Sheet)	City of Alexandria / JLG Architects	Alexandria, MN	2013
900-13-190	Pine City Civic Center	Ice System Study	HTG Architects	Pine City, MN	2013
900-13-191	New Jersey Mall Rink	Ice System Design and Construction Observation Phase Service	Mall of Americal Owners	New Jersey	2013
900-13-192	Hopkins Pavilion Study	Feasibility and Evaluation Study	City of Hopkins	Hopkins, MN	2014
900-13-193	Willmar Civic Center Arena	Mechanical System Evaluation Study	City of Willmar	Willmar, MN	2013
900-13-194	Edina - Braemar Arena Outdoor Rink	Outdoor Rink	City of Edina / Cunningham	Edina, MN	2013
900-13-195	Morgan Park Sports Complex	Ice System Design and Construction Phase Svcs	Chicago Parks District / Studio GC	Chicago, IL	2013
900-13-196	UW River Falls Hunt Arena	Condenser Relocation	University of Wisconsin / KJWW	River Falls, WI	2014
900-14-197	Brett Memorial Ice Arena	Arena Assessment	Matanuska-Susitna Borough / Wolf Architectural	Wasilla, AK	2014
900-14-198	Harry J McDonald Ice Rink	Ice System Repair	Municipality of Anchorage / Burkhart Croft Arch	Eagle River, AK	2014
900-14-199	Minot Curling Club	Floor Replacement	North Dakota State Fair Grounds	Minot, ND	2014
900-14-200	MAYSA Ice Arena	Third Sheet Addition	City of Minot/MAYSA / EAPC	Minot, ND	2014
900-14-201	Neilson Reise Arena	Arena Evaluation Study	City of Bemidji	Bemidji, MN	2014
900-14-202	Greenway Hodgins Berardo Arena	Arena Improvements	APEX	Coleraine, MN	2014
900-14-203	Omni Center	Refrigeration System Evaluation	City of Onalaska	Onalaska, WI	2014
900-14-204	Cottage Grove Ice Arena	Ice System Evaluation Study	City of Cottage Grove	Cottage Grove, MN	2008
900-14-205	South St. Paul Wakota Arena	Refrigeration System Replacement	City of South St. Paul	St. Paul, MN	2014
900-14-206	Harry J McDonald Ice Rink	Dasher Board System Design	Municipality of Anchorage / Burkhart Croft Architects	Eagle River, AK	2014
900-14-207	St. Louis Park Rec Center Outdoor Rink	Outdoor Ice System Design & Study	City of St. Louis Park / RSP	St. Louis Park, MN	2012
900-14-208	Burich Arena	Renovation Project	City of Hutchinson	Hutchinson, MN	2014
900-14-209	Ice Den - Chandler	Ice System Improvements	Coyotes Ice / 292	Chandler, AZ	2014
900-14-210	Scheels Ice Plex	Ice System Design	Ice Sports Association / Banner	Sioux Falls, SD	2013/14
900-14-211	Augsburg College	Ice System Replacement Study	Augsburg College	Minneapolis, MN	2008
900-14-212	University of Minnesota Mariucci Arena	PreDesign	University of Minnesota / JLG	Minneapolis, MN	2013
900-14-213	All Seasons Arena	Evaluation Study	City of Mandan	Mandan, ND	2014
900-14-214	Grand Forks Sports Center	Rink Floor Design	Grand Forks Park District / Arena Systems	Grand Forks, ND	2014
900-14-215	St. Paul Academy Ice Arena	Arena PreDesign Study	St. Paul Academy / HGA Architects and Engineers	St. Paul, MN	2014
900-14-216	Chaska Curling and Event Center	Chaska Curling and Event Center	City of Chaska / 292	Chaska, MN	2015
900-14-217	Watford City Event Center	Watford City Event Center	Watford City / JLG	Watford, ND	2014
900-14-218	Waukesha County	Ice System Evaluation Update	Waukesha County	Waukesha County, WI	2010
900-14-219	Apple Valley Sports Center	Condenser Replacement	City of Apple Valley	Apple Valley, MN	2014
900-14-220	NA	EPA R-22 Rink Case Studies	ICF International	Minneapolis, MN	2014
900-14-221	Hobbs Multigenerational Facility	Facility Update	City of Hobbs / Barker Rinker Seacat Architecture	Hobbs, NM	2014
900-14-222	Hermantown Ice Arena	Arena Improvements	City of Hermantown	Hermantown, MN	2010
900-14-223	Sullivan Arena	Ice System Replacement	Municipality of Anchorage / Burkhart Croft Architects	Anchorage, AK	2013
900-14-224	Class of 1965 Arena	Ice System Design	Colgate University / Sasaki	Hamilton, NY	2014
900-14-225	Martha's Vineyard Ice Arena	Ice System Evaluation	Martha's Vineyard Ice Arena	Vineyard Haven, MA	2014
900-14-226	Ebersole Ice Arena - Delfino Park	Refrigeration System Improvements	City of White Plains	White Plains, NY	2014
900-15-227	Shakopee Community Center	Feasibility Study	Shakopee Youth Hockey Assoc. / 292	Shakopee, MN	2008
900-15-228	West St. Paul Ice Arena	Ice Arena Renovation	City of West St Paul / Wold Architects and Engineers	St. Paul, MN	2015
900-15-229	Bud King Arena	Ice System Replacement	City of Winona	Winona, MN	2015
900-15-230	Neilson Reise Arena	HVAC System Improvements	City of Bemidji	Bemidji, MN	2012
900-15-231	Willmar Civic Center Arena	HVAC System Improvements	City of Wilmar	Wilmar, MN	2015
900-15-232	Thief River Falls Ice Arena	Arena Evaluation	EAPC	Thief River Falls, MN	2015
900-15-233	St. Louis Park	St. Louis Park Ice System Replacement	City of St Louis Park	St. Louis Park, MN	2015
900-15-234	Deerfield Academy New Ice Arena	New Ice Arena	Deerfield Academy / Sasaki	Deerfield, MA	2015/16
900-15-235	Univ of Minnesota Ridder Arena	Condenser Replacement	University of Minnesota	Minneapolis, MN	2015
900-15-236	Reno Ice Arena	New Ice Arena	Greater Reno Community Ice Skating Association	Reno, NV	2015
900-15-237	Phillips Academy Ice Rink	Refrigeration System Replacement Peer Review	Phillips Academy / RFS	Andover, MA	2015
900-15-238	Ben Boeke Ice Arena	Ice System Replacement	Municipality of Anchorage / Burkhart Croft Architects	Anchorage, AK	2015/16
900-15-239	Bentley University Ice Arena	New Ice Arena	Bentley University / Sasaki	Waltham, MA	2015/16
900-15-240	Clearwater Florida Ice Arena	New Ice Arena	Private / Rink Tec International	Clearwater, FL	2015/16
900-15-241	Mandan Sports Complex	Ice System Design	Mandan Parks District / JLG Architects	Mandan, ND	2015/16
900-15-242	Snow King Ice Arena	Ice System Evaluation Study	City of Jackson	Jackson, WY	2015
900-15-243	Casper Ice Arena	Ice Chiller System Replacement	City of Casper	Casper, WY	2015/16
900-15-244	Duluth Entertainment and Convention Center	Curling Floor Replacement	Duluth Entertainment and Convention Center	Duluth, MN	2015/16
900-15-245	Burich Arena	Conceptual Planning of Building Improvements	City of Hutchinson	Hutchinson, MN	2016
900-15-246	Fargo Coliseum	Renovation Project	Fargo Park District / JLG Architects	Fargo, ND	2016

Partial Ice Rink Project List (Since 2012)

Project No.	Facility	Project Name	Project Owner / Client	Address	Year
900-19-337	Slater Family Ice Arena	Ice System Replacement (Phase 2)	Bowling Green State University / SHP Architect	Bowling Green, OH	2019
900-19-338	SHU Ice Arena	New Ice Arena	Sacred Heart University / JLG	Fairfield, CT	2019
900-19-339	Lindenwood Ice Arena	Ice Arena Study	Lindenwood University / Cochran	Wentzville MO	2019
900-19-340	Hastings Civic Arena	Ice System Study	City of Hastings	Hastings, MN	2019
900-19-341	Solar4America Ice	Rinks 3 5 and 6	San Jose Sharks / B32	San Jose, CA	2019
900-19-342	All Seasons Arena	Arena Conceptual Design	City of Mankato	Mankato, MN	2019
900-19-343	Verizon Wireless Center	Ice System Improvements	City of Mankato	Mankato, MN	2019
900-19-344	Graham Arena Complex	Mechanical and Electrical Upgrades	Olmsted County / ISG	Rochester, MN	2019
900-19-345	Anaheim Ice	Rink Floor Replacement	The Rinks / Rink Tec	Anaheim, CA	2019
900-19-346	Hazen All Seasons Arena	Ice Arena Study	Hazen Beulah Hockey Association / EAPC	Hazen, ND	2019
900-19-347	Northeast Ice Arena	Ice Arena Study - COMPLETE	Minneapolis / JLG	Minneapolis, MN	2019
900-19-348	Lund Arena	Ice System Replacement Study - COMPLETE	Gustavus Adolphus College	St. Peter, MN	2019
900-19-349	War Memorial	Ice System Design	Florida Panthers / Rossetti	Fort Lauderdale, FL	2019
900-19-350	Shaw Park All-Season Recreation Complex	Ice System Design and Construction Observation	City of Clayton / Chiodini	Clayton, MO	2019
900-19-351	Johnston Town Center	Outdoor Ice Rink	City of Johnston / Confluence	Johnston, IA	2019
900-19-352	North Athletic Facility	Ice System Design	Palm Beach Athletic Foundation / Chiodini	Palm Beach Gardens, FL	2019
900-19-354	Municipal Athletic Complex (MAC)	Pre-Design Study	City of St Cloud / JLG	St. Cloud, MN	2019
900-19-355	Jorgensen Arena	Ice Rink Study	City of Gunnison	Gunnison, CO	2019
900-19-356	East Grand Forks Ice Arena	Ice Arena Improvements	City of East Grand Forks / JLG	East Grand Forks	2019
900-19-357	Oakland Ice Center	Ice System Design and Construction Observation	City of Oakland / B32	Oakland, CA	2019
900-19-358	Schenley Park	Ice Rink Floor Replacement	City of Pittsburgh / Rink Tec	Pittsburgh, PA	2019
900-19-359	Whittemore Center Arena	Ice System Replacement	University of New Hampshire / RFS / ARC	Durham, NH	2019
900-19-360	Lake Placid ORDA	Olympic Training Center Modernization Project	NY Olympic Regional Development Authority / Cannon Design	Lake Placid, NY	2019
900-19-361	Buffalo Civic Center	Ice System Study Updated	City of Buffalo	Buffalo, MN	2019
900-19-362	Sno-King Ice Arena	Ice Rink Floor System	/ Rink Tec	Snoqualmie, WA	2019
900-19-363	Austin ISports	Rink Floors	/ Rink Tec	Cedar Park, TX	2019
900-19-364	3M Mariucci Arena	PreDesign Update	University of Minnesota / JLG	Minneapolis, MN	2019
900-19-365	UConn Ice Arena	New Ice Arena	University of Connecticut / JCJ	Storrs, CT	2019
900-19-366	Wheeling Park Memorial Ice Rink	Ice Rink Floor and Dasher Replacement	Wheeling Park Commission	Wheeling, WV	2019
900-19-367	Detroit Curling Club	Curling Club Study	Detroit Curling Club	Ferndale, MI	2019
900-19-368	Wollman Rink	Ice Rink Condition Study	Central Park / McLaren Engineering Group	New York, NY	2019
900-19-369	Riverside Ice Rink	Ice System Replacement	City of Buffalo / Stieglitz Snyder Architect	Buffalo, NY	2019
900-19-370	Watts Ice Center	Ice System Study	City of Glencoe	Glencoe, IL	2019
900-19-371	Homewood Flossmoor Ice Rink Condition	Ice Rink Condition Assessment	Homewood Flossmoor Park District / Wight & Company	Flossmoor, IL	2019
900-19-372	David S Palmer Arena	Ice System Replacement	Vermillion County Metro Exposition Auditorium and Office	Danville, IL	2019
900-19-373	Miners Event and Convention Center	Ice System Design	City of Virginia / Commercial Refrigeration	Virginia, MN	2019
900-19-374	Viking Lakes Event Center	Ice System Design	MV Eagan Ventures / Generator Studio	Eagan, MN	2019
900-19-375	Sacramento Recreation - New Ice Arena	Ice System Design	/ HTG Architects	Sacramento, CA	2019
900-20-376	Minneapolis Victory Memorial Ice Arena Study	Ice Arena Study	Mpls Public Schools, Special SD #1 / JLG	Minneapolis, MN	2020
900-20-377	Greensfelder Recreation Center of Queeny Park	Ice System Design	St Louis County Parks / Chiodini Architects	Ballwin, MO	2020
900-20-378	Edwardsville New Ice Rink and Track Complex	Ice System Design	City of Edwardsville / Chiodini Architects	Edwardsville, IL	2020
900-20-380	Farmington Ice Arena	Renovation Phase 1	City of Farmington / Wold Architects and Eng	Farmington, MN	2020
900-20-381	Yost Arena	Arena Ice Quality Study	University of Michigan / Integrated Architecture	Ann Arbor, MI	2020
900-20-382	Traverse City Curling Club	Curling system Design	Traverse City / Cornwell Architects	Traverse City, MI	2020
900-20-383	Champlin Ice Forum	Ice System Replacement	City of Champlin	Champlin, MN	2020
900-20-384	Clearwater Ice Arena	Remodel 2020	Private / Rink Tec	Clearwater, FL	2020
900-20-385	Brentwood Ice Arena	Ice System Review 2020	City of Brentwood / Chiodini	Brentwood, MO	2020
900-20-386	Cloquet Pine Valley Ice Arena	Ice System Replacement	City of Cloquet / McKinstry Essention, LLC	Cloquet, MN	2020
900-20-387	Jahn Ice Rink	Conceptual and Scopal Study	/ RFS Engineering	Pomfret, CT	2020
900-20-388	Manteca Ice and Expo Center	Conceptual and Master Plan Study	City of Manteca / Architectnica	Manteca, CA	2020
900-20-389	SAP Center	Ice Rink Floor Header System Replacement	Sharks, LLC / SAP Center	San Jose, CA	2020
900-20-390	Afton Ice Rink	Ice System Replacement	Afton Athletic Association / Kozeny Wagner	St Louis, MO	2020
900-20-391	Willette Arena	Rubber Flooring Replacement (front end docs only)	City of Stevens Point / 292	Stevens Point, WI	2020
900-20-392	ASU New Arena	Ice System Design Consultation	ASU / Mortenson	Tempe, AZ	2020
900-20-393	Dorothy Hamill Skating Rink	Ice System Design	City of Greenwich, CT / JCJ Architecture	Greenwich, CT	2020
900-20-394	Hopkins Pavilion	Cimco vs Steenburg	Drawe & Laland	Hopkins, MN	2020
900-20-395	Duffey Ice Rink	Ice System Design	Cedar Duffey 2.0 Property LLC /	Minneapolis, MN	2020
900-20-396	Rec Plex North	Ice System Design	City of St Peters / B32	St Peters, MO	2020
900-20-397	Campion Rink	Study	Hanover Improvement Society / RFS Engineering	West Lebanon, NH	2020
900-20-398	Bloomington Ice Gardens	Ice System Study	/ HGA Architects and Engineers	Bloomington, MN	2020
900-20-399	Hobbs Ice Arena	Refrigeration and Dehumidification Study	City of Eau Claire / City of Eau Claire	Eau Claire, WI	2020
900-20-400	The Hockey Center	Refrigeration System Study	St Paul Schools / St Paul Schools	Concord, NH	2020
900-20-401	Schottenstein Center	Ice Arena Addition Study	Ohio State University / JLG Architects	Columbus, OH	2020
900-20-402	Anoka Area Ice Arena	Ice System Replacement	Hockey Communities of Anoka Area / APEX	Anoka, MN	2020
900-20-403	Sartell Ice Rink	Ice Rink Addition - Floor System	/ Rink Tec	Sartell, MN	2020
900-20-404	Taft School Ice Rink	Athletic Facility Update-Ice Rink Floor Conceptual Design	Taft School / Sasaki	Watertown, CT	2020
900-20-405	Braemar Ice Arena	South Rink Dehumidification System Replacement	City of Edina / NRA	Edina, MN	2020
900-20-406	IRA Civic Center	Ice System Improvements	City of Grand Rapids / IC	Grand Rapids, MN	2020
900-21-407	Birmingham Ice Rink	Ice System Replacement	City of Birmingham / Andrus Architect	Birmingham, MI	2021
900-21-408	Schenley Ice Rink	Refrigeration System Replacement	City of Pittsburgh / Clark Contractors, Inc.	Pittsburgh, PA	2021
900-21-409	Outdoor Rink	Providence Outdoor Rink	City of Providence / ARUP	Providence, RI	2021
900-21-410	Sage Rink	Ice System Mechanical Upgrades	Hamilton College / RFS Engineering	Clinton, NY	2021
900-21-411	Ice and Sportsplex	Ice System Design	Private / Chiodini Architects	Jacksonville, FL	2021
900-21-412	Dassel-Cokato Rec Center	Ice Rink Floor Design	Dassel-Cokato School District / ISG	Dassel-Cokato, MN	2021
900-21-413	Runestone Community Center	Third Sheet Addition	Alexandria / 292 Design Group	Alexandria, MN	2021
900-21-414	New Arena	Ice System Design	Brandon Youth Hockey Association / Koch Hazard Architects	Brandon, SD	2021
900-21-415	Mayo Clinic Health System Event Center	Ice System Design Study Update	City of Mankato / City of Mankato	Mankato, MN	2021
900-21-416	Bowie Ice Arena	Ice Arena Renovation Program Study	City of Bowie / 292 Design Group	Bowie, MD	2021
900-21-417	KINO South Sports + Entertainment Center	Ice System Design	Private-City of Tuscan / JLG Architects-Alexandria	Tuscan, AZ	2021
900-21-418	Malibu Skating Center	Ice System Design	City of Redwood City / HTG Architects	Redwood City, CA	2021
900-21-419	Glacial Ridge Curling Center	Ice System Design	City of Willmar / B32	Willmar, MN	2021
900-21-420	Solar4America at Fremont	Refrigeration System Replacement	Sharks Ice / Sharks Ice	Fremont, CA	2021
900-21-422	New Arena	Kenai Ice Rink Feasibility Study	Kenai Peninsula Hockey Association	Kenai, AK	2021
900-21-423	Xcel Energy Center	Refrigeration System HVAC'd Replacement Study	Xcel Energy Center	St. Paul, MN	2021
900-21-424	Jacobson Plaza - Outdoor Skating Trail	Ice System Design	City of Sioux Falls, SD / Confluence	Sioux Falls, SD	2021
900-21-425	Madison Ice Inc.	Cooling Tower Replacement	Madison Ice Inc		2021

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900-15-247	Minnesota Wild Practice Facility	New Practice Facility	MN Wild / Collaborative Design Group	St. Paul, MN	2016
900-15-248	Runestone Community Center	Ice System Replacement	City of Alexandria / APEX	Alexandria, MN	2016
900-16-249	Great Park Ice & Five Point Arena	New Practice Facility	Anaheim Ice / 292	Irvine, CA	2016
900-16-250	Colby Arena	New Ice Arena	Colby College / Sasaki	Waterville, ME	2016
900-16-251	Buffalo Civic Center	Ice System Study Ice System Study	City of Buffalo	Buffalo, MN	2016
900-16-252	All Seasons Arena	Ice System Status Report	Mankato Independant School District No. 77	Mankato, MN	2016
900-16-253	North Buffalo Ice Arena	Ice System Replacement	City of Buffalo / Stieglitz Snyder Architects	Buffalo, NY	2016
900-16-254	Nothern Michigan University	Ice and Mechanical Systems Study	Nothern Michigan University	Marquetet, MI	2016
900-16-255	Elk River Community Center	Feasibility Plan	City of Elk River / 292	Elk River, MN	2016
900-16-256	West Fargo New Ice Arena	Feasibility Plan	City of West Fargo / JLG	West Fargo, ND	2016
900-16-257	Litchfield Civic Center Ice Arena	Ice System Study	City of Litchfield	Litchfield, MN	2016
900-16-258	Thief River Falls Ralph Engelstadt Arena	Equipment Room Study	City of Thief River Falls	Thief River Falls, MN	2016
900-16-259	Lasker Rink and Pool [Not Constructed]	Ice Rink Renovation	Central Park Conservancy / McLaren Engineering Group	Central Park, NY	2016
900-16-260	Titelton District Outdoor Ice Rink	New Ice Rink	Green Bay Packers / Rossetti	Green Bay, WI	2016
900-16-261	Lions Park Ice Rink	New Ice Arena and Renovations	City of Shakopee / 292 Design Group	Shakopee, MN	2016
900-16-262	Chesterfield Arena (?)	Chesterfield New Ice Arena	Chiodini Associates	St Louis, MO	2016
900-16-263	Pagel Activity Center	Arena Expansion Ice System Design	City of Minnetonka / Rink Tec International	Minnetonka, MN	2016
900-16-264	Columbia Athletic Club	Ice Rink Renovation	Waldon Studio Architects	Columbia, MD	2016
900-16-265	Dempsey Anderson Ice Arena	Ice System Replacement	Municipality of Anchorage / Burkhart Croft Architects	Anchorage, OK	2016
900-16-266	Plymouth Ice Center - Rinks 1 and 2	2017 Ice System Improvements	City of Plymouth	Plymouth, MN	2016
900-16-267	Hastings Civic Arena	Ice System Improvements	Apex	Hastings, MN	2016
900-16-268	Slater Family Ice Arena	Ice Rink Floor Replacement	BGSU / SHP Leading Design	Bowling Green, OH	2016
900-16-269	VMCC Arena (BP1, PB2, PB3)	Rink Floor Replacement	City of Inver Grove Heights	Inver Grove Heights,	2016
900-16-270	All Seasons Arena	Ice System Study	Mankato Independant School District No. 77	Mankato, MN	2016
900-16-271	Watertown Municipal Arena	New Ice Arena	City of Watertown / RS Architects	Watertown, NY	2016
900-16-272	Polar Arena	Ice System Replacement	ISD No. 622 / LHB Corp	North St Paul, MN	2016
900-16-273	Richfield Ice Arena	Ice System Replacement	City of Richfield	Richfield, MN	2017
900-17-274	WBSC White Bear Lake Sports Center	Ice System Replacement	City of White Bear Lake / JLG Architects	White Bear Lake, MN	2017
900-17-275	Coral Ridge Ice Arena	Iowa River Landing Hockey Arena Project	JLG Architects	Coralville, IA	2017
900-17-276	Oakton Ice Arena	Ice Arena Study	Wight & Company	Park Ridge, IL	2017
900-17-277	Norwich University Arena	Evaluation Study	Norwich University / RECCO, Inc.	Northfield, VT	2017
900-17-278	Proctor Arena	New Arena	292 Design Group	Proctor, MN	2017
900-17-279	Enterprise Center (Scotttrade Center)	Ice System Replacement	City of St Louis / Murphy Company	St Louis, MO	2017
900-17-280	Brett Memorial Ice Arena	Ice System Replacement	Matt Su Burrough / Burkhart Croft Architects	Wasilla, AK	2017
900-17-281	Apple Valley Sports Arena	Ice System Replacement Study	City of Apple Valley / Ameresco	Apple Valley, MN	2017
900-17-282	Sioux Falls Outdoor Rink	Outdoor Rink Study	Confluence	Sioux Falls, SD	2017
900-17-283	St Michael-Albertville Arena	New Arena	ISD No. / Architects Rego & Youngquist	Albertville, MN	2017
900-17-284	Hopkins Pavilion	2018 Building and Mechanical Improvements	City of Hopkins	Hopkins, MN	2017
900-17-285	Solar4America Ice	Rinks 1 and 2 Replacement	Sharks Ice LLC	San Jose, CA	2017
900-17-286	Litchfield Civic Center	Ice System Replacement	City of Litchfield / Bolton & Menk Inc.	Litchfield, MN	2017
900-17-287	Windom Arena	Ice System Replacement	City of Windom	Windom, MN	2017
900-17-288	Dearborn Fieldhouse & Ice Arena	Dasher Boards Replacement	UM Dearborn	Dearborn, MI	2017
900-17-289	St Louis Ice Center	Design-Build	Murphy Company	Maryland Heights,	2017
900-17-290	Augsburg Ice Arena	Ice System Replacement Project	Augsburg College	Minneapolis, MN	2017
900-17-291	Minneapolis Parks Ice Arena	Life Cycle Cost Management Plan	Minneapolis Park and Recreation Board	Minneapolis, MN	2017
900-17-292	Riverview Ice House	Riverview Ice House Study	HVS / Perkins & Will	Rockford, IL	2017
900-17-293	Elk River Ice Arena	New Ice Arena	City of Elk River / 292 Design Group	Elk River, MN	2017
900-17-294	Glacier Ice Rink	Ice Rink Study	City of Missoula / 292 Design Group	Missoula, MT	2017
900-17-295	Willmar Civic Center	Master Plan	City of Willmar / 292	Willmar, MN	2017
900-17-296	Northfield Ice Arena	New Ice Arena	Commercial Refrigeration Systems	Northfield, MN	2017
900-17-297	Willmar Civic Center	Ice System Replacement	City of Willmar	Willmar, MN	2017
900-17-298	Target Center	Ice System Third Party Review	Ice Builders	Minneapolis, MN	2017
900-17-299	Centennial Sports Arena	Evaluation Study	Centennial Youth Hockey Association	Circle Pines, MN	2017
900-17-300	Lawrenceville Athletic Center	Ice System	Architectural Resources Cambridge	Lawrenceville, NJ	2017
900-18-301	Mesabi School District Outdoor Rinks	Outdoor Ice Rinks	East Mesabi School District / Larson Engineering	Aurora, MN	2018
900-18-302	Veterans Memorial Community Center Ice Aren	West Rink Floor Replacement	Inver Grove Heights, City of	Inver Grove	2018
900-18-303	Bronco Arena	Ice System Replacement	International Falls ISD No. 361	International Falls,	2018
900-18-304	Andover Community Center	Community Center Expansion	Andover, City of/292 Design Group	Andover, MN	2018
900-18-305	Whittemore Center Arena	Whittemore Center Study	University of New Hampshire	Durham, NH	2018
900-18-306	Hobbs Ice Arena	Condenser Replacement	Eau Claire, City of	Eau Claire, WI	2018
900-18-307	Steele Hall Ice Arena	Refrig System Upgrade	NY State University / LaBella Associates	Fredonia, NY	2018
900-18-308	K.B. Willett Ice Arena	Ice System Replacement	Stevens Point	Stevens Point, WI	2018
900-18-309	South Suburban Ice Arena	New Facility	South Suburban Park & Rec District / Perkins + Will -	Centennial, CO	2018
900-18-310	NorthStar Christian Academy Sports Complex	Sports Complex Design	NorthStar Group / Rink Tec	Alexandria, MN	2018
900-18-311	Northwoods CU Arena	Arena Study	City of Cloquet / SEH	Cloquet, MN	2018
900-18-312	Iorio Arena	MA Peer Review	Cushing Academy / CSL Consulting	Ashburnham, MASS	2018
900-18-313	Cottage Grove Ice Arena	Ice System Replacement	City of Cottage Grove	Cottage Grove, MN	2018
900-18-314	Rec Plex Ice System	Ice System Study	City of St Peters	St Peters, MO	2018
900-18-315	Brentwood Ice Arena	Ice Arena Evaluation	City of Brentwood / Chiodini	Brentwood, MO	2018
900-18-316	Anderson Ice Arena	Mains Replacement	Breck School / Rink Tec	Minneapolis, MN	2018
900-18-317	Remsen Arena and Hockey Rink	New Hockey Facility	Choate Rosemary Hall / MSN Architects	Wallingford, CT	2018
900-18-318	Hobbs Municipal Ice Center	Akervik Rink Upgrades	University of WI - Eau Claire / JLG	Eau Claire, WI	2018
900-18-319	Lakeville Ames Arena	Ice System Design and Construction Observation	City of Lakeville / APEX	Lakeville, MN	2018
900-18-320	Schmitz-Maki Arena	Ice Arena Improvements	City of Farmington / Wold Architects and Eng	Farmington, MN	2018
900-18-321	JMC Ice Arena	Ice Arena Renovations	Erie Zoological Society / Bostwick Design	Erie, PA	2018
900-18-322	St Cloud National Hockey and Event Center	Pre-design Study	St Cloud State University / JLG	St Cloud, MN	2018
900-18-323	Aldrich Arena	Arena Redevelopment	County of Ramsey / Loeffler	Maplewood, MN	2018
900-18-324	Fargo Sports Complex	Ice System Design and Construction Observation	Sanford Health / JLG	Fargo, ND	2018
900-18-325	Anaheim Duck Arena	New Arena Prototype	The Rinks / 292	Anaheim, CA	2018
900-18-326	Crown Coliseum Complex	Ice System Replacement	Cumberland County	Fayetteville, NC	2018
900-18-327	Redwood Empire Ice Arena	Ice System Replacement	Snoopy's Home Ice	Santa Rosa, CA	2018
900-18-328	Steinberg Pavilion	Feasibility Study	Forest Park Forever / Chiodini	St Louis, MO	2018
900-18-329	Titelton Plaza	New Skating Path - Warranty and Followup	Titelton Development, LLC / Rossetti	Green Bay, WI	2018
900-18-330	Robson Arena	Ice System Design and Construction Observation	Colorado College / JLG	Colorado Springs, CO	2018
900-18-331	UMD Sports and Health Ice Rink	Mechanical Refrigerant Replacement	University of MN	Minneapolis, MN	2018
900-18-332	Outlaw Square	Ice System Design and Construction Observation	City of Deadwood / Wyss Associates	Deadwood, SD	2018
900-18-333	Centennial Sports Center	Ice System Replacement	School District of Centennial / 292	Circle Pines, MN	2018
900-18-334	ASU The Plaza @ Mesa City Center	Ice System Design and Construction Observation	City of Mesa / Colwell Shelor Landscape Arch	Mesa, AZ	2019
900-19-335	South Billings New Arena	New Arena	City of South Billings / BRS	South Billings, MT	2019
900-19-336	Outlaw Square	Ice System Design and Construction Observation	City of Deadwood / Wyss Associates	Deadwood, SD	2019

A Few of Our Current Projects



Facility Type
Community



Expertise
Design, Construction



Owner
City of St. Peters



St. Peters Rec Plex - North
St. Peters MO

The North Ice Arena is one of two ice arena facilities owned by the City of St. Peters. The 26 year old direct R-22 ice system had exceeded its expected life and showing signs of age. The city hired B32 Engineering Group to perform a study of the ice system in 2018 and design a new ice system, refrigeration room and other facility upgrades in 2021. After flooding damaged the nearly complete construction, the new systems are ready to start up in October, 2022.



Facility Type
Professional NHL



Expertise
Design, Construction



Owner
Xcel Energy Center



Xcel Energy Center
St. Paul, MN

With an aging R-22 indirect refrigeration system, the Xcel Energy Center, home to the NHL team Minnesota Wild, hired B32 Engineering Group to design a new ammonia refrigeration system, code improvements to the new refrigeration room and a new desiccant dehumidification system for the 18,000 seat arena. The project will be publicly bid this fall and construction to take place in the summer of 2023. The total construction cost is estimated to be \$6.5M.



Facility Type
Community and AHL



Expertise
Ice System Design



Owner
Private



Community First Igloo
Jacksonville FL

The existing Icemen Igloo facility included one ice sheet that was the practice facility for the AHL Icemen Hockey Team. This B32 Engineering Team with Chiodini and G&W completed the design of a complete renovation of this facility that is currently under construction and will include two ice sheets, bar & restaurant, concessions, Esports gaming area, proshop, team rooms, etc. B32 designed a new ammonia refrigeration system, two new ice sheets and dasher board systems for this facility. The challenge of this project was working with an existing building structure.



Facility Type
Community



Expertise
Ice System Design



Owner
City of Casper WY



Casper Ice Arena
Casper WY

B32 Engineering Group has been assisting the City of Casper with the replacement of the existing R-22 direct ice system since 2015 by studying alternatives for the replacement and the design and construction of a new ice rink floor, dasher board system and the relocation of an existing ammonia system from another ice arena facility in town. B32 also evaluated the existing refrigeration system to assure it could be expanded to serve a second ice sheet in the future. Overall, this was a great option for the City and which saved money and time.

St. Louis Park Rec Center - Indoor Ice Rink

St. Louis Park, Minnesota



Facility Type
Community
3 Sheets



Expertise
Evaluation, Design, Construction



Status
Completed
2016



Owner
City of
St. Louis Park, MN



Construction Cost
\$4,335,000

Reference:

Cindy Walsh
Parks and Recreation Director
City of St. Louis Park
3700 Monterey Dr
St. Louis Park, MN 55416
952.924.2541
cwalsh@stlouispark.org

Jason Eisold
Rec Center Manager
Rec Center
3700 Monterey Dr
St. Louis Park, MN 55416
952.924.2547
jeisold@stlouispark.org

PROJECT DESCRIPTION

As with many ice arenas built in the 1970's and 1980's, the mechanical systems for this two-rink facility had well exceeded their safe and reliable life expectancy. In addition, the City was greatly concerned with the over 8,000 pounds of R-22 that was being used in the two refrigeration systems to operate these systems.

The challenges on this project were numerous. As one of the busiest ice rink facilities in the U.S., and serving many different types of user groups such as the community, a local college preparatory school, and practices for the NHL's Minnesota Wild team; significant downtime during construction was not an option. B32 Engineering Group extensive experience with ice rink renovation projects and the design of many multi-sheet facilities, assisted in planning a very successful phased construction schedule keeping one ice sheet in operation at all times.

Another significant challenge, and a key goal of the project, was replacing a highly efficient direct R-22 system with a more modern, more environmentally friendly, indirect system without increasing the utility costs. To add to this challenge was keeping the same goal of zero utility costs increase while adding a new refrigerated outdoor ice rink to this facility.

This project was a combination of: a large, multi-million-dollar ice system replacement and renovation project including two new rink floors, new dasher board system and a new common ammonia-based refrigeration system; and the construction of a new outdoor ice rink and new mechanical room. This project was successfully delivered and completed within the very restrictive summer construction season.

These improvements will efficiently and effectively serve the St. Louis Rec Center for the next three decades and beyond and solidify the facility's future as one of the elite ice arena facilities in the nation.



Centene Community Ice Center

Maryland Heights, Missouri



Facility Type

Community/Professional
4 Rinks



Expertise

Design, Construction



Status

Completed On Time
October 2019



Owner

Public-Private Partnership



Construction Cost

Privately Negotiated

Reference:

Patrick Quinn
Chairman

St. Louis Legacy Foundation
314.619.9929
pq@legacyice.org

Mark Bengard
Sr. Vice President of Sales
Murphy Company
314.795.4039
mbengard@murphynet.com

PROJECT DESCRIPTION

Centene Community Ice Center is a new 4 sheet facility that will be home to the St. Louis Blues new practice facility.

B32 was hired to design, consult, and manage construction for the duration of the project. With any multi-sheet facility, the challenges of meeting the high standards of uniform ice quality, flexibility of individual ice temperature control for each sheet of ice; while minimizing energy use and capital costs as much as possible. Meeting these goals are far greater for multi-sheet facilities compared to single sheet facilities. These challenges were amplified with this new 4-sheet facility by adding NHL level expectations throughout the facility, an outdoor ice sheet with uncontrolled ambient conditions, and providing a flexible, common refrigeration system that met the budget conscious project approach.

Our Role: Subconsultant. Ice System Design (refrigeration system, 3 indoor ice rinks and 1 outdoor ice rink, 4 dasher board systems) and consulted on site layout, building layout, etc.



Cottage Grove Ice Arena

Cottage Grove, Minnesota



Facility Type
Community



Expertise
Evaluation Study, Design,
Construction



Status
Started: March 2019
Completed: October 2019



Owner
City of
Cottage Grove, Minnesota



Construction Cost
\$2.7M

Reference:

Zac Dockter
Park and Recreation Director
City of Cottage Grove
8635 West Point Douglas Road
Cottage Grove, MN 55016
651.458.2847
zdockter@cottage-grove.org

Jordan Hirman
Ice Rink Manager
City of Cottage Grove
8020 80th Street South
Cottage Grove, MN 55016
651.458.3415
jhirman@cottage-grove.org

PROJECT DESCRIPTION

The Cottage Grove Ice Arena is one of the premier youth and high hockey facilities in Minnesota. B32 Engineering Group, Inc. designed the ice system for the new third ice sheet addition that took place at the Cottage Grove Ice Arena facility in 2007 and assisted the City with the planning the ice system replacement in the two original ice rinks by completing an in depth study of the ice systems at this facility.

The study included the analysis of different ice system technologies and systems and determining which system and equipment would be the best fit for this facility. Due to the site constraints, the existing refrigeration had to be reused and the change from a direct R-22 systems to an indirect ammonia system meant larger equipment. The B32 Engineering Group team determined that by making the existing refrigeration room about 2 feet wider, the new equipment would fit in the room and the room could be brought up to current code standards. This was a very cost effective solution for the facility. The renovation was completed on time and in budget and has exceeded all expectations.



Crown Coliseum

Fayetteville, NC



Facility Type
Professional &
Community



Expertise
Study, Design, Construction



Status
Started: March, 2019
Completed: Oct, 2019



Owner
Cumberland
County



Construction Cost
\$3.153M

Reference:

Mr. Jeffery Brown
Engineering & Infrastructure
Director
Cumberland County Engineering
and Infrastructure
130 Gillespie St.
Fayetteville, NC 28301
Work: 910.678.7633
Jbrown@co.cumberland.nc.us

PROJECT DESCRIPTION

The Crown Coliseum in Fayetteville North Carolina is a 6,000 seat multi-use facility that is heavily used and is the home to the professional minor league Fayetteville Marksmen hockey team.

The facility had an aging R-22 based refrigeration system. The owner of the facility, Cumberland County hired B32 Engineering Group, Inc. to evaluate options for replacing the existing ice system which included the refrigeration system, the ice rink floor and the dasher board system. Options for ammonia, CO2 and various synthetic refrigerants were presented to the County. The County selected ammonia refrigerant for its superior efficiency and sustainability, however, the refrigeration room was located in the center of the building on the second floor and shared space with most of the HVAC equipment for the facility. Due to code restrictions, the ammonia refrigeration room would have to be located elsewhere.

With B32s extensive experience in ice rink renovations they were able to present a solution that would place the ammonia refrigeration system in a new modular room outside the facility. The pipe routing between the new refrigeration room and the ice rink floor was the most challenging design element of this project. The project was a great success and will serve the facility well for the next 30 plus years.



Enterprise Center (St. Louis Blues) formerly Scottrade Center

St. Louis, Missouri



Facility Type
Professional - NHL



Expertise
Design, Construction



Status
Completed
Design 2017
Construction 2017



Owner
City of St. Louis



Construction Cost
\$1.6M

Reference:

Doug Waugh
Sr. Director of Building Operations
Enterprise Center
1401 Clark, St. Louis MO 63103
314.589.5982
DWaugh@Enterprisecenter.com

Mark Bengard
Murphy Company
1233 N Price Road, St. Louis MO
314.997.6600
mbengard@murphy-stl.com

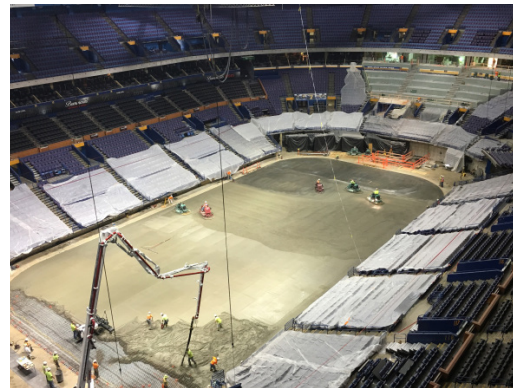
PROJECT DESCRIPTION

The Enterprise Center is best known as the home of the St. Louis Blues of the National Hockey League (NHL). The building was originally constructed in 1994 and the 23-year old ice and mechanical systems were starting to show their age and required replacement. Naturally, with an aging system, a number of issues began to crop up, including the deteriorating ice quality. This project had a number of unique challenges for the entire design team.

First and foremost, this project had a hard deadline due to the Enterprise Center being home to an NHL team. The project needed to be wrapped up by September for the 2017-2018 NHL season. With an already condensed schedule, the project wasn't approved to move forward until February of 2017. At this time, B32 Engineering Group was hired to design the new ice system including the rink floor and refrigeration system, and to work with a large local mechanical contractor, Murphy Company, who had limited ice rink experience. B32 Engineering Group designed the entire project in one month to assure material could be ordered and delivered on time for the 23 week project. The rink floor was constructed in half the time a typical floor takes.

Another unique challenge to this project was the need to have the rink floor change from NHL size (85' wide) to Olympic size (100' wide) with just a turn of a few valves. B32 Engineering Group floor design met this need and provided a very unique option for the owners and operators of this facility.

Due to the great success of this project, the Enterprise Center will provide an amazing ice surface for national and international events for many years to come.



Maryville University Hockey Center

Chesterfield, Missouri



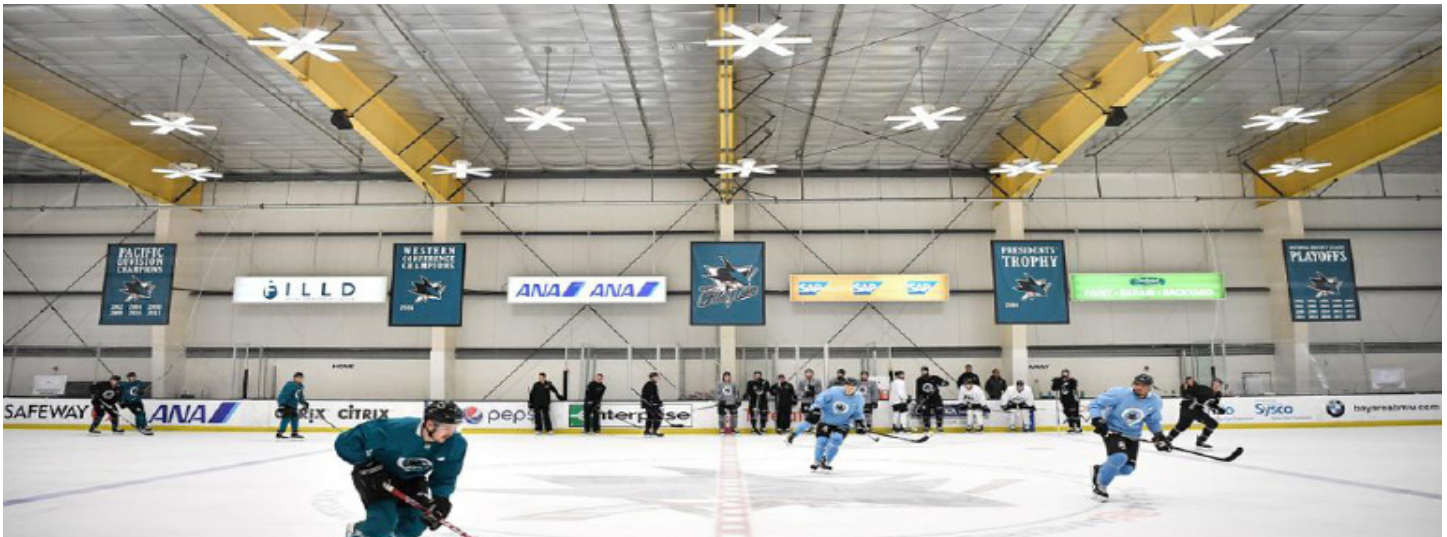
September of 2019; the Maryville University Hockey Center was completed. The project includes a 2-sheet ice facility complex with all essential amenities; concessions/coffee shop, meeting facilities, viewing areas, and bar/dining area. The Complex provides needed ice time and recreational facilities for St. Louis youth and adults and attracts local and regional sporting events and tournaments, generating jobs and tourism dollars for local businesses.

Exploring Partnerships:

- Olympic figure skating training is considering a move to St. Louis, using non-peak hours and attracting top skaters and teams from around the country for US trials to this central location
- St. Louis Curling Club is evaluating the construction of a facility adjacent to the Sports Complex, allowing resources to be combined and leveraging off one another to promote sports that are accessible to all people of all ages and abilities.
- Gateway Special Hockey and the St. Louis Sled Hockey Team have also expressed interest in the new facility
- During the off-season, one of the rinks will be converted for indoor soccer, box lacrosse, or ball hockey programs; further fulfilling the objective of involving more people in sports.

Solar4America - San Jose Rinks 1 & 2

San Jose, California



Facility Type
Professional NHL



Expertise
Ice System Design,
Construction



Status
Completed
Design, 2017
Construction, 2018
Rinks 3,5,6 - 2020



Owner
City of San Jose



Construction Cost
General \$2.5M
Ice System - \$2.5M
Dasher Boards - \$600K

Reference:

Jon Gustafson
Vice President
Sharks Ice LLC
1500 South 10th Street
San Jose, CA 95112
408.999.6751
jgustafson@sharksice.com

Reference:

Richard Rocha
Director of Building Operations and
Guest Services
Sharks Ice LLC
1500 South 10th Street
San Jose, CA 95112
408.999.6719
rocha@sharksice.com

PROJECT DESCRIPTION

Solar4America in San Jose is a non-stop facility, alive with community skating events, public skating, camps, youth and adult hockey games, etc. and is the largest indoor ice rink facility the Western United States. It also serves as the training facility for the NHL San Jose Sharks, the AHL San Jose Barracuda, and the San Jose University Spartans hockey team. At the time of this renovation, the facility had 4 ice arenas and had plans for adding 2 more in the near future. Before looking too far ahead, there was a need to make improvements to the ice systems for Rinks 1 and 2. Rinks 1 and 2 were being served by a very efficient R-22 direct ice system that had well exceeded its expected and safe life.

B32 Engineering Group assisted the operational group in the design and construction administration services for a new ice system that included a common refrigeration system to serve the two ice rinks and two new concrete ice rink floors. The failure of the subfloor heating system in both ice rink floors allowed frost to build up under each ice rink floor 10 feet deep. B32 provided guidance on removing the frost during the demolishing phase as cost effectively and timely as possible using its extensive experience with frost removal. After discussing the refrigerant options for the new refrigeration system, a R-134a based refrigeration system was selected to serve these 2 rinks. With any renovation project come challenges and for this project the challenges included designing the new refrigeration system to fit in the existing refrigeration room, the new cooling tower to fit in the fixed space on the roof and a condensed project schedule required to meet the high demand for ice time. Careful planning was also required when designing the routing of the transmission mains in and around the existing building footings and walls. From start of construction to the start of skating on the new ice rink floors was 17 weeks. This very fast paced schedule required the experienced specialty services of B32 to stay on track, be flexible and make quick decisions and timely site visits during construction. The project was a huge success and met the Sharks Ice schedule and budget.



PROJECT UNDERSTANDING



As a continued effort to improve the operations and financial success of the Creve Coeur Ice Arena located at the Dielmann Recreational Complex at 11400 Olde Cabin Road, the City of Creve Coeur's Public Works and Recreation Departments is seeking request for qualifications for professional engineering services to review and evaluate the Ice Arena refrigerant system and develop a final recommendation for the feasibility of the refrigerant change. The selected engineering firm will then design the recommended system and provide all the necessary documents to bid its construction and installation. The existing ice rink floor and dasher board systems are not part of this project.



The facility has a solid and long tradition of providing ice-related activities including hockey, ice skating and curling. The highest level of play at this facility is high school practices. High School games are not played at this facility due to the limited seating.

The City has been proactive in evaluating and planning for improvements to the refrigeration system at this facility. The City hired this same B32 Engineering Group, Inc Team to complete an Ice Arena Refrigerant Change Feasibility Study in April, 2022 that evaluated the existing refrigeration system, presented four (4) options for improving the existing refrigeration system or replacing it with a new system, along with cost estimates and project schedules. Prior to the B32 study, Murphy Companies completed a study on the condition of the existing equipment.



The existing refrigeration system is an indirect R-22-based/glycol system that was installed in 2003 (19 years old). R-22 refrigerant used in the system was phased out of production in 2020, which has caused the price of R-22 to rise significantly over the past few years. Since 2003 there have been some major improvements to the existing refrigeration system such as rebuilding or replacing all three (3) Carlyle reciprocating compressors, installing a new evaporative condenser in 2008 (14 years old), adding heat to the snow melt pit, replacing the subfloor heating pump, etc. The existing refrigeration system has a capacity of approximately 120 tons. Waste heat is recovered from the system to serve the subfloor heating system under the ice rink floor and the snow melt pit in the resurfacer room.



The existing refrigeration room is approximately 550 square feet which is adequate in size to house a new refrigeration system and the majority of the room construction is noncombustible. There is only one access door out of this room, and it opens directly to the exterior of the building. The existing life safety systems in the refrigeration room include a gas monitoring system and mechanical ventilation and are reportedly in good working order. This room should be updated to meet the current code requirements for the selected refrigerant.



This project presents numerous challenges, all of which the B32 Engineering Group Team has extensive experience with such as: renovation and design of recreation and park facilities (in particular ice arenas); building expansion and renovation; renovation of existing mechanical systems and building components; routing of new piping systems; the potential use of ammonia or CO2 and related life safety concerns; enhanced controls and interfacing with building management system; maximizing the use of waste heat; and proper system design and flowrates to help provide a high performing and efficient existing ice rink floor system. One of the most recent changes is the long lead times on some equipment. B32 has designed and bid numerous ice system projects over the past year or so and understands the supply shortages and options to lower the client's risk.

The City has applied for a St. Louis County Municipal Park Grant to fund part of the capital investment needed for this project. If grant funding is approved, we will work as part of the team to manage the grant requirements and provide the needed documentation. We will also appear as an expert before the City's Facilities Task Force and City Council and provide technical and financial recommendations.

WORK PLAN / SCOPE OF SERVICES



Using a proven, well-defined, step-by-step approach, we will work closely with the City of Creve Coeur, facility personnel and other stakeholders throughout the duration of the project.

The B32 Engineering Group Team will be led by Mr. Scott Ward who has extensive knowledge in ice arena facilities; ice system design, project development, funding applications, and the design and construction processes and is very familiar with the Creve Coeur Ice Arena. B32 understands the value in partnering with experts in the field and is therefore teaming with Chiodini Architects for architecture (extensive ice arena experience and will provide local representation) and G&W Engineering for MEP (extensive ice arena experience and can also provide local representation as needed). All meetings and discussions will be documented and meeting minutes will be distributed in a timely manner.



Project Schedule

Our team has extensive experience in working closely with clients to evaluate and identify renovation and improvement solutions for existing ice arenas and ice systems. We can provide a detailed project schedule that meets the City's goals and needs during our initial design meeting with the City.



With the current bidding climate, material supply shortages, and the number of ice rink projects scheduled for construction over the next few years, we recommend bidding this project in July of the previous year desired for construction. The longest lead items right now is Motor Control Centers (42 weeks). We understand the project schedule to be as follows:

- October 24 - City Council Meeting (award of contract)
- November 7 - January 31, 2023 - Part I Evaluation and Alternatives Feasibility Analysis.
- February 1, 2023 - April 28, 2023 - Part II Design and Bidding of Replacement System

The Proposed Work Plan for the design and construction phases of the project is presented in this section.



TASK A: Part I - Review and Preparation

To maximize the productivity of our first meeting, our team will review existing documents for the facility including drawings, specifications, reports and studies, utility bills, history of improvements, repair logs, etc.

TASK B: Part I - Evaluation and Alternatives Feasibility Analysis

This work will be completed in a step by step approach as outlined below.

STEP 1: Preliminary Walk-through of the Facility

The B32 Engineering Group Team is already very familiar with the facility but would like to walk through the facility again prior to our first meeting.

STEP 2: Project Kick-off Meeting

Introductory meeting with the City of Creve Coeur, City Project Manager, facility personnel, and other stakeholders to discuss the following:

- Introduction of all stakeholders and B32 Engineering Group team members
- Project goals
- Review two prior studies completed by Murphy and Chiodini.
- Project schedule.
- After completing a thorough discussion on the existing facility and its systems as well as, initial discussions on desired improvements, we will complete a field investigation of the existing facilities by each discipline and specialty required for scope of project, which may include site, building systems, ice systems, mechanical (HVAC), electrical, and structural.

- Interview of facility personnel. No one knows the facility and systems better than those who operate and maintain them. The unique design, character, and age of each ice arena facility make this information all the more valuable in completing a comprehensive study. Even though B32 knows your facility very well, we never stop learning. These interviews or discussions may be informal and take place over a period of time either in person, telephone or through electronic communications. Potential interviewees include: facility managers, equipment operation and maintenance staff, City design or engineering staff, outside service contractor (if it makes sense), etc.
- Perform on-the ground condition assessment of the existing refrigeration system, its components, related systems and components (architectural and MEP systems) and the facility general arrangements and operations.

STEP 3: Analysis and Technical Review of Feasible Options

With the collection of material and information complete a thorough process of analyzing and evaluating the information on the existing facility and proposed new systems will be performed. During this step we will:

- Evaluate refrigerant and refrigeration system and equipment options, waste heat recovery systems and other systems.
- Evaluate using the existing refrigeration room for the new refrigeration system and improvements required to meet current code requirements.
- Confirm the existing facility's ability to support the systems.
- Evaluate options on typical energy use, cost, and life safety.
- Evaluate impacts such as safety and environmental considerations and product quality.
- Identify and evaluate at least 3 options for replacing the refrigeration including the use of artificial refrigerants and natural refrigerants like ammonia and CO2.
- Provide recent, actual applications both in the St. Louis area and nation wide for all options. We would be excited to organize and guide the City of Creve Coeur, facility personnel, and other interested stakeholders on a tour of any number of the B32 Engineering Groups Team's successful ice arena building renovation or new projects in the St. Louis area or set up tours for any of B32's very successful ice rink projects nationwide. This will provide you with the opportunity to see ice systems in operation and get feedback from facility staff. We have completed a number of community based facilities in the St. Louis area that are similar in size, function, and programming to the Creve Coeur Ice Arena.
- Provide opinions of construction costs for each option based on recent and current market conditions and B32's extensive ice rink project experience.
- Provide an accurate project timeline based on B32's extensive experience with ice rink projects. B32 typically has 10-15 ice rink projects under design or construction at any one time providing valuable information on the current status of materials, labor, etc. related to ice rink projects.

STEP 4: Final Recommendation

During this step we will:

- Coordinate with City staff findings and results of analysis with a final recommendation option for selection.
- Present selected option to Task Force, as needed.
- Make final presentation to City Council for approval consideration of the selected option.

TASK C: Design Phase - Design and Bidding of the Replacement

After acceptance of the Evaluation and Alternative Feasibility Analysis Phase by the City of Creve Coeur we will continue into the design phase.

STEP 1: Preliminary Design Phase (45% Complete)

With a defined scope, we will prepare preliminary design phase documents. During this step we will:

- Prepare Preliminary drawings for all systems and improvements including process, mechanical, electrical, piping, instrumentation and controls, fire protection, structural and all other drawings, narratives, spreadsheets, calculations, reports, and other elements as required for bidding and construction.
- Prepare draft of procurement and Division 1 documents.
- Prepare opinion of probable construction costs.
- Update detailed design development schedule that will plug into the anticipated project implementation schedule.
- Meet with the City to review the drawings, schedule and opinion of probable construction cost.
- Meet with local, State and Federal regulatory compliance agencies, including the Chief Building Official and Fire Marshal, to review the proposed system design and
- Revise preliminary design phase documents, opinion of probable construction cost after meeting with the City and regulatory agencies.

Step 2: Final Design Phase (90% design review, 100% design)

After acceptance by the City of the Preliminary Design Phase Documents we will:

- Develop final specifications for improvements.
- Prepare final procurement and City documents.
- Provide a final opinion of probable construction costs.
- Update design development and project schedule.
- Meet with the City to review the plans at 90% complete, project schedule and estimate of probable construction costs.
- Revise bidding documents according to comments by the City and review agencies.
- Provide 100% final plans, specifications, and opinion of probable construction.
- Attend city council meeting(s) as necessary.

Step 3: Bidding Phase

During this step we will:

- Prepare advertisement for bid for the City to review and to provide to legal news publication and other trade magazines.
- Provide recommendation on bidding and award schedule.
- Provide three (3) copies of the bid documents to the City for the City's use.
- Provide three (3) copies of the bid documents to the City for permit review.
- Distribute copies of bid documents to the contractors.
- Answer questions from contractors, suppliers, and the City during the bid opening and record bid results.
- Attend pre-bid meeting and bid opening as desired by the City.
- Review the bid results and recommend award of construction contract.
- Prepare construction contracts for review by the City.



TASK D: Optional Construction Phase Services

Proper installation of the refrigeration system and related building, mechanical and electrical systems plays a significant role in the economic and social success of the ice arena facility. Experienced ice arena specialists provide a higher level of confidence that the installation has been done right and the final product has been constructed as the design intended.

We will provide the construction administration phase services necessary to monitor and document the construction of the project for the City and to help assure the project is very successful. There are numerous variables that will determine the number of inspections for the project including the scope of the project experience level and performance of the contractor. An outline of the typical construction phase services provided by our team for similar projects is presented below.



- Pre-construction Conference – To discuss the project requirements, expectations, communication, schedule, testing procedures, submittals, inspections, payment estimates and change order procedures.
- Progress Meetings - Coordinate and take part in regular progress meetings.
- Site Visits – The B32 Engineering Team will visit the site during the key construction activities. Outlined below examples of some of the more important milestones for the ice system and building addition:
 - * Demolition and exposure of existing conditions.
 - * Subgrade preparation of rink floors, footings, foundations, utilities.
 - * Footing and foundation installation; utility installation.
 - * Refrigeration equipment inspection - Observe installation of refrigeration equipment, piping, controls, and other systems within the mechanical room. Check equipment and piping clearances, piping supports, material conformance, etc. Perform a preliminary check of the dasher board installation after the concrete ice floor has been installed and cured.
 - * Building system installation including walls, roof, flooring.
 - * Mechanical and electrical system installations.
 - * Final inspection/equipment start-up - Perform a final walk through of the systems generating a list of items (punch list) to be completed. Review start up and shut down procedures. Review Operation and Maintenance manuals provided by the contractor.
- Contract Administration - We will also provide shop drawing review of equipment and materials used on the project. We will perform construction administration tasks such as reviewing and processing pay requests, change orders and documenting the project's progress. We will provide the City with a Field Observation report for each site visit.





Engineering Group

P. 651.256.3090

2211 O'Neil Rd. Hudson, WI 54016



Ice Arena Refrigerant Change Feasibility Study

The Deilmann Recreation Complex

For:

City of Creve Coeur
300 N New Ballas Road
Creve Coeur, MO 63141

November 4, 2021

Revision 1:

April 5, 2022

Submitted by:

Scott A. Ward, P.E.
B32 Engineering Group, Inc.
2211 O'Neil Road
Hudson, WI 54016
651.256.3090



File No. 900.16.270



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2.0 BACKGROUND AND PURPOSE

The Creve Coeur Ice Arena is located in the Deilmann Recreation Complex at 11400 Olde Cabin Road in Creve Coeur, Missouri. The Creve Coeur Ice Arena has a long tradition of ice hockey, ice skating, and curling. The highest level of play at this facility is high school practices. High School games are not played at this facility due to the limited seating. As part of a continued effort: to improve operation and efficiency at the facility; to plan for future improvements to the ice system; and to continue to provide high quality ice for its user groups; the City of Creve Coeur has commissioned this study to evaluate the options for replacing the R-22 refrigerant in the existing 18-year-old indirect R-22-based ice system, or replacing the entire refrigeration system, along with other improvements. R-22 refrigerant was phased out of importation to and production in the U.S. in 2010 due to its high ozone depleting potential (ODP). In the past 6 months or so the price of R-22 refrigerant has risen substantially and is expected to keep rising as supplies have become very limited and purchases restricted to small quantities.

B32 Engineering Group, Inc. visited the site, with Chiodini Architects, on September 23, 2021. The ice sheet was in place during the site visit. B32 Engineering Group, Inc. has reviewed the Murphy report dated February 15, 2021, agree with its findings and reference it throughout this report.

The facility was built in 2003 and currently operates in the ice mode year-round.

3.0 ICE SYSTEM REVIEW

3.1 Description of Existing Ice System

The existing ice system includes a refrigeration system, a concrete ice rink floor system and a dasher board system. The existing refrigeration system is an indirect R-22-based/glycol refrigeration system and was installed in 2003. Since 2003 the following major improvements to the refrigeration system were completed:

1. 2008 – Compressor 3 remanufactured or rebuilt.
2. 2008 – New evaporative condenser.
3. 2008 - Added heat to the snow melt pit.
4. 2019 - Compressor 1 remanufactured or rebuilt.
5. 2017 – Compressor 2 remanufactured or rebuilt.
6. 2017 – Subfloor or underfloor circulation pump.
7. 2021 – Installed new fins in existing evaporative condenser. The city will finish installing interior fins in 2021.

The existing refrigeration includes: three Carlyle reciprocating compressors Model 5H120-A219 with capacity of approximately 20 tons each at a 0-degree saturated suction temperature providing a total capacity for the refrigeration system of approximately 120 tons; flooded-type plate and frame chiller system with two plate and frame chillers and one surge drum; rink floor pumps, one evaporative condenser, a control system and a waste heat recovery system. The existing system is considered a “skid package” system where the majority of the components are built and delivered on a single steel frame or “skid”.



Photos 1 & 2 – Existing refrigeration system

There is a waste heat recovery system that serves the subfloor heating system under the rink floor and the snowmelt pit in the resurfacer room. This system essentially provides free heat from the refrigeration system. The subfloor heating system is reportedly in good working order and there are no concerns with frost building up under the ice rink floor. The snowmelt pit heating system is reportedly performing well.



Photo 3 – Existing evaporative condenser



Photo 4 – Existing snow melt pit and coil

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The existing concrete ice rink floor was installed with the original building in 2003 and extended to NHL standard size of 200' x 85' in 2008. The fluid in the subfloor heating system is glycol. The concrete is reported to be uneven which leads to uneven ice thickness and possibly increased energy use and ice quality concerns. In 2003-04 the subfloor header piping system under score keeper's box was replaced. In 2008 the size of the rink floor was extended to the NHL standard size of 200'x85'.



Photo 5 – Overall ice rink floor



Photo 6 – Bleacher seating in ice arena

The existing refrigeration room is approximately 550 square feet which is adequate in size to house a new refrigeration system. See the conceptual ice system layout at the end of the report. There is only one access door out of this room, and it opens directly to the exterior of the building. The existing life safety systems in the refrigeration room include a gas monitoring system and mechanical ventilation and are reportedly in good - working order. B32 Engineering Group did not test or witness the operation of any life safety systems.

The existing dasher board system was installed in 2003 (18 years old) and is reaching its typical life expectancy of 20-25 years. Some improvements to the existing system were completed and include the replacement of the white poly facing and the modification of the boxes and doors to meet the requirements of the Americans with Disabilities Act (ADA) in 2008. The manufacturer of the dasher board system is not known. The system appears to be in fair condition and no other concerns have been reported.



Photo 7 – Existing dasher board system



Photo 8 – Existing dasher board system – Scorer's box

4.0 ICE SYSTEM IMPROVEMENT AND REPLACEMENT OPTIONS

4.1 General

The existing 18-year-old ice system (refrigeration system, ice rink floor and dasher board systems) is nearing its expected useful and safe life of 25 years. Some improvements have been made to the refrigeration system, as outlined above.

The scope of this study did not include evaluating the existing ice rink floor or dasher board system. Murphy performed thermal imaging on the ice rink floor in 2021 and found no large differences in temperature concluding there are likely no leaks in the piping system.

The existing refrigeration room is large enough to accommodate any of the recommended refrigeration system improvement and replacement options outlined in the next section. The conceptual ice system layout, included at the end of this report, shows the layout for Option 3 – stick built ammonia system. This drawing also shows a new access door and vestibule between the refrigeration room and the resurfacer room. The additional access will provide a more convenient access for the facility staff to enter the refrigeration room and provides another layer of protection or isolation between the refrigeration room and the resurfacer room if the ammonia option is selected. The cost estimate includes these improvements and other code required improvements to the refrigeration room each of the recommended options outlined below.

4.2 The Future of Refrigerants

When discussing ice system options, refrigerants are now the key element to consider when determining what type of refrigeration system is the best fit for your ice rink facility. So, it is necessary to understand how refrigerants impact refrigeration equipment and system options. First, let's start with a little history. R-22 has been the most popular refrigerant used in ice rink applications in recent history. With the signing of the Montreal Protocol in 1987, the United States Environmental Protection Agency (EPA) implemented the final rule of Section 604 of the Clean Air Act in July 1992, limiting the production and consumption of a set of chemicals known to deplete the stratospheric ozone layer as measured by their ozone depleting potential (ODP). R-22, which also has a high global warming potential (GWP), was one of these targeted chemicals and as of 2020, is no longer manufactured or imported in the U.S and can no longer be installed in new refrigeration systems. However, R-22 can be used in existing systems until the supply runs out.

In 2016 the Kigali Amendment was applied to the Montreal Protocol focusing on the phasedown of production and consumption of HFCs to reduce greenhouse gas emissions driving down the global warming potential (GWP) of refrigerants. More than 90 countries ratified this amendment in 2019 including Canada but excluding the U.S. as of February 2020. The U.S EPA made certain HFC refrigerants unacceptable for use in the Significant New Alternatives Policy (SNAP) Rules 20 (2016) and 21 (2017). However, the U.S. courts partially vacated these rules, and the industry is awaiting the EPA rewrite expected in 2020. Despite this, states may choose to adopt and set their own timeline for implementation of the SNAP rules. Some of the refrigerants that are currently used in ice skating facilities and are on the phasedown list include: R-134A, R-404A, R-407B, R-407C, and R-507A.

California is one of the states leading the way to lower GWP refrigerants. The California Air Resources Board (CARB) Activity adopted the SNAP Rules 20 and 21 in September 2018 and approved a limit the GWP of refrigerants used in ice rinks to < 750, following the lead of other Countries such as Canada and Europe. This would eliminate R-134a which has a global warming potential of 1410 (meaning the release of one gram of R134a would have the same global warming effect as releasing 1410 grams of carbon dioxide). In late 2020 California passed legislation reducing the GWP even lower to < 150, eliminating most synthetic refrigerants. California is part of a "Climate Alliance" that approximately 14 other states participate in, including New York, which have adopted HFC transition dates.

Currently, the ice rink industry is caught in a transition period for refrigerants as new environmental regulations are implemented. Careful consideration and evaluation of the current refrigerant options should be made. The replacement refrigerants for HCFC refrigerants (e.g., R-22, etc.) and HFC refrigerants (e.g., R-507, R407C, R-134a, etc.) are fairly new with a limited history and performance data in this application. Some of those new refrigerants are R-448A, R-449A, and R513A. R-513 is a new blended synthetic refrigerant that is supported by the National Hockey League as a sustainable, non-ozone depleting, lower global warming potential (GWP) alternative refrigerant. Its GWP is 613 and its ASHRAE Safety Classification is A1 which is lower toxicity and no flame propagation.

Large global companies, such as Coca Cola, are leading the charge to ban HFCs and use natural refrigerants such as CO₂, hydrocarbons and ammonia. Since 2004, more than thirty ice skating facilities in Europe have switched over to using CO₂ as the secondary refrigerant with ammonia as the primary. The first CO₂-based ice system in North America, and the first *direct* CO₂-based system in the world, opened in 2011 in Quebec, Canada with a second rink opening in Montreal in 2012. The U.S. now has eight ice rink facilities that use CO₂. B32 Engineering Group, Inc. was

the leader in this application designing the first CO₂ based ice rink system in the U.S. in 2016 and has since designed five more.

4.3 Refrigeration System Improvement and Replacement Options

Four main options were identified for improving or replacing the existing refrigeration system at this facility. Additional information such as common terms or definitions, financial programs, cost estimates, etc. can be found at the end of this report. Where applicable, this report references the Murphy report dated February 15, 2021, for additional information and to provide a contractor's perspective to the improvements and cost estimates. The following options will be discussed in this section:

- Option 1: Maintain existing R-22 refrigeration system. Make selected improvements.
- Option 2: New indirect, HFC/HFO synthetic-based refrigeration system.
- Option 3: New indirect, ammonia-based refrigeration system. See conceptual layout in report.
- Option 4: New indirect, CO₂-based refrigeration system.

The estimated energy efficiency stated below for each refrigeration system replacement option is given to provide a rough order of magnitude only and may not be specific to this facility. The efficiency of each system can vary greatly depending on the facility type, programming, building construction, operations, weather, length of season, etc.

Cost estimates include construction cost, design, legal, financial and administration costs, and design and construction contingencies for proposed improvements. Cost estimates are based on similar work performed in ice rink facilities from 2018-2021 and recent bid results. Costs will vary depending on the time of year the projects are bid, the economic climate and the size and scope of the project. In general, costs are rising due to the number of ice rink renovation projects, cost of materials, COVID restrictions, etc.

4.3.1 Option 1: Maintain existing R-22 refrigeration system. Make selected improvements

Description: The City may elect to continue to operate the existing indirect R-22-based refrigeration system with selected improvements with the goal of replacing the system in the very near future.

Advantages:

- Lower near-term costs.
- Avoid disruption to user groups, ice schedule and revenue from construction activities.
- Allow a little more time for the new refrigerants and technology to develop. Extending the use of the existing refrigeration systems for a while longer will allow newer ice system technology, such the use of CO₂ refrigerant or new synthetic replacement refrigerants, to develop allowing manufacturing costs to decrease, and service companies to gain more experience.

Disadvantages:

- On-going maintenance and equipment costs.
- Risk disruption to schedule and loss of ice as equipment and systems become less dependable.
- Risk of catastrophic leak or failure in system and high cost of repairs and refrigerant replacement.

- Increased environmental concerns with increasing risk of refrigerant release, etc.
- Future availability and higher cost of refrigerant. In the last 6 months or so R-22 refrigerant supplies have decreased substantially increasing the cost to record levels (approximately \$23/pound per Murphy and expected to rise significantly higher by the end of the year) and limiting the purchase of R-22 to 30-90 pounds per purchase. The existing system has an estimated charge of over 1,000 pounds of R-22 per Murphy's report.

Recommendation: Unfortunately, at this time there is no "drop-in" or replacement refrigerant for R-22 refrigerant in a flooded type of refrigeration system like the existing system. The traditional pure synthetic refrigerants like R-507 and R-134a will most likely start to be phased out as soon as 2024 based on their high global warming potential (GWP). In addition, these refrigerants substantially decrease the capacity of the refrigeration system by 50% or more as shown in the Murphy report dated February 15, 2021. New blended synthetic refrigerants such as R-513, R-448A, R-449A, etc. would have the same issues and potentially reduce the capacity of the system even further. In addition, these new refrigerants are blends of multiple refrigerants vs pure refrigerants like R-22, R-134a etc. which would likely cause additional operational issues in a flooded-type refrigeration system. Simply replacing the refrigerant in the system is not a recommended option at this time.

Since the trend toward higher cost and lower availability for R-22 refrigerant is not expected to change any time in the foreseeable future, and there are no proven refrigerant replacements for R-22 in a flooded refrigeration system or without substantially reducing capacity, we recommend the City start budgeting and planning for a full replacement of the refrigeration system. If the City elects to continue to operate the existing system, we recommend that only the improvements or repairs that required to maintain the system in a safe working condition and to improve the monitoring of the refrigerant charge and system for leaks, etc. be performed. We recommend the following improvements, etc.

- Budget for 500 pounds of refrigerant replacement and store if possible. If a surplus of R-22 refrigerant is not purchased and stored, one smaller leak in the system could force the facility to shut down until additional R-22 could be purchased. This will likely result in the loss of the ice sheet and cancellation of programming.
This is the first time in 20 plus years that the ice rink industry has faced this type of limitation and potential for substantial impacts to the operation of the facility.

Cost Estimate of items above: \$18,000

- Recoat condenser steel support system as recommended in Murphy report.
- Continued monitoring and testing:
 - Monitor the condition of all systems for life and safety concerns.
 - Monitor for refrigerant leaks in the system.
 - Monitor and test all fluids in the system twice a year.
 - Monitor the condition of the ice rink floor and surrounding perimeter concrete and walls. Document all cracking, heaving, movement, etc.
 - Monitor glycol temperatures from the subfloor heating system to assure the system is operating properly.
- Continue to perform the required maintenance on the equipment and systems.

Cost Estimate of items above: Typical maintenance.

4.3.2 Option 2: New indirect, HFC/HFO-synthetic based system (R-513, etc.)

Description: Replace the existing R-22-based indirect refrigeration system with a new R-513-based refrigeration system, or similar type refrigerant, located inside the existing refrigeration room with a water fluid cooler. The equipment used in this type of system is more commercial grade quality and may include direct expansion chillers (vs flooded), blended HFC or HFO refrigerant, semi-hermetic compressors (vs open drive) and pumps. B32 can provide a conceptual drawing of this system if desired.



Photo 9 - Example of a Carrier or Trane package systems

Advantages:

- Lower capital cost.
- Potentially less space required.
- Lower refrigerant charge.
- Potential to be converted to another synthetic refrigerant type as synthetic refrigerants are phased out in the future. R-513 is a new blended synthetic refrigerant by Opteon that is supported by the National Hockey League as a sustainable, non-ozone depleting, lower global warming potential (GWP) alternative refrigerant. Its GWP is 613 and its ASHRAE Safety Classification is A1 which is lower toxicity and no flame propagation. See the Future of Refrigerants section of this report for additional information.

Disadvantages:

- Lower quality of materials and equipment compared to the existing system. For example, the compressors would likely be replaced when they fail and not re-built, refrigerant piping is copper in place of steel, etc.
- Lower life expectancy (approx. 20 years vs. 30+ years for an ammonia industrial grade system).
- Lower efficiency than industrial grade system. Estimated to be 10-15% less energy efficient than the existing R-22 indirect system.
- Uses synthetic (HFO) refrigerant. Future regulations are uncertain regarding synthetic refrigerants.
- Less waste heat available to recover and use from system.
- Equipment arrangement (e.g., skid package) makes maintenance more difficult.

Cost Estimate: \$1,262,000

Cost of Preventative Maintenance. All of the refrigeration system options have similar preventative maintenance requirements and costs. The main difference in maintenance cost is the type of compressors. All options can use screw or reciprocating compressors. The existing R-22 refrigeration system uses reciprocating compressors and would have the highest maintenance costs. Option 2 typical uses screw compressors and could save approximately \$7,000 per year in top end maintenance on the reciprocating compressors.

Recommendation: This is a good option if the budget cannot support a natural refrigerant and these systems are currently being used in other ice rink facilities including some NHL facilities.

4.3.3 Option 3: New indirect, ammonia-based system

Description: Replace the existing R-22-based indirect refrigeration system with a new ammonia-based refrigeration system in existing refrigeration room. See figure at the end of this report for conceptual location and equipment layout.



Photo 10 - Example of a stick-built industrial grade, flooded ammonia-based system

Advantages:

- Best available proven technology for this application.
- Proven performance and dependability.
- Maximum operational efficiency. Estimate to be 20% to 25% more efficient than existing R-22 system.
- Sustainability. Ammonia is a naturally occurring refrigerant.
- Longevity of industrial grade equipment and refrigerant (30+ years). Synthetic refrigerants may be faced with future restrictions with high global warming potentials. Ammonia is also a pure refrigerant.
- Lower cost refrigerant (\$2 per pounds vs. \$15 to \$28 per pound for synthetics)
- Availability of equipment and parts.
- Refrigerant charge will be less than the existing R-22 system. Could also explore the option of a low charge ammonia system reducing the charge to under 500 pounds.

Disadvantages:

- Requires more space. Typically, an ammonia system will require more space for the equipment because of the industrial grade equipment that is used in these systems and the systems are typically built on-site and are not a package type system.
- Recommend installing a vestibule on the inside of the existing refrigeration, as shown on the figure at the end of the report, to house life safety equipment so that it can be monitored prior to entering the ammonia room. All types of refrigeration systems require certain life safety systems like a gas monitoring system and one eyewash-shower station inside the mechanical room and an emergency ventilation switch and refrigeration stop button on the outside of the refrigeration room. For ammonia, a second eyewash-shower system is required outside the refrigeration room. The only way to provide this second system and prevent it from freezing is to construct a vestibule or install in the resurfacer room. The vestibule itself is not required by code. However, it does offer a few additional safety advantages. It provides a safe space for anyone entering the room to stop and monitor any potential hazards (like an ammonia leak) before entering the room through the gas monitoring system or window in the door. It also provides another barrier between the ammonia system and anyone that might be outside the refrigeration room. The risk of an ammonia leak is no greater than any other type of refrigerant and all refrigerants are dangerous. The amount of the ammonia that would be less than the existing R-22 system and the overall charge is much less than the large industrial facilities, so fire and explosion are much less of a concern, if at all. Ammonia refrigerant has been used in ice rink applications since they started building the facilities and is now more common than ever.
- Potentially more training required for operators of the refrigeration system. All refrigerants are dangerous and should be approached with caution and operating staff should be trained. Even though additional training is not required by code to operate an ammonia system, it is recommended that the operating staff take training courses specifically for ammonia refrigeration including both the operation and safety of the system. It has been B32's experience that most ice arena facilities that use ammonia refrigeration use an outside service company that has experience with ammonia for repairs and even some routine maintenance and system checks.
- Potentially greater health/safety hazards in comparison to synthetic refrigerants.
- Reporting requirements. There may be additional annual reports that are required depending on the volume of ammonia that will be in the system. The US EPA has been more aggressive at requiring additional reporting for ice rinks (mainly on the east coast) that operate with more than 500 pounds of ammonia. The proposed system could require as much as 900 pounds. If a low charge ammonia system was used that quantity could be much less, maybe even less than 500 pounds. The reporting for any facility that has less than 10,000 pounds is fairly straightforward. The cost estimates are based on a typical ammonia system.
- Higher capital costs.

Cost Estimate: \$1,504,000

Cost of Preventative Maintenance. All of the refrigeration system options have similar preventative maintenance requirements and costs. The main difference in maintenance cost is the type of compressors. All options can use screw or reciprocating compressors. The existing R-22 refrigeration system uses reciprocating compressors and

would have the highest maintenance costs. Option 3 has historical used reciprocating compressor but in the past 5 years more screw compressors have been used. The use of screw compressors could save approximately \$7,000 per year in top end maintenance on the reciprocating compressors.

Recommendations: This option should be strongly considered because of its increased efficiency and use of natural refrigerants as well as the ever-changing phase-out of synthetic or artificial refrigerants. However, the City should be mindful of the potentially greater health hazard over synthetic or artificial refrigerants such as R-513, etc. Although all refrigerants are hazardous. It would be prudent to start discussions of the replacement options with the fire marshal, the City's insurance carrier, and other interested parties to educate them on all aspects of ammonia refrigerant.

4.3.4 Options 4: New indirect carbon dioxide (CO2)-based system

Description: Replace the existing R-134a-based refrigeration system with a new CO2-based indirect refrigeration system located inside the refrigeration room and using an air-cooled gas cooler system. The use of CO2 refrigerant may likely be the next substantial "innovation" in the ice rink industry. This option is based on a multiple semi-hermetic compressor system of approximately 200-ton, plate and shell chiller, pumps, etc. operating at leaving glycol temperatures of 10°F and entering glycol temperatures of 13°F. It's likely that this option will fit in the existing refrigeration. B32 can provide a conceptual drawing of this system to confirm. See the Future of Refrigerants section in this report for additional information on CO2 and the use of CO2 in ice rink facilities.



Photo 11 - Example of an Indirect CO2 Chiller Package

Advantages:

- Higher efficiency. CO2 indirect is estimated to be approximately 5% less efficient than an ammonia system.
- Potentially higher heat recovery temperatures.
- Potentially less space required than an industrial grade system.
- Uses an air-cooled gas cooler system which is shorter in height than the water fluid cooler proposed in Options 2 and 3.

Disadvantages:

- Higher equipment costs due to limited availability.
- Fewer contractors familiar with technology.
- Proprietary control systems used with this technology.
- Efficiency drops off in warmer temperatures.
- Additional safety devices and systems may be required.
- There is a U.S. patent on some or all of this technology as it applies to ice rinks and therefore manufacturers may be limited.

Cost Estimate: \$1,635,900

Cost of Preventative Maintenance. All of the refrigeration system options have similar preventative maintenance requirements and costs. The main difference in maintenance cost is the type of compressors. All options can use screw or reciprocating compressors. The existing R-22 refrigeration system uses reciprocating compressors and would have the highest maintenance costs. Option 4 typically uses semi-hermetic reciprocating compressors which are typically not rebuilt but rather discarded and replaced when a failure occurs.

Recommendations: It is recommended that a CO2 refrigerant-based indirect refrigeration system be considered. If the City is interested in pursuing the use of CO2 refrigerant, we encourage a site visit to at least one facility that is currently using this type of system, along with in-depth discussion with the facility's management and operation personnel and manufacturer's representatives. B32 Engineering Group has extensive experience with CO2 refrigerant applications in ice rink facilities.

It is also recommended that a more in-depth study of CO2 system options and code requirements be performed during a pre-design or preliminary design phase for this project to determine the feasibility of a CO2 ice system in this facility.

5.0 PROJECT SCHEDULE

The improvements should be planned well in advance of the desired construction time so equipment and materials can be ordered and delivered to the site. Minimizing disruption to the facility's busy schedules and user groups will be a key element to the success of this project.

A very general, typical schedule for similar ice rink type projects is as follows:

Design Phase:	June-September (3-4 months)
Bidding:	October-November (October is the ideal bidding time for this type of work)
Order Materials:	November – March
Construction:	March – October (we estimate construction on this project to take 3-4 months)

If construction is started later and the new refrigeration system is not operational by October, a temporary chiller could be used until the new refrigeration system is complete. The cost of a temporary chiller system is approximately \$23,000 per month plus utilities. These costs are not included in the cost estimate.

B32 Engineering Group, Inc. has extensive experience in working closely with clients to evaluate and identify renovation and improvement solutions for existing ice systems. We understand the City will use the information in this report to determine the scope of the refrigeration system replacement project. Once the project scope and funding sources have been identified, we will work closely with the City to develop a detailed project schedule.

6.0 SUPPLEMENTAL INFORMATION

6.1 General Definitions

Included in this section are definitions for the basic terminology used throughout this report.

Ice System: A term that collectively refers to the refrigeration system, ice rink floor system, waste heat recovery system and dasher board system. This is the type of system that is currently installed in this facility.

Direct System: A *direct* refrigeration system circulates the primary refrigerant (e.g., R-22) directly through the ice rink floor. There is no secondary solution or refrigerant. These types of systems were very common in the 1970's and early 1980's. Today, indirect refrigeration systems, where glycol solutions are circulated in the rink floor, are more common due to costs and environmental concerns with large quantities of refrigerant required to operate the system.

Indirect-type System (existing system at the Hockey Center): In an *indirect* system the primary refrigerant (e.g., R-22, ammonia, etc.) stays in the refrigeration room. Heat is removed from the ice rink floor through a secondary refrigerant or glycol solution that is circulated in the floor. The heat exchange between the glycol solution and the primary refrigerant takes place in the refrigeration room.

HCFC: Hydrochlorofluorocarbon (e.g., R-22, etc.) – synthetic refrigerant with less ozone depleting than CFCs (e.g., R-12, etc.) but deplete natural resources and contribute to global warming. These are phased out by the Montreal Protocol.

HFC: Hydrofluorocarbon (e.g., R404A, R407C, R-507, etc.) – synthetic refrigerant that deplete natural resources and contribute to global warming. Many have a high global warming potential (GWP) and are now to being phased out of production.

HFO: Hydrofluro-Olefins (e.g., R513A, 1234YF, etc.) – a new class of synthetic refrigerant that have a much lower global warming potential (GWP) than HCFCs or HFCs. These new refrigerants are blends of several refrigerants and are not pure refrigerants as many of the HCFCs and HFCs are.

u-HFC: Unsaturated Hydrofluorocarbons - Low GWP HFCs that produce dangerous hydrogen fluoride when they burn and transform to trifluoro-acetic acid in the atmosphere. These are generally patented and much costlier.

Natural Refrigerants: Naturally occurring refrigerants such as ammonia (R-717), carbon dioxide (CO₂) and hydrocarbons.

6.2 Financial Assistance Programs.

There are several financial programs that have traditionally been used on ice rink renovation projects. The local utility companies should be consulted to determine what programs are available and apply to this project(s). They may include:

1. **Engineering Assistance Study Program.** Some utilities offer this program. The purpose of this program is to provide the City with the necessary business case justification to implement energy-saving opportunities. This evaluation report can be expanded to identify energy conservation opportunities, energy modeling, etc. to meet the programs requirements. Some utilities will reimburse their users up to 75% of the cost of this study. One example where the user would benefit from this additional energy analysis is in selecting a refrigerant (ammonia, CO₂, etc.) or refrigeration system to replacing the existing synthetic (R-22, etc.) refrigerant or system. It is typically required that the program be pre-approved by the utility prior to starting any work on the study.
2. **Rebate Programs.** Rebate programs are often available through utilities for many energy improvement measures that can be performed such as lighting replacement, motor replacement, installation of variable frequency drives, improving insulation systems, etc. Custom rebate programs are also available and may apply to the refrigeration system replacement depending on the type of system selected. The utilities should be contacted to identify possible rebates prior to starting any improvement project relating to energy savings. Some rebates require preapproval prior to purchasing and installation.

END

Opinion of Probable Project Costs - Refrigerant Change Feasibility Study
Deilmann Recreation Complex, Creve Coeur MO
Creve Coeur, MO
B32 File No. 900.21.437



Date: 11.4.21

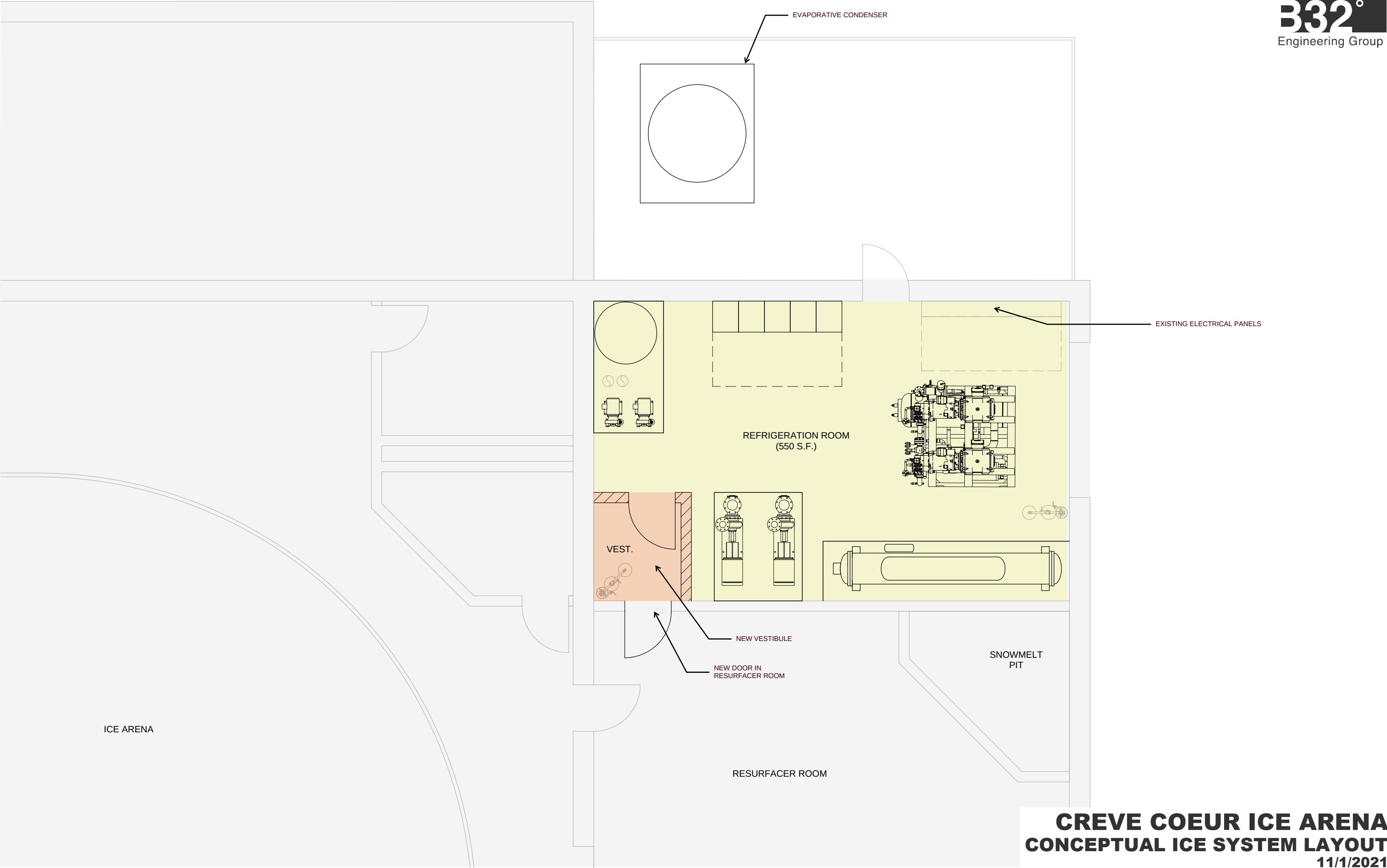
Costs include: escalation, general conditions, ice rink contractors profit, insurance, bonds

Revised:

Item	Cost Estimate ¹		
	Option 2	Option 3	Option 4
Refrigerant type	R-513	Ammonia	CO2
Grade of system	Commercial	Industrial	Mix
Demolition of existing refrigeration system and condenser	\$20,000	\$20,000	\$20,000
Misc. HVAC demolition	\$5,000	\$5,000	\$5,000
Misc. Electrical demolition	\$5,000	\$5,000	\$5,000
Remove and dispose of existing glycol and flush existing rink floor, transmission mains and refrigeration system (option to test and reuse)	\$18,000	\$18,000	\$18,000
New 120 ton refrigeration system (includes new motor control center or panels, condenser , pumps, glycol, refrigerant, etc.)	\$650,000	\$800,000	\$900,000
New glycol solution	\$40,000	\$40,000	\$40,000
Preheat for resurfacers water	Not available	Not included	Not included
Reuse existing snowmelt pit	\$0	\$0	\$0
Concrete equipment pads	\$2,000	\$2,000	\$2,000
Rework existing condenser supports	\$5,000	\$5,000	\$5,000
New electric service if required	\$25,000	\$0	\$25,000
Eyewash and shower stations (1 for synthetic and CO2 and 2 for ammonia)	\$10,000	\$18,000	\$10,000
New ventilation system in refrigeration room	\$35,000	\$45,000	\$35,000
Misc. plumbing in refrigeration room (water lines, move or add drains, etc.)	\$15,000	\$15,000	\$15,000
Misc. electrical in refrigeration room (receptacles, panels, lights, etc.)	\$20,000	\$20,000	\$20,000
Replace existing single exterior door	\$8,000	\$8,000	\$8,000
New vestibule and door into resurfacers room (vestibule for ammonia only)	\$15,000	\$40,000	\$15,000
Misc. sitework improvements around existing refrigeration room	\$0	\$0	\$0
New screen wall (ammonia and R513) or modify existing for CO2 option	\$0	\$0	\$10,000
Paint interior of existing refrigeration room	\$3,000	\$3,000	\$3,000
Subtotal of estimated construction costs	\$876,000	\$1,044,000	\$1,136,000
Estimate, design and constr. Contingency (20%) ¹	\$175,200	\$208,800	\$227,200
Total estimated construction costs	\$1,051,200	\$1,252,800	\$1,363,200
Engineering, legal, financial and administrative (20%) ¹	\$210,240	\$250,560	\$272,640
Total estimated project costs (2022)	\$1,261,440	\$1,503,360	\$1,635,840
Expected useful life - refrigeration system (yrs.)	15-20	30+	25
Adjusted Costs for 2023²	\$1,311,898	\$1,563,494	\$1,701,274
Adjusted Costs for 2024²	\$1,364,374	\$1,626,034	\$1,769,325

Footnotes:

1. See cost estimate narrative in report.
2. Applied escalation costs of 4% per year.



Opinion of Probable Project Costs - Refrigerant Change Feasibility Study
Deilmann Recreation Complex, Creve Coeur MO
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Date: 11.4.21

Costs include: escalation, general conditions, ice rink contractors profit, insurance, bonds

Revised: 7.26.22

Item	Cost Estimate ¹		
	Option 2	Option 3	Option 4
Refrigerant type	R-513	Ammonia	CO2
Grade of system	Commercial	Industrial	Mix
Demolition of existing refrigeration system and condenser	\$24,000	\$24,000	\$24,000
Misc. HVAC demolition	\$6,000	\$6,000	\$6,000
Misc. Electrical demolition	\$6,000	\$6,000	\$6,000
Remove and dispose of existing glycol and flush existing rink floor, transmission mains and refrigeration system (option to test and reuse)	\$21,000	\$21,000	\$21,000
New 120 ton refrigeration system (includes new motor control center or panels, condenser, pumps, glycol, refrigerant, etc.)	\$750,000	\$900,000	\$1,000,000
New glycol solution	\$48,000	\$48,000	\$48,000
Preheat for resurfacer water	Not available	Not included	Not included
Reuse existing snowmelt pit	\$0	\$0	\$0
Concrete equipment pads	\$3,000	\$3,000	\$3,000
Rework existing condenser supports	\$6,000	\$6,000	\$6,000
New electric service if required	\$30,000	\$0	\$30,000
Eyewash and shower stations (1 for synthetic and CO2 and 2 for ammonia)	\$12,000	\$22,000	\$12,000
New ventilation system in refrigeration room	\$42,000	\$54,000	\$42,000
Misc. plumbing in refrigeration room (water lines, move or add drains, etc.)	\$18,000	\$18,000	\$18,000
Misc. electrical in refrigeration room (receptacles, panels, lights, etc.)	\$24,000	\$24,000	\$24,000
Replace existing single exterior door	\$10,000	\$10,000	\$10,000
New vestibule and door into resurfacer room (vestibule for ammonia only)	\$18,000	\$48,000	\$18,000
Misc. sitework improvements around existing refrigeration room	\$0	\$0	\$0
New screen wall (ammonia and R513) or modify existing for CO2 option	\$0	\$0	\$10,000
Paint interior of existing refrigeration room	\$3,800	\$3,800	\$3,800
Subtotal of estimated construction costs	\$1,021,800	\$1,193,800	\$1,281,800
Estimate, design and constr. Contingency (20%) ¹	\$204,360	\$238,760	\$256,360
Total estimated construction costs	\$1,226,160	\$1,432,560	\$1,538,160
Engineering, legal, financial and administrative (20%) ¹	\$245,232	\$286,512	\$307,632
Total estimated project costs (2022)	\$1,471,392	\$1,719,072	\$1,845,792
Expected useful life - refrigeration system (yrs.)	15-20	30+	25
Adjusted Costs for 2023²	\$1,589,103	\$1,856,598	\$1,993,455
Adjusted Costs for 2024²	\$1,716,232	\$2,005,126	\$2,152,932

Footnotes:

1. See cost estimate narrative in report.
2. Applied escalation costs of 8% per year.

**EXISTING BUILDING ASSESSMENT
AND DEFICIENCY REPORT FOR:**



CITY OF
CREVE COEUR
MISSOURI

September 1, 2022

PREPARED BY:

Archimages
architecture | interiors & planning

CEDC
CIVIL ENGINEERING
DESIGN CONSULTANTS

kpff

HORNER  SHIFRIN



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CITY OF CREVE COEUR GOVERNMENT CENTER

300 N. New Ballas Road, Creve Coeur, MO 63141

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CITY OF CREVE COEUR MISSOURI
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1. INTRODUCTION

This study was prepared, at the request of the City of Creve Coeur, Missouri, by Archimages and their consultants for the city to assess their existing Government Center facility located at 300 N. New Ballas Road in Creve Coeur, MO. Site observations by the design team occurred on March 22, 2022. This report identifies deficiencies, non-compliance issues, safety, and health concerns. This report also investigates operational efficiencies resulting from the configuration of the facility compared to current standards of operation for Government Centers. Archimages has incorporated in this summary, findings in the fields of architecture, structural, mechanical, electrical, and plumbing engineering as well as fire protection systems and civil engineering.

The Creve Coeur Government Center building includes workspace for administrative personnel and departmental staff. The property is bounded by *New Ballas Road* to the West, *Magna Carta Drive* to the north and *Residential Homes* to the south and east. The City's new Police Station and parking lots are located directly adjacent the Government Center to the north and is to be considered on the government center campus. In addition, there is a stormwater creek that traverses the site on the east edge of the property.



Aerial Photo from Google Earth displaying boundary of existing properties that comprise Government Center Property.

CITY OF CREVE COEUR MISSOURI

BUILDING ASSESSMENT REPORT

According to the City of Creve Coeur's Website, *The Government Center building was originally constructed as Weber Elementary School in 1951, and the building has received a total of eight additions since it was originally constructed. The classroom wings have been adapted to accommodate departmental functions spread out over two floors. A sally port and firing range were added to the rear of the facility. The gym, multipurpose room and two meeting rooms on the lower-level function as the Community Center. A portion of the upper level was modified to serve as the council chambers and courtroom. The building has been modified several times over the years on a small-scale approach and continues to function as the Government Center today.*

Recent renovations pertain only to minor cosmetic repairs, regular maintenance, or equipment additions. Staff has indicated that a new roofing system is one of the top priorities due to the ongoing maintenance required to keep it from leaking in multiple areas.

This report is based on visual observations, staff interviews and evaluation of available documents. Given that the existing facility is currently occupied and servicing the public, there has been no additional demolition performed with the purpose of investigation. Therefore, there is no claim, either stated or implied, that all conditions have been observed, square footage verified, or testing performed.



View of Existing Main Entrance Lobby / Public Gathering Space



View of Existing Main Entrance Lobby / Skylights along South side of Lobby

2. EXECUTIVE SUMMARY

The investigation process started with the review of available documents and a tour of the facility. The investigation team observed interior environments, structural components, the exterior envelope as well as the building's electrical, mechanical, and plumbing systems. The process continued by interviewing staff members and department heads to determine the current conditions and workspace needs. After careful study of the existing building, we concluded the facility is deficient in many critical areas.

The primary deficiencies of this facility are a result of the **CURRENT CONDITION and AGE OF THE FACILITY**. Staff members are working in a facility that has been designed as a school building back in the 1950's and has been added on and remodeled at various times throughout the years. The facility has many areas that require repair or **REPLACEMENT** such as main piping systems and components that are life safety related.

There are a number of **SAFETY / SECURITY** concerns in comparison to current government center design standards. Concerns relating to the number of entrances to the building, public/staff interaction, and **PUBLIC ACCESS** throughout the main corridor and vertical circulation systems are a few of the main problems.

ACCESSIBILITY throughout the building is one of many code violations that need to be addressed with any type of renovations or additions. Access to the dais within the council chambers is an example of ADA violations and should be addressed in any redesign of the facility. The building also falls short and does not meet today's standards / code requirements for energy conservation due to the construction type of the building. With this condition the building is very **INEFFICIENT** in the use of the city's resources pertaining to **ENERGY CONSUMPTION**.

Due to the facility's **ANTIQUATED** exterior construction and **EXCESSIVE SIZE** the continuous maintenance, conditioning of spaces not utilized, and upkeep of the government center to maintain operations/repairs is an additional strain on the city's limited resources. The building is currently double the space required based on current programming needs and there are several areas that are vacant or utilized for storage of archival files and equipment.

The relationship and adjacencies of existing departments within the facility are inefficient and affects daily **OPERATIONS**. The current facility lends itself to an inconsistent placement of personnel, inhibiting proper interaction, and adding to the inefficient use of the staff's time. Productivity is reduced by the separation between employees and the location of the support and storage areas they use on a regular basis.

The building's ability to provide **SERVICE TO CITIZENS** is also confusing and inefficient. The public areas of the facility are not appropriately located for visiting community members and staff personnel should a citizen require a meeting with the government center's staff members. Citizens may have to transverse throughout the building and utilize the vertical circulation components of the building to get from one department to the other.

Buildings of this age also have the potential of containing materials known today as potentially hazardous, such as lead paint, mold, or asbestos. Based on visual observations, it appears that the building still contains areas that may contain hazardous materials. The city's staff has indicated that the city did have an environmental study of the old school completed in 1987-1988 by Professional Environmental Engineers. This was the basis for the environmental work done on the building to remove the asbestos in the finished parts of the building. An updated report will need to be conducted depending on the direction the city will proceed.

CITY OF CREVE COEUR MISSOURI
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Our team also investigated the existing building's mechanical, electrical and plumbing systems. The systems have reached or exceeded their **LIFE EXPECTANCY** and are inefficient compared to current standards. Employees reported many issues with lack of comfort and the inability to control temperatures. Several of the systems are original to the building and require extensive replacement of piping, valves and other components. As stated, the existing building will need extensive renovations to comply with current energy codes and standards. If not updated, as the city adopts and enforces new Building Codes in the future, it would be difficult to justify their non-compliance.

Remodeling the existing building could improve a limited number of the minor deficiency issues but not the major items for the long-term use. These would require an extensive amount of work and the results will be costly. In addition, the **INEFFICIENCIES** of the building would require extensive demolition and renovations in order to provide the adequate environment of current government centers.

Given these and other issues outlined in the balance of the report, it is our professional opinion that the existing facility is inadequate and does not meet the current needs of the Government Centers for the City of Creve Coeur, Missouri. It is our suggestion that further programming and planning of a new facility on the existing site should be conducted to provide the City of Creve Coeur with proper facilities that fit current and future needs of both employees and citizens for the foreseeable future.

3. SITE ANALYSIS

A. EXISTING CONDITIONS

SITE DESCRIPTION

The subject property is located at 300 N. New Ballas Road in Creve Coeur, MO. The property is bounded by New Ballas Road to the West, Magna Carta Drive to the north. The existing building is a two-story building with multiple entrances.

The existing Government Center's property has two entrances off New Ballas Road. The southern entrance is a right-in / right-out type of entrance due to the landscaped median along New Ballas Road at this location. The northern entrance is full access and is utilized as the main entrance to both the city hall and the police station. The Government Center's Main Public Entrance to the building is located on the west side and enters the upper floor the building.



Enlarged Aerial Photo from Google Earth displaying feature elements at the Government Center Property.

CITY OF CREVE COEUR MISSOURI
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View of Existing Main Entrance Lobby / Skylights along South side of Lobby

The main entrance is accessed from a drive isle that runs north and south connecting the two site entrances. This drive has parallel parking on both sides of the drive and is typically used for visitors and Handicapped parking to the building's main entrance. A small pocket of visitor/staff parking is located in the southwest corner of the property directly adjacent to the southern entrance.

The property supports nearly 125 parking stalls located along the western drive lane, the northern side of the building and the eastern half of the property. Much of the parking is located on this east side and is adjacent to the lower-level rear entrance to the building. The remaining property is paved for vehicular movements and green space for vegetation and turf areas.



View from New Ballas South Bound Lanes

The topographic relief across the site is considerable and slopes from the southwest to the northeast. The grades along the southern property line start at 640' and drop to 610' in the northeastern corner of the parking lot. The main entrance is located at 633.9' and the lower-level entrances are located at 619.3 which give a 14'-6" floor to floor height. The grades along the eastern property line continue to drop off substantially from 610' to 590' in a relatively short distance. This area is densely vegetated with old growth trees and underbrush providing a landscape buffer between the Government Center and the neighboring residential property.

In addition to the Government Center, the Creve Coeur Police Station is located on the property. A large percentage of the property is paved except for a regional retention area to the north along Magna Carta Drive. The construction of the police station has incorporated current design standards and meets site planning requirements including storm water management and water quality control required by MSD. The Police Station project also meets the city's requirements for green space, landscape design and parking requirements. The Government Center on the other hand does not meet current standards and has excess paved parking areas for the building it currently supports. It does not meet requirements for storm water management and water quality control and will need to be addressed during redevelopment of this site.



View from the Southwest Entrance

B. SITE CHARACTERISTICS

Government Center Site Characteristics

Current Municipal Center site design is based on the safety, security, maneuverability and WAYFINDING of the visitors and staff. Visitors to the Government Center should be able to identify the public entrance of the building as soon as they enter the site and see adequate parking within a short walking distance to the building's main entrance. There should be appropriate handicapped parking stalls, well-marked and convenient for both van accessible and standard automobiles, as well as ample parking for groups utilizing the facility.

Parking for staff should be separated from the public if possible and separate entrances to the building should be utilized for public and staff. Overflow parking should be in close proximity to the main entrance for special occasions such as monthly public board meetings and other civic gatherings.

The location of the existing Government Center's main entrance is difficult to understand for the first-time visitor especially if the northwestern site entrance is used by the patron. There are a number of entries to the building on the north side that could be mistaken as the main entrance. The parking availability at the main entrance is limited and is parallel parking in nature. There are two handicapped parking spaces marked at the main entrance that do not appear to meet ADA requirements.

Zoning

- **Zoning District**
Per the Existing Land Use map of City of Creve Coeur, the property is in the "Other Institutional" land use and is Zoned Municipal according to the St. Louis County property maps.
- **Parking Requirements**
The parking amounts located on the site appear to be excessive for the number of staff and visitors to the government center, although, the location of the parking stalls is not in the appropriate locations as previously discussed. The rear parking lot is currently being utilized to store various trailers and city vehicles on a temporary basis due to the excessiveness of paved surfaces available.

Storm water

Storm: There are several public storm sewers throughout the site and are in various conditions. These pipes will need to be analyzed for their capacity and current condition as part of any new development. Currently, the roof drain system gets overloaded in heavy rains and backs up into the building through the surface grated drain near the NW corner of the building. The water comes in through the double glass doors on the Multi-Purpose Room. The drainpipe system needs to be excavated and replaced with a larger pipe to handle the volume if the existing building were to be utilized moving forward.

Sanitary Sewer

Sanitary: The sanitary sewer line is located east of the eastern property line on the neighboring property. It is a 6-inch diameter clay sewer main connecting to the building in two locations with a depth class of 0 to 6 ft and generally flows west to east.

CITY OF CREVE COEUR MISSOURI
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Water Service

Water: Water main is brought in from New Ballas Road on the west side of the property. There appears to be two main water vaults. One at the south entrance where it appears the domestic water is being brought into the building and a vault at the north entrance where it appears the 8" fire line is being brought into the building. This fire main entrance was redesigned and reconstructed recently when the police station was completed. Flow and pressure information was obtained at that time and can be utilized for a redesign of the government center if needed. Fire flow requirements are based on size and type of buildings, which are unknown, therefore it cannot be determined, at this time, if they have the capacity for the future development.

Electrical Service

Electric: Electric service is brought to the building from the south property line and connects to a transformer adjacent to the south entrance. The Service is then brought into the lower level near the center of the building. It would appear that the electrical service for a renovation or new facility will be attainable and adequate. The electrical demand of any new development will need to be calculated to determine if any upgrades to the system are required, which is an unknown at this time.

A.D.A.

There are two parking spaces designated as ADA parking located at the main entrance parallel to the curb/sidewalk. These spaces do not appear to be in compliance with current standards of design and cross slopes. This area will require a current survey to be conducted for verification. There are three additional parking spaces designated as ADA parking located near the entrance to the lower-level community room. These parking spaces are designed as head-in parking stalls but do not appear to have the correct



Handicap parking stalls at City Hall Main Entrance

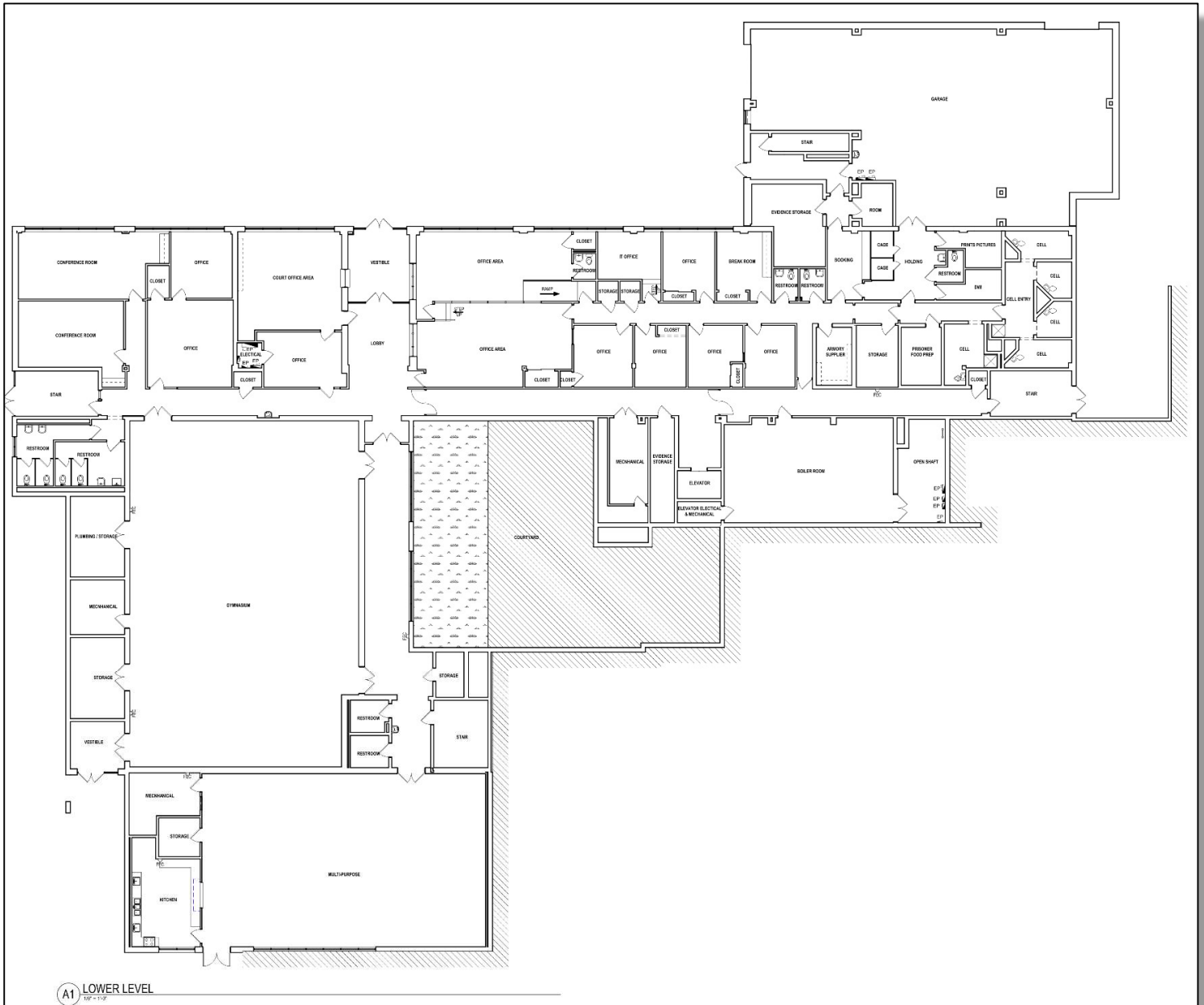
size, striping and signage requirements. These should be redesigned when new striping occurs. There are also two additional parking spaces designated as ADA parking located at the rear entrance to the building. These will also need to be verified for correct cross slopes and striping conformance.

The pavement slopes at the ADA spaces would need to be designed so that the pavement and approach to the building would not be any steeper than the maximum allowed of 2%.



Handicap parking stalls at City Hall Rear Entrance

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Lower-Level Existing Conditions Floor Plan

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BUILDING ASSESSMENT REPORT



Upper-Level Existing Conditions Floor Plan

4. ARCHITECTURAL ASSESSMENT

A. BUILDING CODE AND ADA COMPLIANCE

CURRENT BUILDING CODES

- The City of Creve Coeur currently enforces the following codes for Commercial Facilities.
 - 2015 International Building Code - Enforced by the Creve Coeur Building Division
 - 2015 International Energy Conservation Code - Enforced by the Creve Coeur Building Division
 - 2015 International Property Maintenance Code - Enforced by the Creve Coeur Building Division
 - 2015 International Mechanical Code - Enforced by the St. Louis County Department of Public Works
 - 2014 National Electrical Code - Enforced by the St. Louis County Department of Public Works
 - 2015 Uniform Plumbing Code - Enforced by the St. Louis County Department of Public Works
- The city has adopted revised versions of the 2015 International Building Code, 2015 International Energy Conservation Code, and the 2015 International Property Maintenance Code, copyrighted material owned by the International Code Council, Inc., Washington DC. The administrative chapters, as amended, are published in full in the City Code of Ordinances, with permission. City amendments to other portions of the codes are also in the City Code of Ordinances.

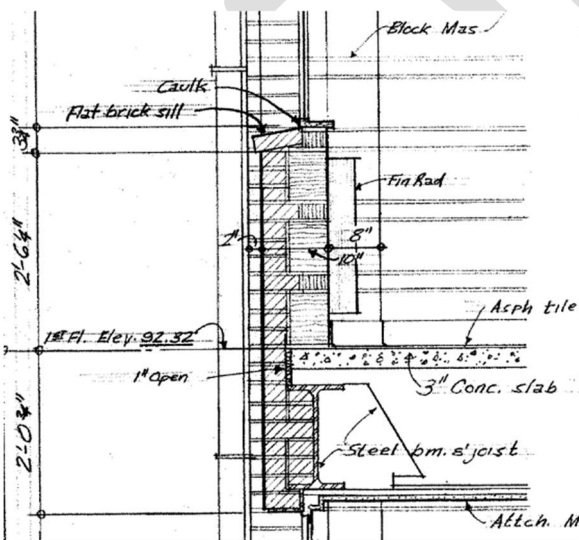
BUILDING CODE DEFICIENCIES

- There are a number of current building code infractions that occur in the existing facility that would not be allowed in a new facility. These include infractions against the codes listed above and the Americans with Disabilities Act (ADA). Most of the ADA are items occurred at entrances and exits of existing doorways along with heights of thresholds and other clearances around fixtures and doors.

- Several of the doors throughout the facility do not meet the required minimum width for ADA clearances and at several existing doors, the hardware is non-compliant based on the orbital latch sets. Current codes require lever style handles.

- Various restroom facilities are in violation of code and ADA requirements. Turning clearances, heights and fixture designs do not meet the requirements in addition to the lack of grab bars. There are several restrooms that have been retrofitted with grab bars but do not provide the clearances required to meet code.

- The existing exterior envelope of the building has several energy code deficiencies compared to today standards and requirements. The exterior walls generally are comprised of an integral block and face brick exterior wall system. This type of wall is a solid wall system and lacks any type of continuous insulation or air space cavity utilized in current wall systems. The



Drawing showing masonry wall construction – No thermal break or continuous insulation

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View of horizontal guardrails and shortened rail extensions.

mass wall system does not allow for any thermal break between the outside and inside environments and therefore would not meet current envelope energy requirements including the requirement for continuous insulation.

- The windows within the building appears to have been replaced at some time with thermal insulated windows and appear to be in satisfactory condition. There are a few situations where the inner or outer pane of glass has been broken/cracked and should be replaced to maintain the thermal properties of the windows.
- A few the exterior doors also fall short of the energy code due to poor seals and weatherstripping. There are several that daylight can be seen from the inside of the building and therefore allow for the conditioned air to escape continuously. Conversely this allows for windblown rain to enter the building at those locations.
- The existing stairwells are in violation of the current codes with respects to the hand/guard rails. They incorporate horizontal guard rail tubing which creates a ladder effect in lieu of the standard vertical pickets spaced no more than 4" o.c. to meet current codes. The handrails are also short and do not extend the correct distance past the top and bottom treads as required by current codes.

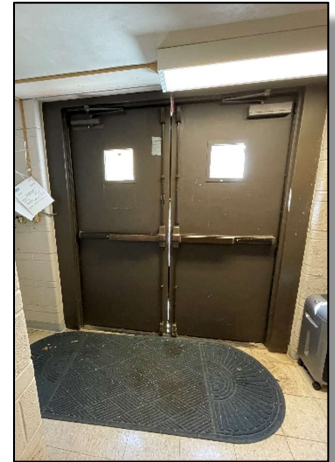
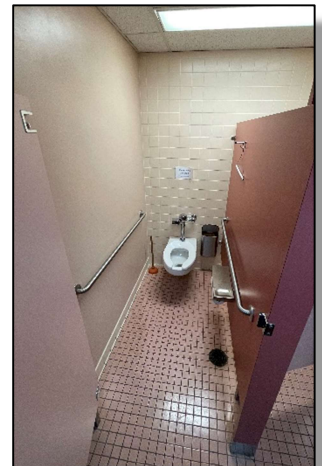


Photo showing large air gap between doors to allow air/weather infiltration

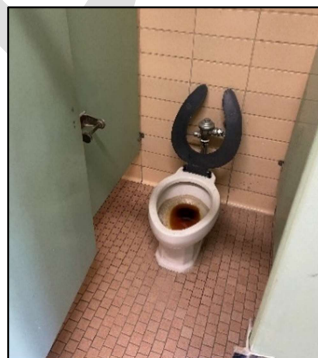
- The plumbing fixtures are also lacking proper drainpipe coverings under exposed lavatories and have toilet accessories that do not meet current code and ADA requirements throughout some of the restroom locations.
- Clearances and turning radii are limited in some of the areas such as restrooms, approaches to doorways and some of the corridor widths. Although the city has utilized the existing facilities and may have made accommodations as needed over the years with current staff, they are still at risk of violating some of the ADA laws.
- The existing building has a several areas that are not being occupied and are deteriorating and causing issues with continuous maintenance. Staff has reported that some of the areas have been shut off due to broken water valves and broken toilets, sinks and faucets.



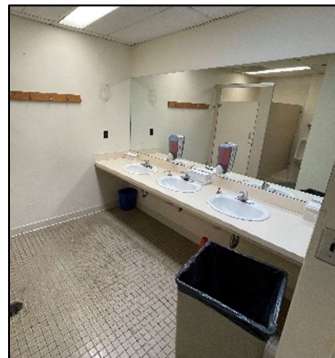
Existing Restroom with narrow passage and antiquated plumbing fixtures



Modified Handicap toilet stall (non-compliant)



View of broken and abandoned toilet/restroom



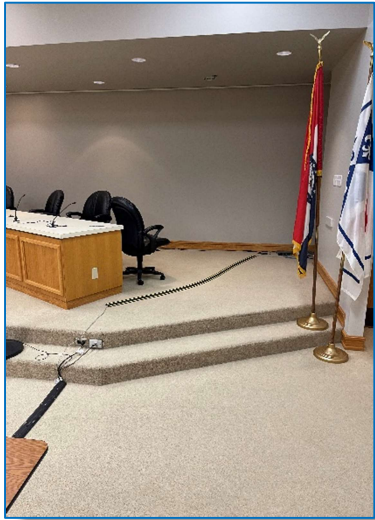
View of exposed drainpipes under sinks

CITY OF CREVE COEUR MISSOURI

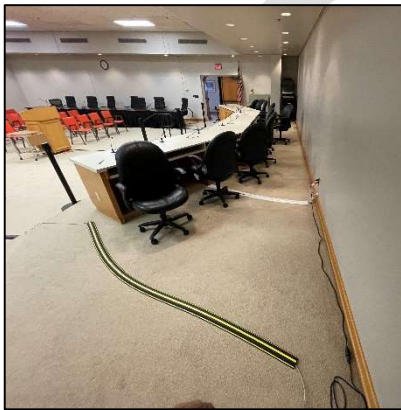
BUILDING ASSESSMENT REPORT



View of Council Chambers with non-accessible raised dais



View of Council Chambers showing wire and cables running on surface of floor.



View of Council Chambers showing wire and cables running on surface of floor sometimes protected with tape on carpet.

- There are other accessible violations within the building including access to the council chamber's dais. In order to access the dais, the council person will need to ascend two steps one either side of the dais as well as any other citizen wanting to approach the front of the dais. This makes it impossible for disabled persons to utilize the council chambers and be participants with the council members during any of the meetings utilizing the dais.

- Within the dais area, there are several electrical and AV chords/cables that transverse through the walking paths of the patrons. This is a tripping hazard to participants and the attending citizens utilizing the facility for functions within the room. The city has utilized tapered rubber surface covers and, in some cases, tape on to the carpet to limit and control the tripping hazard but has not eliminated it from the area.



View of Council Chambers and wire raceways with wire and cables running on surface of floor being protected by tapered rubber covers.

- There are also several other areas within the building with inaccessible spaces. The lower level's phone / IT room requires the user to ascend two steps to gain access to the room and work on the infrastructure within this room. The steps are a result of the raised communications floor required from the previous police station that occupied the space. The flooring system can be removed should the space be utilized for different functions.
- Should an emergency dispatch center be included within this facility, the current building is deficient in the lack of structural integrity of the building. The current International Building Code (IBC) classifies Fire, Rescue, Ambulance, Police Stations, and Emergency Call Centers Risk Category IV Structures. These buildings are seen as Essential Service Facilities that would need to remain operational in the event of a disaster, such as earthquakes, floods, heavy snow falls or significant windstorms.
- This Category IV Structures requirement would only become a factor should the city share the building's excess space with the regional 911 Emergency Dispatch Center. Significant structural modifications to a portion of the existing building would be required should this type of use be located within the existing facility. The electrical and communication systems would also need to be renovated significantly should this use be incorporated into the existing building.

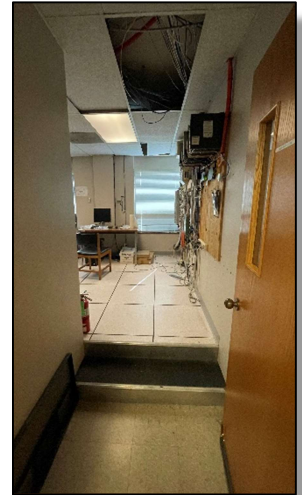


Photo showing 2 steps into Phone/IT Room

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B. EXISTING BUILDING CONDITION & MAINTENANCE ISSUES



Example view of existing roof condition overlooking lower hallway and Gym.

- The building's envelope is currently inefficient and is showing signs of major deterioration in certain areas. While the structure of the building does not show signs of major structural failure as discussed in the structural section further in the report, the building is experiencing areas of settlement and shifting of the exterior skin.

- The building is currently in need of major exterior improvements to the roof and several areas where the floor has settled and caused the exterior skin to shift and crack the masonry wall system.

- The roofing system has been patched and coated several times over the past number of years. The current condition of the roof is at the end of its life cycle and needs to be replaced. Staff has commented that they are continuously repairing leaks after major rain events throughout the year.



Existing roof condition were patched due to leaking.

- The condition of the existing roof would not warrant adding an additional coating. An entire tear out and re-roof is recommended should the city wish to continue to utilize the building for the long term. This will allow for increased insulation to meet today's thermal standards and allow for waterproof conditions.

- Continuous leaking also leads to further deterioration of the roof deck and possible damage to the wall cavities. There are many ceiling areas where roof leaks appear to have occurred. Depending on the areas that are affected, the introduction of the moisture into the building materials can lead to the development of mold in the building, affecting the interior work environment and cause unhealthy conditions for the staff.

- With respect to the building's exterior skin, there are several areas that show signs of floor settling and exterior brick veneer movement. A few of the areas of concern are on the west side of the building near the entrance to the community room. The building maintenance staff has caulked these areas and appears to be a temporary fix. Staff has indicated that the southwest corner of the community room has dropped over the years and is showing a gap between the floor and the wall.

- The other area staff indicated movement in the floor is on the upper-level break room. That floor has dropped over time and is showing a gap between the floor and wall of about an inch. The exterior condition shows that some of the existing grade has eroded to the extent that additional foundation support was required to be installed to maintain the current condition of the floor. Staff has reported that the added structure to the outside of the building has appeared to have stopped the settling. The existing grade in the courtyard appears to continue to settle over time.



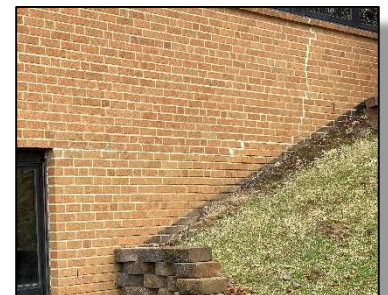
Views of water leaks above the ceiling



View of cracks in Brick Veneer



Photo showing foundation support of breakroom floor



View of cracks in Brick Veneer

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Other areas around the building that show signs of movement are on the east side of the building in multiple areas. The photos below are an example of these conditions. It would be recommended that these areas be addressed and should be caulked at a minimum to keep moisture from penetrating the wall system.

- Should the city decide to renovate this facility, further investigation of existing soil conditions, settling or movement should be monitored and determined the cause of the excessive cracking.



Other areas of concern regarding the exterior envelope are documented in the photos below and should be addressed to maintain weather proofing of the building.



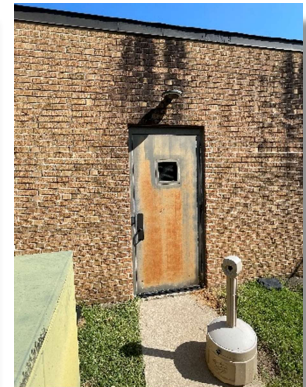
Peeling paint and deteriorating wood fascia on canopy



Plywood filler is falling out of window at air conditioner



Condensation Drain out of window panel. No caulk around pipe / water & insect infiltration



Southern employee entrance - Rusting Door and water damage to Masonry Veneer.

The facilities antiquated building envelope causes higher operational costs as maintenance and repairs are frequent. These energy inefficiencies create poor working conditions, lower productivity, and increase energy consumption. As time continues, the overall health, safety and maintenance of this facility is compromised. More time and money are spent to just maintain the basic functions.

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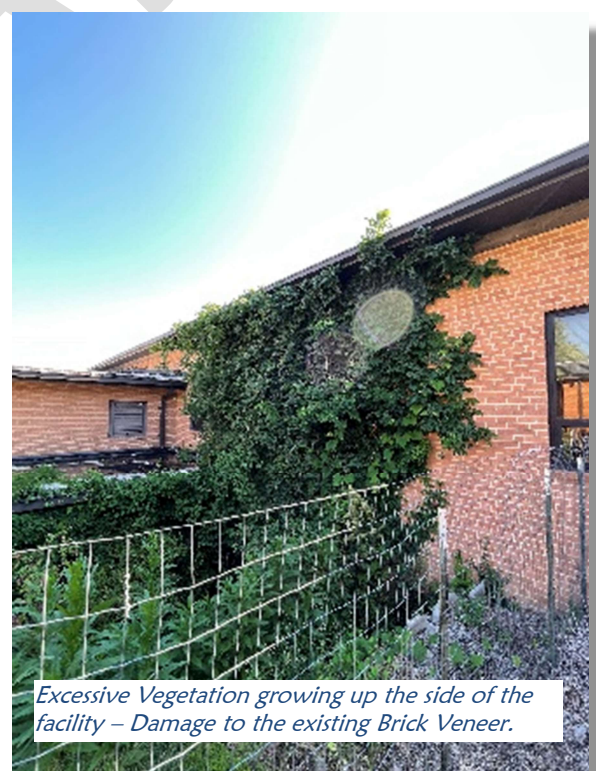
Water Damage to Canopy at City Hall Main Entrance



Entrance Canopy seam repaired with black duct tape at center of canopy over Main Entry Doors.



Excessive Vegetation in area well at courtyard and lower level corridor prohibits maintenance of building components.



Excessive Vegetation growing up the side of the facility – Damage to the existing Brick Veneer.

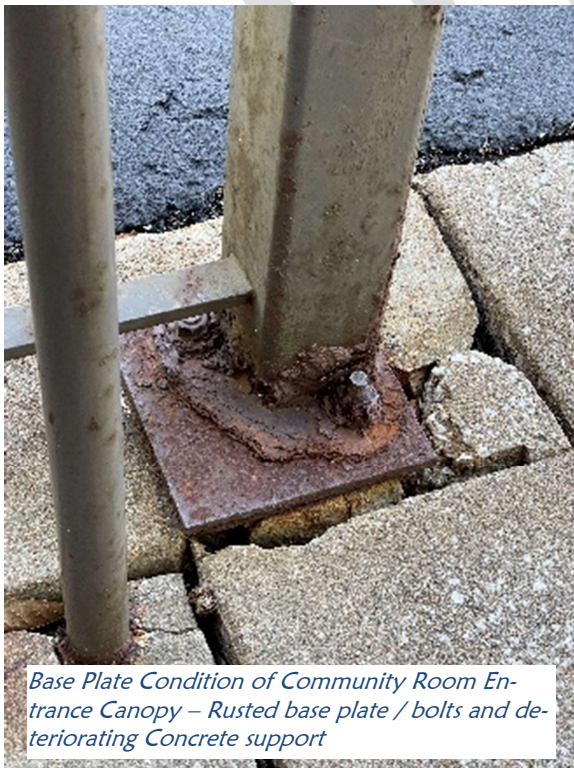
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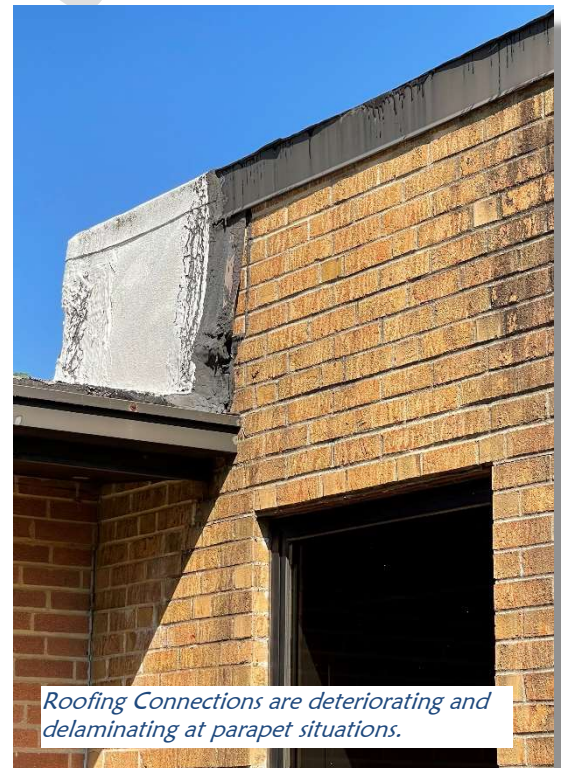
Existing Entry into Community Room – Despite drain at top of step and area drain at landing, entry doors are subject to flooding should area drain gets clogged or covered.



Many of the guard rails / handrails are rusting through and are not properly anchored



Base Plate Condition of Community Room Entrance Canopy – Rusted base plate / bolts and deteriorating Concrete support



Roofing Connections are deteriorating and delaminating at parapet situations.

C. GOVERNMENT CENTER OPERATIONS

SPACE AND OPERATIONAL DEFICIENCIES

Public Access



Main Public Entrance Lobby with service windows on either side and access to council chambers

- Public access to the facility is difficult and confusing to visitors that have not experienced the facility. Although the Main Public Entrance to the facility is located on the west side along North New Ballas Road, there is limited parking and little directional signage that indicates the main public entrance. There are also additional building entrances that could be viewed as a public entrance to the building that are in fact restricted entrances.

- Once in the main lobby, it is difficult to understand where to go for services. There are three large “reception windows” that could be approach, each of them appears to be equally important. Visitors approach the window of choice asking for information in which staff may have to redirect them to a different window for the appropriate service. The service counters have folding tables in front of the windows with chairs for personal service and for separation control as has been recommended by the CDC for disease control. The glass and surrounding areas do not provide any type of ballistic security.

- The main lobby contains several informational areas including wall display cases, standalone pamphlet/brochure displays, directional signage and additional bench seating for visitors. One of the main features of the lobby is the skylights that allow sunlight to fill the space. This asset is positive with respects to the day light, but the staff has reported several leaks over the years that will need to be addressed.

- The building has several additional areas that have public access on limited basis. The first one is the community room on the lower level at the northwest corner of the building. This room is utilized for public and group meetings. It is accessed from the lower parking area to the north by way of a ramp or stairs to the lower entrance. Despite a trench drain at the top of the steps and an area-drain at the landing, this area and entry doors are subject to flooding should the drain get surcharged, clogged or covered.

- Although not labeled as such, the entrance into another public space is located just north of the community room and is the entrance to the gymnasium on the north side of the building. The Gym can also be accessed from the northern entrance near the exit stairwell. This entrance



Entrance to Community Room at Northwest Corner of Building



Entrance to Gymnasium on Northwest corner of Building.



North Entrance to building adjacent to Gymnasium



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has a sign indicating entrance to the community center. It also gives access to a number of conference rooms and access to the main corridor system of the building.



Exterior of East Entrance

- The final Public Access entrance is located on the eastern side of the building and was previously the entrance to the police station. Since the police station is now located in a separate building, this entrance is being used for the courts department as well as a staff entrance due to the abundance of parking on this side of the building. This entrance does not have any directional signage, therefore, confusing to the community visiting the building. The Eastern entrance has what appears to be, acceptable handicapped parking spaces and entrance walk to the building.
- Public Access to the government building is spread out and has multiple unsecured entrances. This is in contradiction to current design standards for secured environments for governmental staff and public control. The public can enter any one of these entrances and if unescorted, can have access to most of the main corridor system throughout the building. There are controlled access points into the administration and community development/public works departments as well as the old police station and current courts department, but the public has full access to both floors' corridor and vertical circulation systems without being escorted.
- Current Government Center Design Trends limit the public interaction to a main lobby area and escorted interaction to staff throughout the rest of the building. Should the need to have multiple public entrances, they are limited to lobby spaces only without connecting to the main corridor/circulation system.

Departmental Adjacencies

- Upon analysis of the building's layout and interviews with departmental staff, it appears that the departments are located within the building based on space availability within certain areas of the building not necessarily departmental relationships. Should an extensive remodel or new building be proposed, a relocation of departments should be reviewed to allow for better adjacencies.



Lower-Level East Entrance Lobby

- Currently the courts department is located in the lower level of the building and is utilizing the community room for their proceedings. This department is separated from the others and is located within the old police department records area. This department and functions would be better served if they were adjacent to the council chambers and finance department.
- The administration department is currently located near the council chambers and is one of the departments that can operate without adjacency to the chambers or other departments. Therefore, further conversation about the location of the administrative and the courts department in proximity to the council chambers should occur resulting in the appropriate location for each.
- Building Entrances and departments that interact with the public on a regular basis should be considered when designing a new facility. The

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finance and courts departments interact with the public through transaction windows into the lobby. These interactions are short exchanges of information and rarely do they require lengthy conversations.

- The community development and public works departments also interact with the public through transaction windows for the majority of their communications. These departments also have a need to meet with the public for a longer period of time and need direct access to a conference room for more in-depth meetings. In the remodel or new facility there should be a medium-size conference room adjacent to the lobby and this department for efficient operations of the staff and public.

Efficiency / Utilization of Existing Facility



- The existing building is a two-story building with approximately 62,000 square feet of space. Upon review of the current operations and staff requirements, the programmed space required is approximately 32,000 - 34,000 square feet of space. Therefore, this building has approximately 30,000 square feet of excess space that is not being utilized for the current needs of the city. This excess of space is being utilized for archival storage, building plan storage, court documents, and unused furniture/equipment.

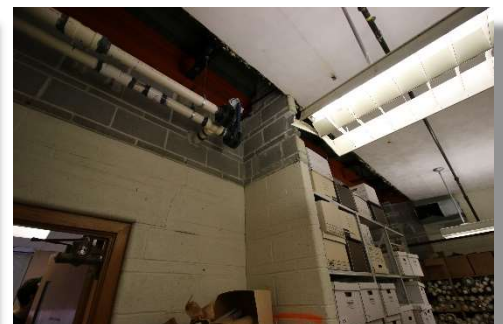
- The excess space must be maintained; therefore, resources are being utilized for routine maintenance and repairs even though the space is unoccupied. There are many rooms that have been converted into plan storage, computer equipment storage and workshop space.



- These spaces were older classrooms that have never been utilized as office or public space and currently have the old floor and ceiling tiles as well as the old fluorescent lighting. They still have the existing chalkboards/tackboards on the walls from the day the city took over occupancy of the building.

- These spaces have been adapted with sprinkler piping and makeshift heating and cooling. This adaptation of space over the years has resulted in exposed conduits, open ductwork, and other non-conventional methods of construction. Many of the systems need to be replaced and have reached their life expectancy. There are areas that have been modified to incorporate newer equipment and other utilities and have not been repaired back to existing conditions. There are missing ceilings and exposed piping in some of the storage rooms that would need to be repaired should the space become occupied space.

Many of the extra rooms have been utilized as archival storage space for the city's planning / public works departments



Excess space within the building has been utilized as storage space

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Old restroom was converted into file storage room. Existing infrastructure was left in place.



Electrical closet has been utilized as storage and now electrical panels cannot be accessed resulting in code violations.



Electrical panels and switch gear is being blocked by storage items resulting in code violations.

- There are several areas that have been utilized for storage that were never intended to be used for this purpose. A couple of the existing restrooms have been converted into storage but the existing infrastructure (shut off valves, toilet flanges, etc) has been left in place and never removed. This has the potential for further maintenance issues should someone bump something into a valve without seeing it, water could damage the archive files, furniture, and equipment within that space.
- There are mechanical/electrical closets that have been converted into storage areas and are now resulting in code violations within the building. Electrical panels require access to them as well as proper clearances surrounding them for safety.
- Although the city staff has utilized this excessive space for storage needs and the ability to have facilities maintenance office within the building, this vacant space and the area that was once utilized by the police department has created an overabundance of occupiable square footage, again, resulting in increased utility costs, inefficient systems and ongoing maintenance on space that is not needed or required for current operations. This causes the city's resources to be spent on areas not being utilized.

5. STRUCTURAL ASSESSMENT

A. PURPOSE AND SCOPE

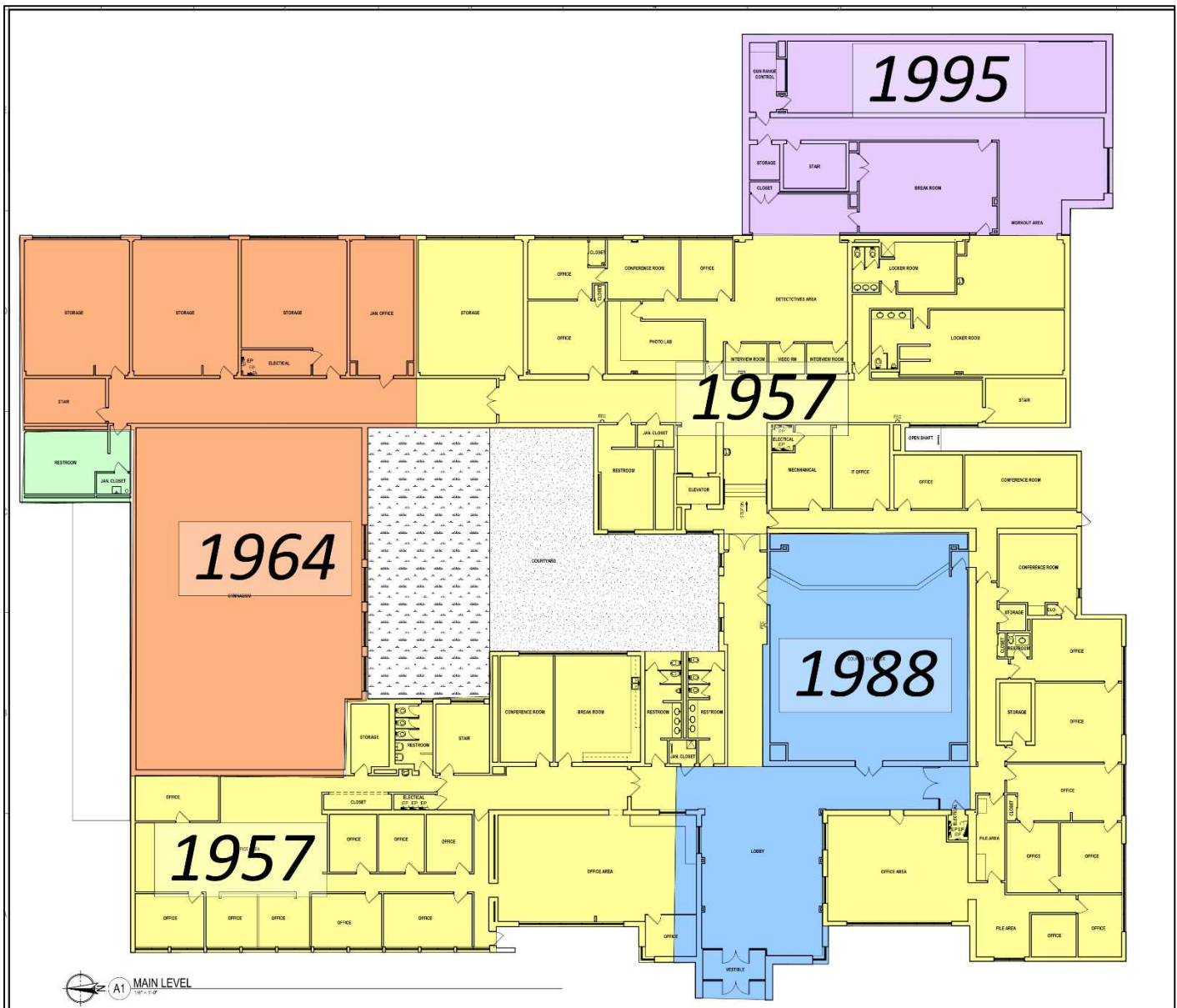
- The purpose of the structural condition assessment is to complete a visual evaluation and initial Code review of the existing facility to support renovation planning and budgeting efforts for proposed alterations and improvements. The goal is to identify potential structural issues and/or limitations of the existing facility for consideration in the renovation and reuse of the facility serving as City Government Building and 911 Dispatch Center.
- The condition assessment is limited to visual observation of the existing structure readily accessible to view, review of available existing drawings, review of the Existing Building Code triggers, and experience with similar construction. No testing or selective demolition of any kind was warranted or completed during this phase of evaluation.

B. EXISTING FACILITY DESCRIPTION (Ref Overall Plan)

- Original 1957 Weber School Building
Original drawings were not available; however, construction is assumed to be similar to the 1964 expansion detailed below.
- 1964 Gymnasium and Classroom Expansion
The building expansion consists of a two-story stand-alone building. The roof framing is pitched to drain at 1 ½ inch/foot slope and includes 1 ½ inch wide rib metal roof deck over bar joists spaced at 4 feet on center. Roof joists are supported on a combination of load bearing masonry walls and steel beam and column framing. The floor construction includes a 3-inch normal weight concrete slab supported on corrugated form-deck and 18-inch-deep steel bars joists spaced at 2 feet on center. The floor framing is typically supported on either load bearing masonry walls or steel beam and column framing. The building is founded on a system of interconnected grade beams and belled drilled piers. The lower-level slab construction is not noted on the existing drawings, however, most likely consists of a 4-inch thick lightly reinforced normal weight concrete slab on grade.
- 1988 Reception and Public Entry
The addition is a one-story steel framed building with a partial mechanical mezzanine housing air handling units to serve the clerestory. The addition is integrated into the original 1957 school building and no expansion joints were provided. The roof construction consists of wide rib metal roof deck over 26-inch-deep steel bar joists spaced at 6 feet on center. Roof joists are supported on a combination of existing masonry walls and new steel beam and column framing. The mezzanine has a 3-inch-thick normal weight concrete slab on 10-inch-deep steel bar joists at 24-inches on center spacing. The addition is supported on straight shaft drilled piers bearing on rock.
- 1995 Sallyport and Firing Range
The addition consists of a two-story building at the southeast corner of the facility. A hybrid structural system was used to accommodate the firing range enclosure. The roof structure consists of sloping steel bar joists spaced at 7'-6" on center and supported by a load bearing concrete wall on the east end and steel girders and column on the west end. The typical floor

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framing consists of a normal weight concrete slab over form-deck and 18-inch-deep steel bar joists spaced at 24-inches on center. The floor joists are supported on a system of steel girders and columns. The elevated firing range construction consists of an 8-inch-thick enclosure of normal weight reinforced concrete floor, ceiling and walls supported on steel girders and columns. The building foundation consists of shallow spread footings bearing on soil. The lower-level slab construction is a 6-inch slab on grade reinforced with welded wire reinforcing.



OVERALL FACILITY PLAN

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C. EXISTING CONDITIONS AND OBSERVATIONS



- Overall, the building structures that make up the facility appear to be in good condition and well maintained. No overt signs of global structural issues related to distress, deflection, settlement, and/or deferred maintenance were noted. Some localized areas of distress and settlement were noted and discussed in more detail below.

- The facility is founded on a sloping site with the high point at the southwest corner of the site sloping down to a low point along the north and east elevations. The sloping site drops one full story across the width of the building and provides walk-out egress from the Lower Level along north and east elevations. Based on observations and discussions with staff, groundwater infiltration has been an ongoing issue and in our opinion this issue is aggravated by the sloping nature of the site and interior courtyard condition.



- The roof appears to be well maintained and relatively well draining. Some signs of rainwater ponding were noted. Staff noted that roof leaks are an ongoing maintenance issue, and it is our understanding plans for the renovation include a re-roof.

- Settlement of the slab on grade was noted in two areas of the building including the northeast corner of the Lower-Level which appears to have settled a few inches sloping down from west to east with the low point at the far northeast corner of the building, and within the breakroom/kitchen on the Main Floor. Although the slab on grade settlement is undesirable, based on our observations, it appears to be associated with poorly compacted subgrade soils and not a global foundation issue for the building structure. Cracks observed in the exterior wall near the northeast and northwest corners of the building will be discussed in more detail below but are believed to be unrelated to the observed slab on grade settlement.



- The existing facility is founded on a system of drilled piers and grade beams. Although an original soils report was not available for review, the type of foundation system used for the existing facility is a good indicator that the site is underlain by soft or poorly consolidated soils. It would be difficult to complete a soils investigation with the existing building in place, but it is very likely any future additions would also require drilled pier foundations and should be considered in planning for construction access to the site and budgeting.

- Cracks were noted in the exterior wall portion of the building and near the northeast corner. The cracks are generally vertical and linear cracks characteristic of normal masonry movement due to moisture related expansion and shrinkage, as well as seasonal changes. It is further noted that very few control joints were observed in the existing exterior masonry walls. In our opinion the observed cracks are not a structural or foundation settlement issue.

- The Lower-Level entry into the community room at the northwest corner of the facility appeared to be poorly drained and was noted to collect surface runoff which saturates the soils in and around this area as well as potential to infiltrate into the building.



D. STRUCTURAL LIMITATION AND CONSIDERATIONS

- Construction Access

- i. The planned addition will like require re-work in the area of the interior courtyard to construct a new retaining wall along the north perimeter of the courtyard. This area may be difficult to access during construction and construction of a new retaining wall will require significant excavation and backfill. New building construction supported behind the new retaining wall is at risk of settlement and must be carefully coordinated and the backfill compaction inspected and documented during construction.

- Existing Floor Structure in Older Buildings (pre-1988 Expansion)

- i. The existing structural floor system was originally designed for classroom occupancy (ie. 60 psf floor live load) and would be appropriate for use as paper office; however, public lobbies, and/or assembly areas require a minimum floor live load of 100 psf. Spaces requiring floor live loads exceeding 60 psf would most likely require strengthening. Strengthening of an existing bar joist floor system can be difficult and expensive. Ideally planning of the re-configured space would limit or avoid public spaces or heavy storage within the areas of elevated floor structure.
- ii. With the closely spaced steel bar joist framing it can be difficult to accommodate floor penetrations for new plumbing or mechanical shafts. Consideration should be given in early planning to allow some flexibility in the final layout and configuration of plumbing fixtures and mechanical shafts to coordinate with the existing joist framing.
- iii. Bar joist floor system may produce annoying floor vibrations for office space near heavily trafficked areas. This may be a serviceability issue for future occupied space and may be considered in layout and planning.
- iv. Light framed bar joist floor systems will not readily accommodate heavy cmu partitions, or moveable partitions, and if these are desired as part of the renovation an allowance for localized strengthening should be included in the construction budget.

- Existing Lateral Bracing System and Seismic Vulnerability

- i. The existing lateral bracing system for the original building(s) consists of an unreinforced masonry (URM) shear wall system common for this time period. This system is vulnerable to significant seismic damage and when building renovation/reroofing is planned the International Existing Building Code (IEBC) mandates minimum seismic retrofit provisions consisting of out of plane anchorage of the exterior walls and lateral bracing of parapets. The existing building has minimal parapets and likely not a major issue; however, out of plane anchorage of the perimeter wall into the existing roof deck will require a significant effort and an appropriate allowance budgeted.
- ii. The existing URM lateral system provides the sole lateral bracing for the original construction and the Building Code restricts the scope of alterations to the existing walls including new or enlarged wall openings, etc. Significant alterations to the existing walls would very likely trigger a more comprehensive seismic upgrade of the building and should be carefully considered and/or budgeted accordingly in the planned renovations.

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- Existing Roof Structure

- i. Roof mounted equipment and/or screen walls may be accommodated; however, will require localized strengthening of the steel joist structural system and should be budgeted accordingly. Furthermore, duct penetrations would ideally be coordinated to fit between existing joist to avoid supplemental framing and headers that would be required for larger duct penetrations.
- ii. Support of new MEP/FP infrastructure should take into consideration the existing bar joists and ideally coordinate hangers with joist panel points to avoid localized strengthening of the joist chord and web. Hanger loads under 300 lbs. may typically be accommodated without strengthening.

- Building Addition Configuration

- i. The roof height of any proposed additions adjacent to the existing building would ideally not exceed the height of the existing adjacent building to avoid accumulation of drifting snow and potential for strengthening the existing roof to support the increased snow load.
- ii. Expansion joints within the existing facility should be maintained and any MEP/FP systems bridging the expansion joints between buildings should be provided with flexible connections capable of allowing some differential movement.

- Change of Occupancy and Risk Category

- i. Incorporation of a 911 Dispatch center into the existing facility will trigger a change of occupancy and increased risk category. In accordance with the IEBC the change in occupancy will require a comprehensive structural analysis and evaluation of the existing building serving the dispatch center for current IBC lateral load provisions, as well as ICC 500 storm shelter requirements. Based on initial discussions the current renovation plans will strategically locate the 911 Dispatch center completely within the 1995 Building which is expected to minimize the impact on the construction cost and extent of retrofit and strengthening, if any, compared to other areas within the facility.

E. STRUCTURAL CONCLUSIONS AND RECOMMENDATIONS

The existing facility appears to be structurally sound and suitable for the proposed renovation and improvements. As noted above structural alterations, as well as increased loading demands can be challenging to accommodate for buildings of this type of construction and reasonable budget allowances and contingencies to address these challenges should be considered in the planning process. Modifying the existing building could prove costly and final result may not accomplish valued results.

6. BUILDING SYSTEMS ASSESSMENT

A. General

- This report documents the engineering review requested to assess the existing Mechanical, Electrical, and Plumbing systems at the Creve Coeur Government Center in Creve Coeur, MO. The scope of the evaluation included a site visit to observe the condition of the existing building and system in preparation of this report. The site review was conducted on March 22, 2022. No destructive investigation or below floor evaluations were made. Minimal above ceiling inspections were made.



B. Existing Building - General

- The Creve Coeur Government Center was constructed in the 1950s with several building additions throughout the years. A gun range and sally port were added in 1990s to the southeast corner of the building. Building systems have been added, renovated, and upgraded over the years and current conditions will be discussed below.

C. Observed Conditions & Evaluation - Mechanical

- The building is zoned and served by water cooled heat pumps units located throughout the building. The multipurpose room, gymnasium, main lobby and council chambers are served by large vertical heat pumps located in mechanical closets throughout the building. All other zones are served by horizontal heat pumps located above the ceiling. The heat pumps are controlled by space mounted temperature sensors. The condition of the heat pumps varies in capacity and condition, with some of the observed units dating back as far as 1988. The life expectancy for a heat pump ranges between 20-25 years with most of the units exceeding their useful life. The older heat pumps utilize R-22 refrigerant which is no longer manufactured and is starting to become expensive should additional refrigerant be needed.
- Two 100% ventilation air units with DX cooling and hot water heating are located in a central mechanical closet in the lower level and ducted to serve fresh air throughout the building and to the heat pumps. The associated condensing units are located in the adjacent courtyard. The age of the system is unknown and appears to be nearing the end of useful life. The unit utilizes R-22 refrigerant which is no longer manufactured and is starting to become expensive should additional refrigerant be needed.
- Condenser water is generated by a single fluid cooler, located in the south equipment yard, and is rated for 95 tons of nominal capacity. The unit is 13 years old and appears to be in fair condition and well maintained. The unit's

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life expectancy is approximately 20 years with an estimated 7 years of life remaining. A shell and tube heat exchanger is located on the supply side of the condenser water system which uses the heating hot water system on the shell side to vary the condenser water temperature by modulating a three-way control valve. Two 30-hp, base-mounted, condenser water pumps circulate condenser water throughout the building. Both pumps appear to be in fair working condition but are nearing the end of their useful life. The system's associated air separator and expansion tank appeared to be in poor condition and at the end of useful life. The condenser water is a propylene glycol mixture and is distributed throughout the building to serve the heat pumps. The piping is uninsulated Schedule 40 PVC pipe. The age of the piping varies throughout the building with several instances of piping leaks. The piping is mostly in poor condition and should be replaced throughout the entire building. A filtration system was added to the condenser water system in 2020.

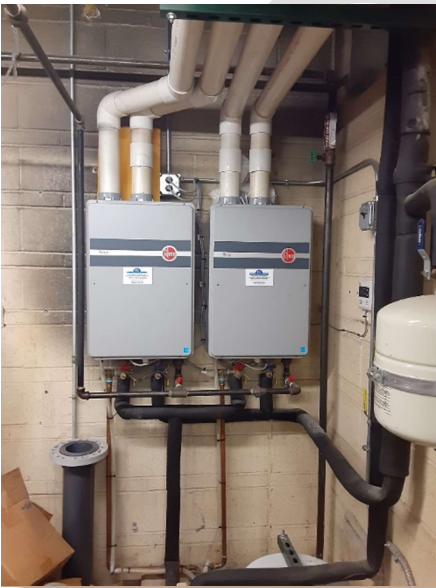
- Heating hot water is generated by two, gas-fired, condensing water boilers each sized for 1300 MBH capacity. The boilers were manufactured in 2012 and are in good condition and well maintained. Two, 20 hp, base mounted pumps circulate heating hot water throughout the building to serve the two ventilation air units, cabinet unit heater and unit heaters. The pumps are in good working condition. The age of the piping varies throughout the building with most of the piping original to the installation date. Piping near the boiler was replaced with the boilers and is in good condition. The heating hot water system, in general, is in good condition and will be reused to accommodate the proposed renovation. The capacity of the existing system will need to be evaluated to determine if additional capacity is required for new building loads.



- The existing system control panel is furnished by Johnson Controls and is now obsolete, requiring replacement to provide adequate system controllability. The panel is located in the boiler room and currently monitors the heating hot water and condenser water pumps, boiler, fluid cooler and heat exchanger 3-way control valve.
- There are several general exhaust fans located on the roof and above the ceiling and zoned to restrooms, cells, locker rooms, and storage rooms throughout the building. The age of the fans vary throughout the building. Most exhaust fans appear to be near the end of useful life.
- The two-story Sally Port/Firing Range addition was constructed in 1995 to the southeast corner of the building. The Sally Port is heated with two gas-fired unit heaters that were recently replaced and ventilated with a 5,000 CFM propeller exhaust fan interlocked to an intake louver. The garage has a carbon monoxide (CO) gas detection system that enables the ventilation system upon a detection of CO. The systems in the Sally Port are in good condition. A compressed air system with a 60-gallon receiver is distributed along the perimeter of the sally port with 4 quick-connect ports. The firing range is served by a gas-fired make-up air unit located above the ceiling and exhausted with an inline, centrifugal exhaust fan.
- The existing ductwork is a mixture of lined ductwork, externally wrapped ductwork and flexible ductwork. The ductwork appears to be original to installation and dirty in areas constructed more than 20 years ago. It is unlikely the duct can be cleaned sufficiently to remove any mold spores that might have accumulated in the ductwork.
- The air devices are mostly extremely old, possibly original air devices, most of which are dirty and with deteriorated finishes

D. Observed Conditions & Evaluation - Plumbing

- The existing underground plumbing systems were not evaluated. Based on the age of the building and condition of much of the visible piping above grade, it is assumed that the existing below grade piping is primarily of cast-iron construction and is likely approaching the end of its projected operational lifespan. It is recommended that the existing sanitary sewers be camera'd to assess their condition.
- The oil interceptor in the existing garage was not visible but is in functioning condition based on facility personnel reports. The facility personnel did not report clogging or flow issues at the garage drainage locations or interceptor.
- A majority of the roofs are drained via gutters and downspouts. The areas with a piped storm drainage system do not appear to have an overflow system. Based on roof conditions, it is likely that rainwater is backing up onto the roof and pooling during moderate rain events. Facility personnel reported additional backflowing of storm system piping at lower levels of the building. This backflow/flooding was occurring at a cleanout location at the northwest corner. It is recommended that this existing storm sewer below grade be camera'd to assess the size and condition of the existing piping.
- The incoming water service is provided via a service tunnel that terminates at the lower-level main mechanical room. This service piping was replaced in recent years and is in good condition. At the incoming location in the mechanical room this piping routes above and inside the clearance space of multiple electrical panels which is a potentially hazardous assembly. This incoming piping ties into existing piping prior to making connections into water heaters, domestic cold-water distribution, and backflows for water supplies to mechanical systems and equipment. These various assemblies were in generally good condition with some smaller branches and connection piping needing replacement.
- The facility did not report that water pressure is an issue in the building although some fixtures produced limited flow, likely due to calcified branch piping and failing fixture internals.
- Hot water is supplied to the existing building via two instantaneous water heaters and a small storage type heater located in the main mechanical room. These water heaters are in like-new condition and appeared to be operating at time of visit.
- The building is served by a hot water return system and pump located within the lower-level mechanical room. The pump has been replaced at some time during the life span of the building and appears to be in good working condition. Based on existing drawings the return loop is serving the majority

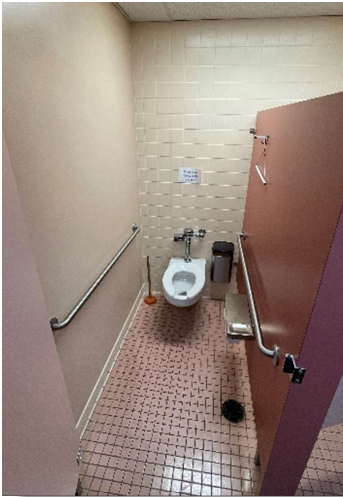


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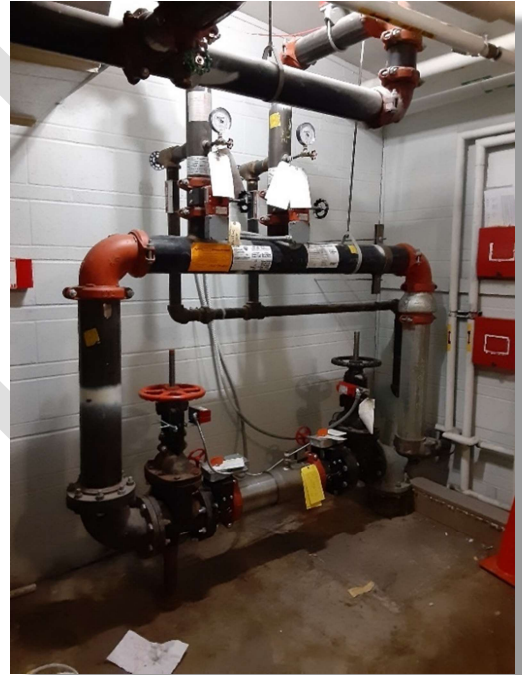
of hot water producing fixtures in the building. Some fixtures appear to be too far from the loop to deliver hot water in adequate time or they are not served by the loop at all. Some expansion of the loop would be required to comply with current code-established standards.

- Existing fixtures at bathrooms appear to be original fixtures in many locations. These fixtures are likely not compliant with local and national codes regarding sill heights, accessibility, and flow rates. Some existing toilets had damaged seat hinges and arms, discoloration on bowls, and signs of wear on fixture bodies. Some existing lavatories had damaged or non-functioning aerators and wobbly handles.



- The Fire Service and Sprinkler room is located adjacent to the Gymnasium. The incoming service piping is in good working condition and the backflow assembly has been replaced in the last few years. The valves and piping mains visible within this room are all in good working condition.

- Sprinkler heads observed throughout the building appeared to be of varying ages. In most cases, the sprinkler heads appeared to be the originally installed heads. These sprinkler heads are at the half-way point of their effective lifespan and will need replacement in the coming years. It is likely that future fire inspections will generate notices for replacement of individual heads that have been painted or degenerated past the point of operation. The condition of branch mains and arm-over piping above ceiling is unknown. Based on ceiling construction and sprinkler head ages the piping is likely the original installed in many cases. This piping may need repair or replacement in some cases, but is likely in good condition generally. No dry system piping or equipment was observed on site.



- The gas meter and incoming gas service piping was in good condition and operating at time of visit. Facility personnel did not discuss issues with the gas piping on site. Where visible, gas piping appeared to be in good condition. No major code violations or installation problems were observed at time of visit.



E. Observed Conditions & Evaluation - Electrical Systems



- Normal Electrical power service for the facility is supplied from a pad mounted 3-phase 120/208 volt utility transformer located on the south side of the building. This pad mount transformer is fed underground from the utility pole mounted overhead conductors running east-west about 75 feet south of the building.
- Electric service into the building is fed from the pad mounted transformer to a pad mounted NEMA 3R Main 1200-amp service entrance rated disconnect switch through a 1200 amp pad mounted NE-MA 3R automatic transfer switch then into a new distribution panel in the basement. The new distribution panel was just installed in 2021. Most other distribution panels are circa 1988 when the building was renovated.
- Most branch circuit wiring in the facility was installed before 2008. Prior to 2008 branch circuit power conductors were allowed to share neutrals. We believe most branch circuits are installed with common neutrals.
- We did not take apart any receptacles to see if a separate ground wire was installed in the branch circuit wiring however on the electrical gear replacement project there were not grounds installed in the conduit of the feeders to panels and ground conductors were added in some of the feeders between the exterior gear and the interior gear.
- The complete building is on emergency power. Emergency power is provided by a 350 KW diesel generator with subbase fuel tank located outside the main electric room on the south side of the building. Subbase diesel fuel tank has a capacity of about 24 hours at full load. Existing generator is a Katolight generator about 30 years old.
- As noted in service entrance description there is a 1200-amp ATS on the exterior after the main electric disconnect. There is also a 100-amp automatic transfer switch on the lower level. We have not found any drawings that show how this is connected however believe this to be the original transfer switch for the building for life safety loads.
- Lighting in the building has had some upgrades however mostly has been done with fluorescent fixtures and metal halide fixtures. Lighting controls are with on/off toggle switches and some time clock controls.
- Fire alarm panel is a Simplex 4100 system with cellular digital communicator. Fire alarm panel is expandable if necessary for new devices.
- There is a data closet in the central part of the building. A fiber optic cable is installed to the building from the south side of the property.



D. Mechanical / Electrical / Plumbing Recommendations

- Based on the site inspection, Horner & Shifrin has reached the following opinions with a reasonable degree of engineering certainty. Conclusions reached and opinions offered are based upon the information available to Horner & Shifrin at the time of this report and may be subject to revision after the date of publication as additional information becomes available.
- The following actions are recommended to repair the observed conditions of the facility.

Mechanical -

- The heat pumps vary in age and condition and should be replaced as need to accommodate the proposed renovation. All associated ductwork, controls and piping will be included in replacement. Any heat pumps in or serving area of renovation will be replaced.
- Ventilation units are in poor condition and utilizing refrigerant that is obsolete. These units should be replaced with any renovation. The capacities should be evaluated to accommodate adequate capacity for proposed renovation.
- Existing fluid cooler is reportedly in good condition with 7 years of useful life remaining. Existing fluid cooler may be reused in renovation however the system will require evaluation to ensure the existing capacity is adequate. The system's associated heat exchanger, air separator, expansion tanks and pumps are in fair to poor condition. With the use of propylene glycol mixture, these components are subject to further corrosion and deterioration internally. These components should be replaced.
- The condenser water distribution piping is in poor condition and failing. The piping should be replaced in its entirety.
- The existing heating hot water system is in good condition and can be reused to accommodate the proposed renovation. The capacity of the existing system will require evaluation to ensure existing capacity is adequate. Minor modifications to the existing piping will be required to accommodate equipment changes that are served by this system.
- The existing building control panel is obsolete. The system should be replaced with all new building automation system to provide the user with full building control. All major equipment should be integrated onto the building automation system.
- Systems serving the Sally Port and Gun Range do not need be modified or replaced unless reported non-operational by facilities.
- All exhaust fans and associated ductwork located in the area of renovation should be replaced.
- All ductwork and air devices located in the area of renovation should be replaced.

Plumbing

- A large number of the plumbing systems have code or operational deficiencies that should be addressed.
- The domestic hot water loop should be extended to cover all fixtures and reduce delivery times enough to be code compliant.

- Plumbing fixtures, in most cases should be replaced with new ADA compliant (where necessary) fixtures with proper sill heights, sanitary surface treatments, and flow requirements to achieve current standards.
- Domestic branch piping and insulation should be evaluated and repaired/replaced as needed. It is likely, based on what was observed, that much of the branch piping will require replacement.
- Secondary roof drains or overflow scuppers should be installed. Currently, if a roof drain were to be clogged, water would potentially build up enough to cause structural damage or failure to the roof.
- At a minimum, the first 10 feet of roof drain piping should be insulated from each roof drain.
- The existing underfloor piping should be evaluated and repaired/replaced as needed.
- Vent piping should be extended to a minimum of 12" above the finished roof surface in all cases to prevent snow build up from blocking them.
- A roof hydrant should be provided on the roof to allow for cleaning of the rooftop mechanical systems.
- The existing grease interceptor in the serving kitchen should be replaced.
- The existing oil interceptor in the garage should be evaluated for repair/replacement.

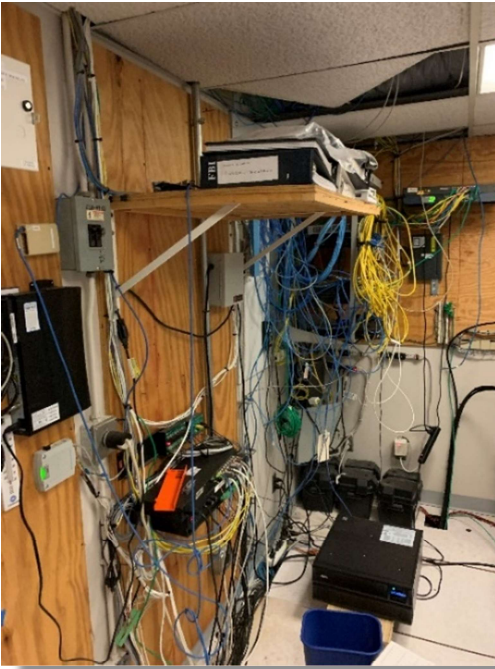
Fire Protection

- Many of the existing sprinkler heads, notably in original building areas where no subsequent renovation has taken place, should be evaluated for proper operation. This system will begin to require service and replacement in the coming years.
- The branch piping serving existing heads should be evaluated for replacement where possible.

Electrical Systems

- Existing electric service in the basement may be able to be used depending on new loads. Circuit breakers could be added/deleted based on new equipment and loads.
- Branch circuit panelboards are original to 1988 renovation and operation is uncertain. Based on new layout of departments these will likely be replaced to allow more efficient layout of spaces and safety.
- Lighting is recommended to be replaced with LED fixtures with renovations to meet current energy standards.
- Lighting controls shall be upgraded to meet current Energy Code
- Closed Circuit television to observe the exterior parking areas, and people entering building are a standard at most Government Centers we design and are recommended.
- Access control is existing at existing building but is not compatible with existing system at the police station. A new system on the same platform as the police station would be considered in any new renovation.

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- Existing emergency generator is reportedly in good condition but past its normal life expectancy. Existing generator may be reused in renovation however emergency power distribution needs to separate any life safety system power from optional standby power loads. Generator was installed when a police facility and complete building was needed on emergency power. In new layout the complete building is not required on emergency power and a smaller generator may be sized based on load required to be on emergency power. If the existing generator is kept and the complete building is put on emergency power then when the generator will need to be replaced by purchasing the larger unit (this assumes new renovation loads are less than existing service).

7. BUILDING NEEDS PROGRAM - NEW GOVERNMENT CENTER

The following BUILDING NEEDS PROGRAM was generated based on several programming sessions with the city's steering committee and responses from several departmental staff personnel.

The program is broken up into several columns for clarity. The first few columns indicate the *Master Department/Sub-Department/Title* of the room or person and the *Employee's Name* at the time of the programming process. The third and fourth columns indicates the Number of *Occupants Utilizing the Space* and if the space requires an *Office or Workstation*. The fifth column indicates preferred *floor location* given the main entrance on the first floor. The sixth and seventh columns indicate approximate square footage of the *existing space* in the current building and the approximate square footage of *industry standard sizes* of space allocated for the room type.

The Program then indicates the quantities required for each departmental section and the total area required for each use. The Program Requirements column are notes based on comments made during programming sessions.

It then summarizes area allocations for the Public Spaces, Building Core Areas, Community Development / Public Works, Administration, Finance, and Courts. The program also includes a potential tenant (WCDC) that may occupy space within the building. The last section of the program totals the net areas and includes a circulation factor and building gross square footage factor to provide a gross square footage area for the building.

Program Highlights presented to City Council and Task Force:

- 32-34,000 square footage needs
- 3,300 square feet of tenant space included
- No Gym Space in new program
- Reuse of existing Gun Range/Sally Port portion of the building.



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Department	Position/Title	Employee Name	Occupants Utilizing Space	Office / Workstation	1st Floor / 2nd Floor (1 or 2)	EXISTING (APPROX) Net Floor Area (s.f.)	Net Floor Area (s.f.)	Department Totals (Square Footage)	Program Requirements/Adjacencies/Public Access-Direct, indirect
SHARED SPACES	Public Spaces	Main Floor Men's Public Restroom	3T-2U-3L	-	1	204	350		
		Main Floor Women's Public Restroom	4T-3L	-	1	204	350		
		Secondary Floor Men's Public Restroom-Unisex	1T-1L	-	2	228	64		
		Secondary Floor Women's Public Restroom-Unisex	1T-1L	-	2	228	64		
		Main Floor Vestibule / Lobby		-	1	1,213	1,200		
		Secondary Floor Vestibule / Lobby		-	2	120	200		
		Council Chambers-City Council / Municipal Courts	10 + 10 (60-100)	-	1	2,244	2,000		Existing Max Occupancy 154; Includes room for Planning & Zoning 8 + people
		Community Room	4 + 100	-	1	2,394	2,000		Checkpoint area for security with a metal detector; courtroom for 75 people; maximum size for 100 people at round tables (8 to 10 per table)
		Council - chair/table storage / AV room		-	1	162	135		
		Gun Range		-	2	1,280	1,280		Utilize existing in place
		Gym	150	-	-	3,876	-		Not required for new build
		Kitchenette		-	1	310	300		For Chamber and Community Room
		Storage		-	1	135	135		
		Council Anti-Room/ Large Conference		-	1	400	400	8,478	
Building Core Areas	Public Spaces	Medium Conference Room	325 s.f.	-		772			Existing: 2 on lower level
		Small Conference Room	200 s.f.	-					
		Break Room/ Kitchenette		-	1	447	450		Outdoor Access?
		Fitness / Conditioning		-	2	864	864		existing near gun range; keep as amenity; may need to reconfigure and confine it to existing portion of building kept
		Staff Restrooms - Upper Level	46 s.f.	-	2	401	92		New-unisex restrooms overall in/near departments
		Staff Restrooms - Lower Level	46 s.f.	-	1	401	184		New-unisex restrooms overall in/near departments
		Quiet Room/Mother's/Wellness/Lactation Room		-	1	80	80		
				-					
		File Server Room/ Security Cameras / Phone Room		-	2	247	192		
		Mechanical		-	1	1,374	1,000		
		Electrical Room		-	1	260	200		
		Janitors - By Main Toilet Areas	64 s.f.	-	1 & 2	90	128		one per floor
		Garage Storage (Old Sally Port)		-		3,231	-		
				-					
		-		1,520					
		-		3,507					
Sub-Total - Shared Areas								11,668	



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Department	Position/Title	Employee Name	Occupants Utilizing Space	Office / Workstation	1st Floor / 2nd Floor (1 or 2)	EXISTING (APPROX) Net Floor Area (s.f.)	Net Floor Area (s.f.)	Department Totals (Square Footage)	REMARKS
Community Development	1 Director of Community Development	Jason J.	1+2G	Office	1	186	200		
	2 City Planner	Bethany M.	1+2G	Office	1	130	150		Drafting Board
	3 Administrative Support Associate Supervisor	Megan W.	1+2G	Office	1	104	125		Office needs to have large amount of glass looking into Admin Support area and be able to see front counter; could be workstation but would need adjacent small conference room for private conversation and meeting minutes processing
	4 Administrative Support	Diana M.	1	Wkstr	1	127	81		Support office staff with public works, community development, and building division these staff members often cover for each other so they need to stay together and stay adjacent for the two departments (CD and PW)
	5 Administrative Support	Jayne P.	1	Wkstr	1	127	81		
	6 Administrative Support	Vacant	1	Wkstr	1	127	81		
Building Department	F1 Future Hire-CD		1	Wkstr	1	0	81		
	1 Chief Building Official	Greg T.	1+2G	Office	1	186	175	799	
	2 Senior Plans Examiner	Brad H.	1	Wkstr	1	185	150		Drafting Board
	3 Plans Examiner	John Y.	1	Wkstr	1	132	150		Drafting Board
	4 Inspector	Scott B.	1	Wkstr	1	72	64		Drafting Board
	5 Inspector	Dave M.	1	Wkstr	1	72	64		
	6 Inspector	Richard Z.	1	Wkstr	1	72	64		
	7 Inspector	Patrick B.	1	Wkstr	1	64	64		Inspectors can be located in a larger combined area that consist of touch down spaces with shared collaboration/work table in middle
	8 Inspector	Adam B.	1	Wkstr	1	64	64		Small counter with personal 38" cabinet and computer.
	F1 Future Hire-BD		1	Wkstr	1	0	64		
Public Works	1 Director of Public Works	Jim H.	1+2G	Office		240	200	859	
	2 Assistant PW Director/City Engineer	Vacant	1+2G	Office		130	175		
	3 Project Manager	Tom D.	1	Wkstr		130	81		
	4 Civil Engineer	Kevin M.	1	Wkstr		132	81		
	5 Project Manager	Jim V.	1	Wkstr		64	81		
	F1 Future Hire-PW1 - Civil Engineer		1	Wkstr		0	81		
	F2 Future Hire-PW2 - Project Manager		1	Wkstr		0	81		
	Building Maintenance Worker II	Jeff S.	1	Wkstr		250	420		This would be one larger room with a workstation for Jeff's within the room. Room to contain all tool / work bench and building supplies/storage
	- Work Bench / Tool Room / Building Supplies					564		1,200	
	Public Counter					127	150		Needs to have two (2) transaction windows for public access.
Support Space	Work / Copy					105	100		
	High Density File System					315	325		Almost at capacity with rolling file shelving - might need additional units (starting to convert files to electronic format)
	Plotter / Scanner					60	50		
	Building Dept. Plan Storage Room					380	500		
	Large/Medium Conference Room - Internal to suite	12 to 15				282	325		This is not to be shared with others
	Small Conference Room - Public Access					0	175		Needs to be adjacent to department AND main lobby (public access)
								481	300
								2,356	1,925
Sub-Total - Community Development								4,783	



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Department	Position/Title	Employee Name	Occupants Utilizing Space	Office / Workstation	1st Floor / 2nd Floor (1 or 2)	EXISTING (APPROX) Net Floor Area (s.f.)	Net Floor Area (s.f.)	Department Totals (Square Footage)	Program Requirements/Adjacencies/Public Access-Direct, indirect
Administration	1 Mayor's Office	Dr. R. Hoffman	1+2G	Office	2	357	200		
	Mayor's Conference Room		15 to 20		2	305	400		Large Conference Room in Administration Suite (Dual Use) - if large enough
	Mayor's Restroom				2	25	0		Do not need this in new building. Could leave in place in renovation.
	2 City Administrator	Mark P.	1+2G	Office	2	209	250		
	3 Assistant City Administrator	Sharon S.	1+2G	Office	2	178	175		Need extra room for City Files; semi-private workstation
	4 HR Generalist	Janet R.	1+2G	Wkstr	2	313	130		Need room for Personnel Records; semi private workstation
	Small Conference Room				2	In office	120		4 person conf room adjacent to HR's space to have private discussions for benefits, etc. (others can share conf rm)
	5 Public Information Officer	Melissa B.	1+2G	Office	2	180	150		Close to but does not need to be adjacent to admin dept. (needs some quiet) not readily accessible to the public.
	6 City Clerk	Kellie H.	1+2G	Office	2	342	175		Need file storage
	Future Hire-AD				2	0	64		1 - FTE (Part-Time, Intern, or Temp Workstation Flex Space)
	Administration Conference Room				2	300	200		4-8 people
IT / MDF	Work / Copy				2	114	100		Confidential files to be copied
	Vault - City Clerk - Fire Rated Room for Document protection				2	91	200		permanent documents ordinances, exec session minutes, resolutions... could microfilm
	HR and Administrative Files - Fire Rated Room				2	In office	200		
	City Clerk Archive Files				2	75	100		Administration Suite - Accessibility to public but NO public window needed. Does not need to be adjacent to any particular department but on the same floor as Finance
								2,484	
	1 IT Information System Coordinator	Chris T.	1		2	119	100		
	2 IS Support Staff (Part Time)		1		2	119	100		IT Department can be in one room with combined space total of 200 s.f. space
								200	
Sub-Total - Administration									2,684
Finance	1 Director of Finance	Lori O.	1+2G	Office	1	140	200		
	2 Sr. Accounting Associate	Tracy B.	1+2G	Office	1	95	150		
	3 Accounting Associate	Krista A.	1	Wkstr	1	182	81		2nd Back up window
	4 Accounting Clerk	Jayne/Jessie (pr)	1	Wkstr	1	182	81		Receptionist for finance window / Part Time
	5 Payroll Associate	Vacant	1	Wkstr	1	182	81		3rd Back up window; Semi-private workstation - Conversations with personnel
	Future Hire-Finance		1	Wkstr	1	0	81		
	Conference Room		6 to 10		1	182	200		Auditor will set up and work from here
	Work / Copy Area / Mail				1	182	100		
	Secured File Area-Active	In office			1	120	150		
	Archive File Storage				1	481	300		150 'banker boxes' currently for archive storage
								1,795	
Sub-Total - Finance									1,424



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Department:	Position/Title	Employee Name	Occupants Utilizing Space	Office / Workstation	1st Floor / 2nd Floor (1 or 2)	EXISTING (APPROX) Net Floor Area (s.f.)	Net Floor Area (s.f.)	Department Totals (Square Footage)	Program Requirements/Adjacencies/Public Access-Direct, Indirect
Courts	1 Court Administrator	Jody C	1+2G	Office	1	173	173		
	2 Court Clerk	Tina H.	1	Westr.	1	100	100		separation to openly converse without hindering other clerks
	3 Court Clerk	Kirsten B.	1	Westr.	1	182	100		separation to openly converse without hindering other clerks
	4 Judge / Conference Room / Training		6	Office	1	168	173		private office for virtual court and flex space during the day. Could be used as training area or break room for courts
	5 Prosecuting Attorney / Conference Room		1+2G	Office	1	204	173		Currently has space in Police Station (Need to re-confirm if space is also needed in City Hall as well or if this is just a small conf room adjacent to lobby for attorneys to consult with Prosecutor prior to in-person court.)
	F1 Future Hire-court clerk		1	Westr.	1	0	81		separation to openly converse without hindering other clerks
	F2 Future Hire-court clerk		1	Westr.	1	0	81		separation to openly converse without hindering other clerks
	F3 Future Hire-court clerk		1	Westr.	1	0	81		separation to openly converse without hindering other clerks
	Customer assistance window area		2		1	100	100		Preferably option for 2 windows for future consolidation with other courts; Additional area for electronic terminal for public to use to lock up cases and make electronic payments via web portal
	Work / Copy Area				1	100	100		
	Secured File Area / Archive Files				1	208	250		14 vertical filing cabinets-current use court cases and warrant files
	Small Conference Room		4		1		120		Adjacent to Lobby near courts room - waiting space for visiting attorneys or outside prosecuting attorney's office
	Police Storage Room for Court Night				1		64		Comply with CALEA; lock guns in secure area; metal detectors; tables; signs; other equipment
	Private Restroom				1		70		Judicial Staff - due to security concerns
							1,228		
Does not have to be but might be beneficial next to Finance Department Start rec doing courts during the daytime hours and is concerned with congestion of city hall functions - possibility have a separate entrance									
Sub-Total - Courts							1,672		
WCDC	General Manager	Crystal	1+2G	Office	2		173		doesn't need to be immediately adjacent to dispatch floor
	Supervisor	Ryan	1+2G	Office	2		150		immediately adjacent to dispatch floor with window overlooking dispatch floor
	Dispatch Console Room		4	Westr.	2		500		10 monitors per station
	Dispatch Console Growth		2	Westr.	2		250		
	Walking Tread Mill Area (on dispatch floor)				2		80		
	Conference Room		8 to 10	Private Rm	2		250		
	Break Room				2		168		Microwave; toaster oven; full-size refrigerator; counter space for food deliveries; Table and 4 chairs
	IT Room				2		150		2 Standard 4 post racks
	Locker Room		20		2		480		Unisex space with Changing Room; do not need restroom/shower in this area
	Storage				2		80		Extra PCs, paper, office supplies, servers, etc 8x10 should be sufficient
	Restrooms				2		128		Could access building's restroom if close proximity
	Access to City Conference Rooms for Board Meetings		14						
Have specific power supply requirements for St. Louis County Radio; Have specific requirements for County CAD requirements; need antenna mount location									
Sub-Total - WCDC							2,411		



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Department	Position/Title	Employee Name	Occupants Utilizing Space	Office / Workstation	1st Floor / 2nd Floor (1 or 2)	EXISTING (APPROX) Net Floor Area (s.f.)	Net Floor Area (s.f.)	Department Totals (Square Footage)	Program Requirements/Adjacencies/Public Access-Direct, Indirect
Totals: 1 STORY	TOTALS OF ALL SPACES (NET)					30,776		24,642	
	Net Area Square Foot							24,642	
	Circulation factor (20%)							4,928	
	Sub-total							29,570	
	Building Gross SF Factor (10%)							2,957	
	Building Total Gross SF 1 Story							32,527	
	Stair #1							190	
	Stair #2							190	
	Elevator							70	
	Elevator Equipment							70	
	Sub-Total Vertical Circulation							520	
	Building Gross SF 2 story							33,047	
Existing Building total square footage						61,426			

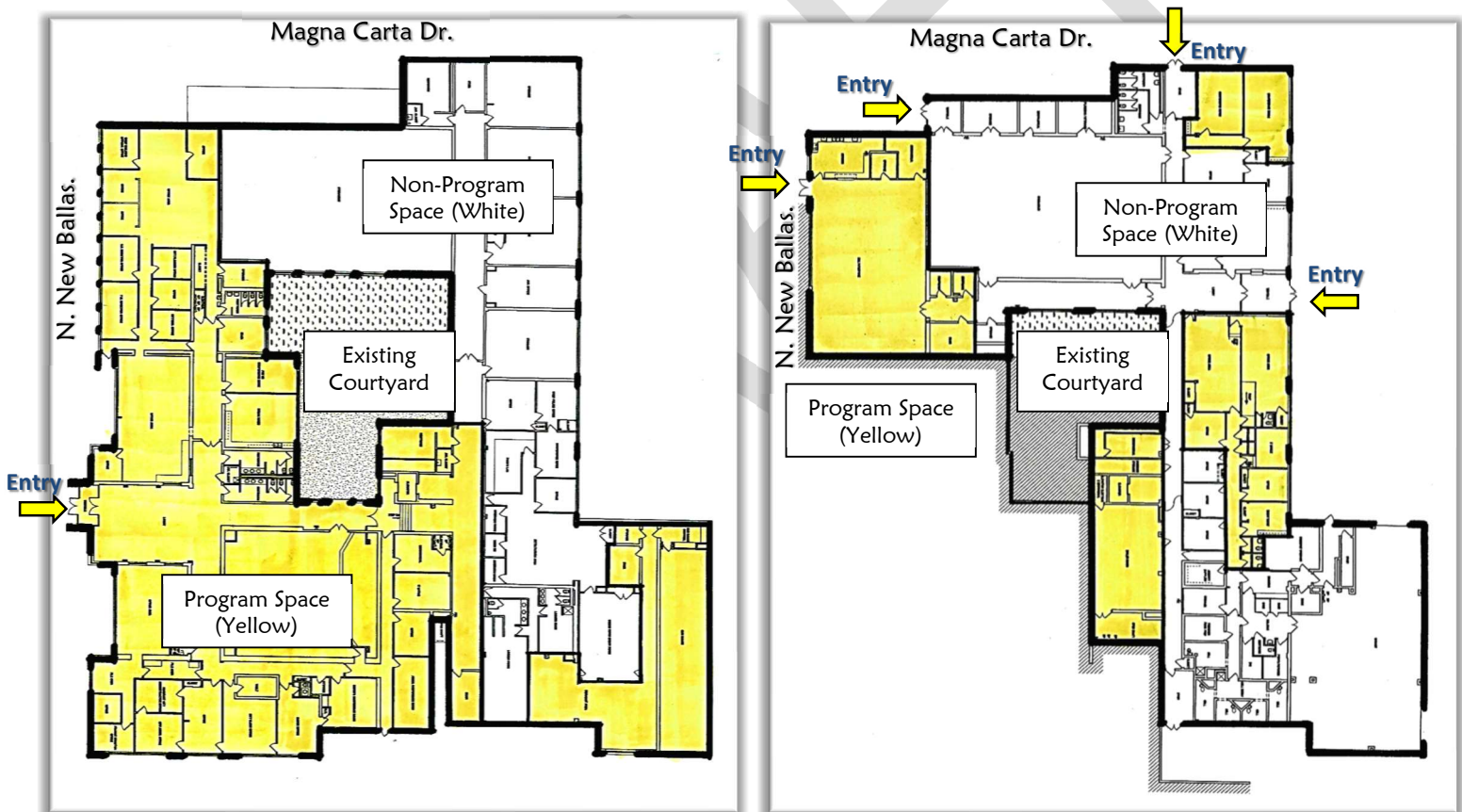
8. SITE / BUILDING DESIGN CONCEPTS

The following BUILDING DESIGN CONCEPTS were generated based on several programming sessions with the city's steering committee, the task force and responses from a number of departmental staff personnel. It was also designed utilizing the building needs program previously discussed.

The objective of the building plans were to review 3 different conceptual concepts.

- The first set of plans utilized an ***"Adaptive Reuse"*** approach of the existing building. Indicating the space required and extra space within the existing facility without any demolition or additions.
- The second set of plans utilized a ***"Partial Demo / Renovation"*** approach to the design of a renovated building. The plans indicated the areas to be demolished and other areas of the existing structure to be utilized through renovations or additions
- The third set of plans utilized a ***"New Construction"*** approach. This concept removes all the existing structure and builds a new facility with new site design concepts.

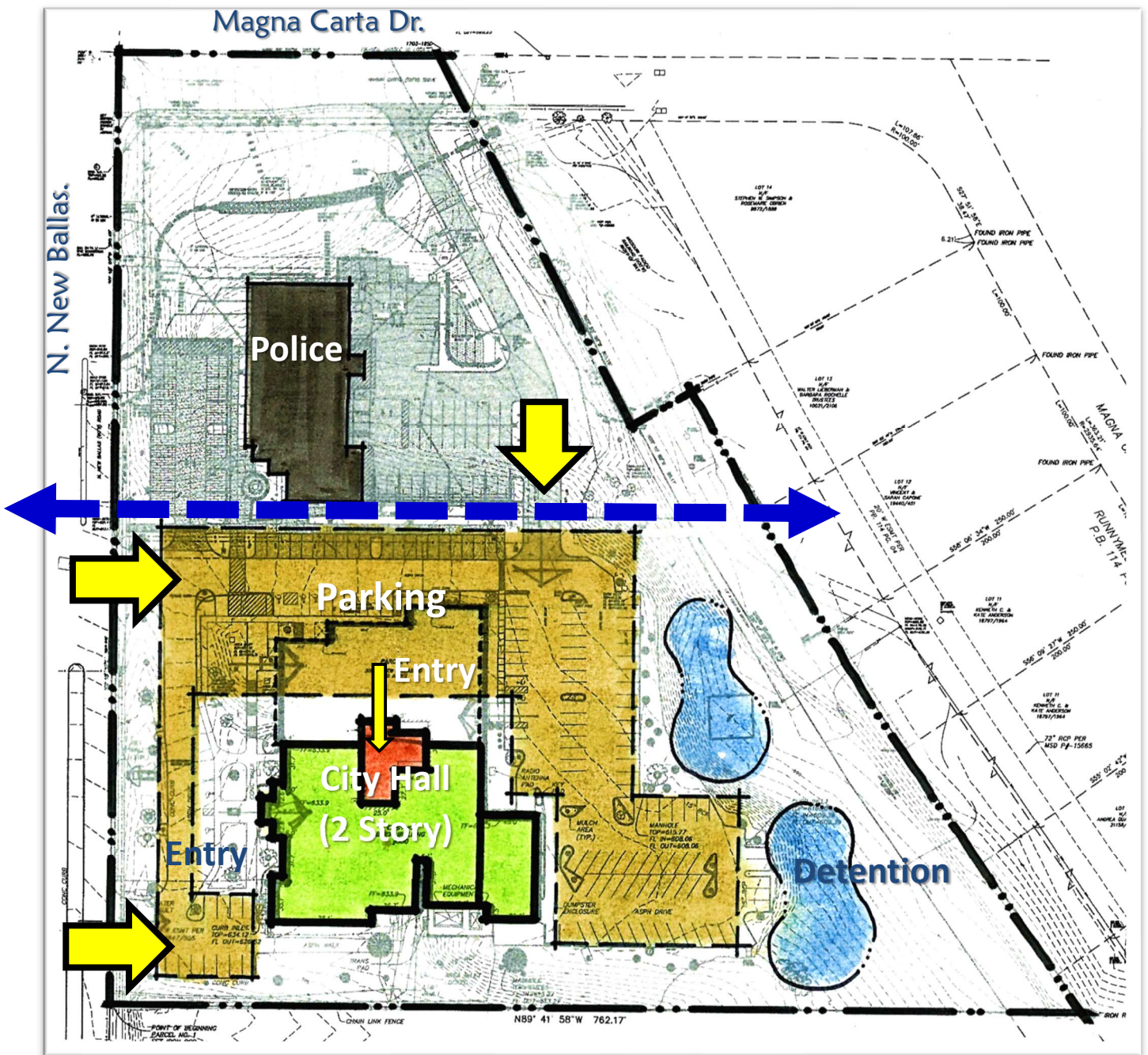
There are additional notable items depicted on the following concept floor plan.



Floor Plans of ***"Adaptive Reuse"*** approach of the existing building. Indicating the space required and extra space within the existing facility without any demolition or additions.

Option #1

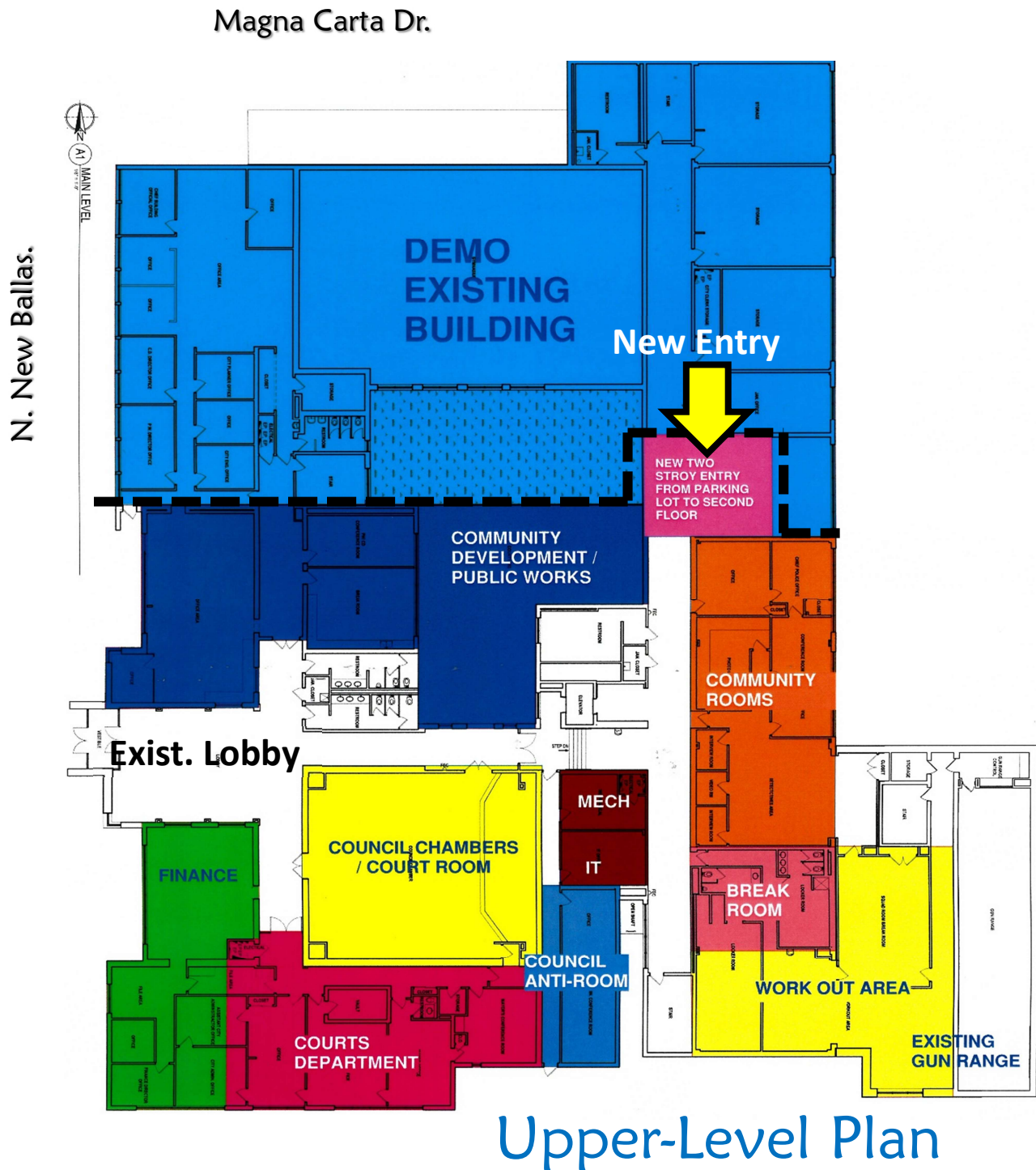
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Site Plan for "Partial Demo / Renovation" approach.

Option #2

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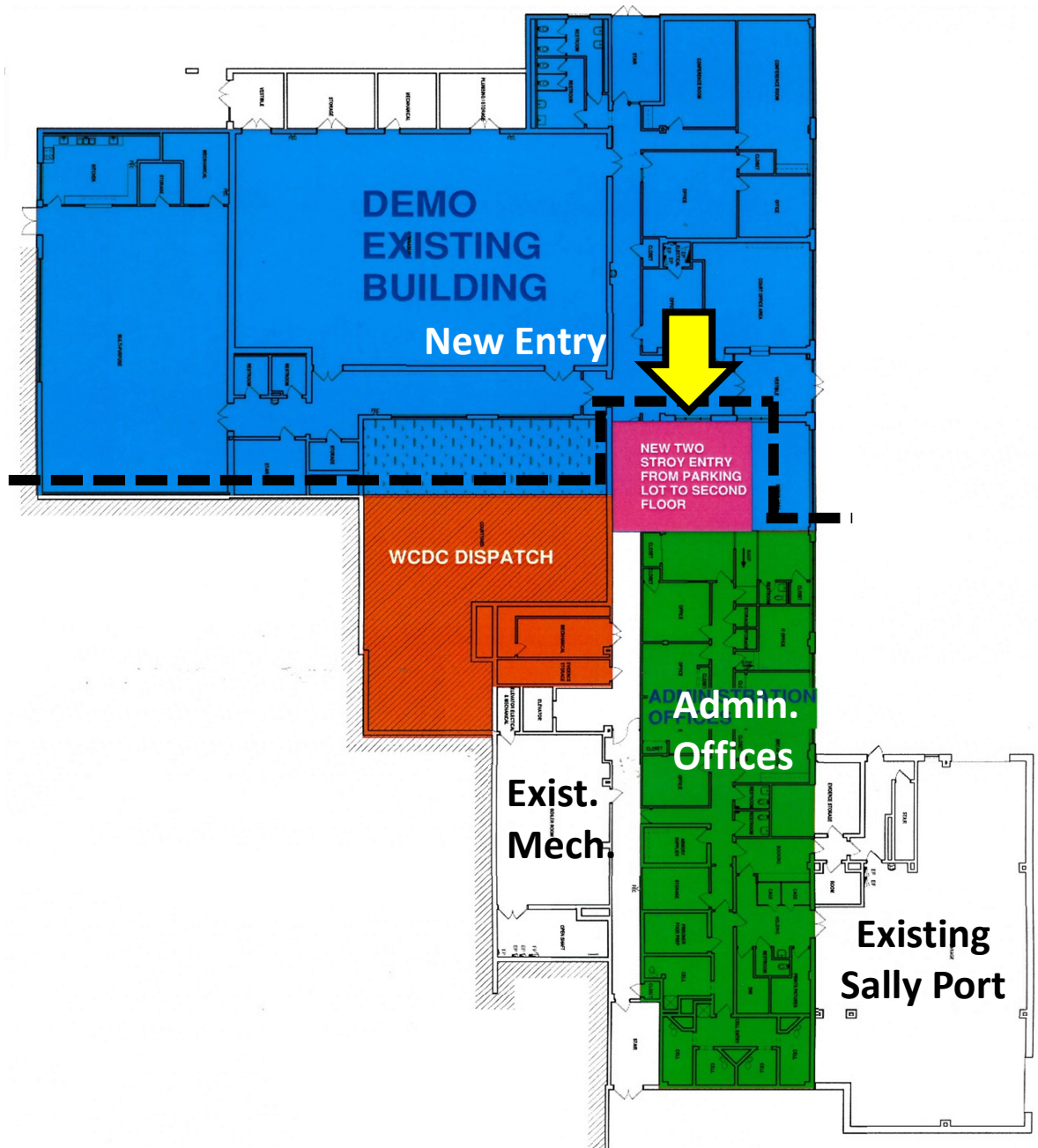
Floor Plans of "Partial Demo / Renovation" approach to the design of a renovated building. The plans indicated the areas to be demolished and other areas of the existing structure to be utilized through renovations or additions.

Option #2

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Magna Carta Dr.

N. New Ballas.

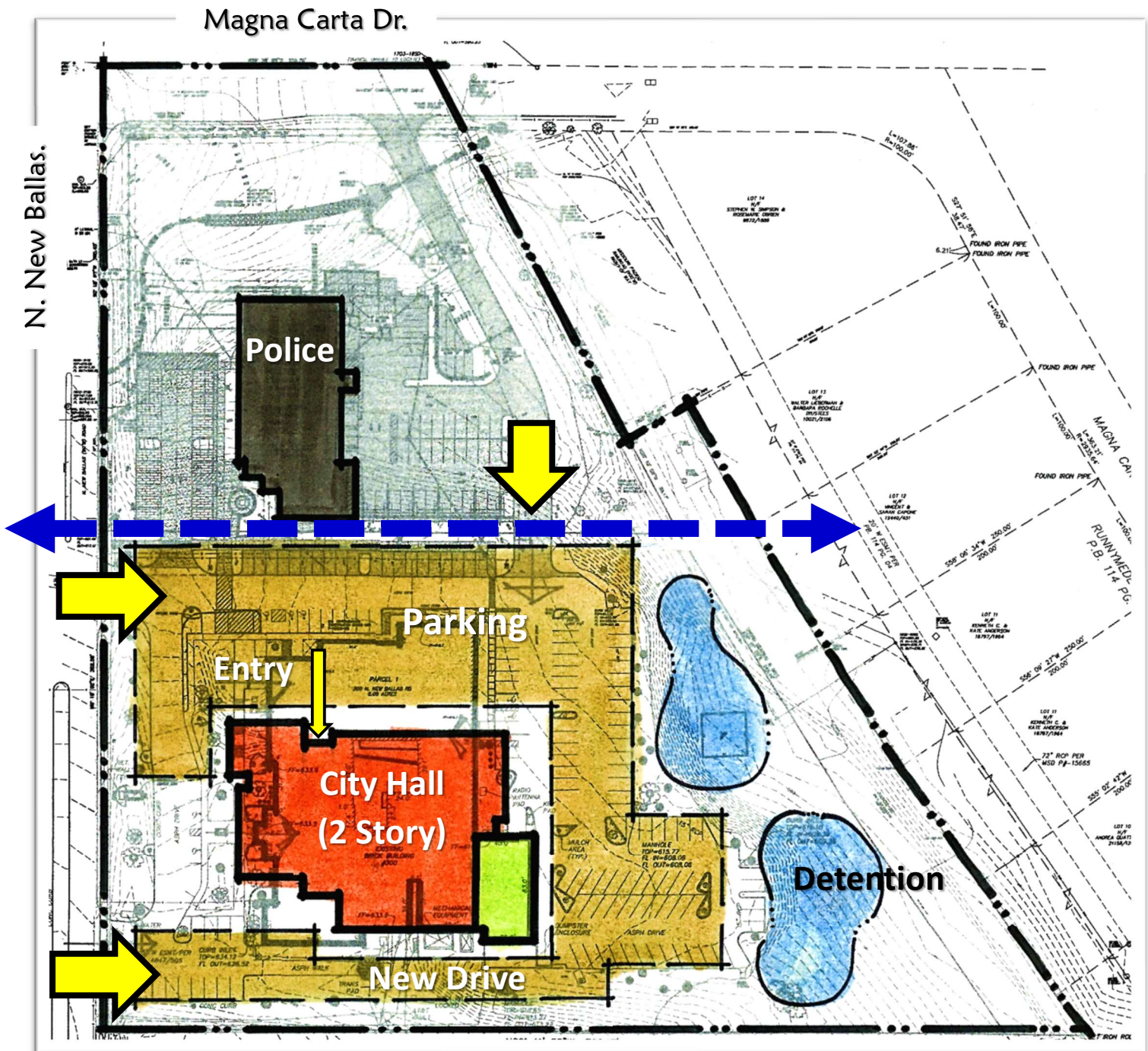


Lower-Level Plan

Floor Plans of "Partial Demo / Renovation" approach to the design of a renovated building. The plans indicated the areas to be demolished and other areas of the existing structure to be utilized through renovations or additions.

Option #2

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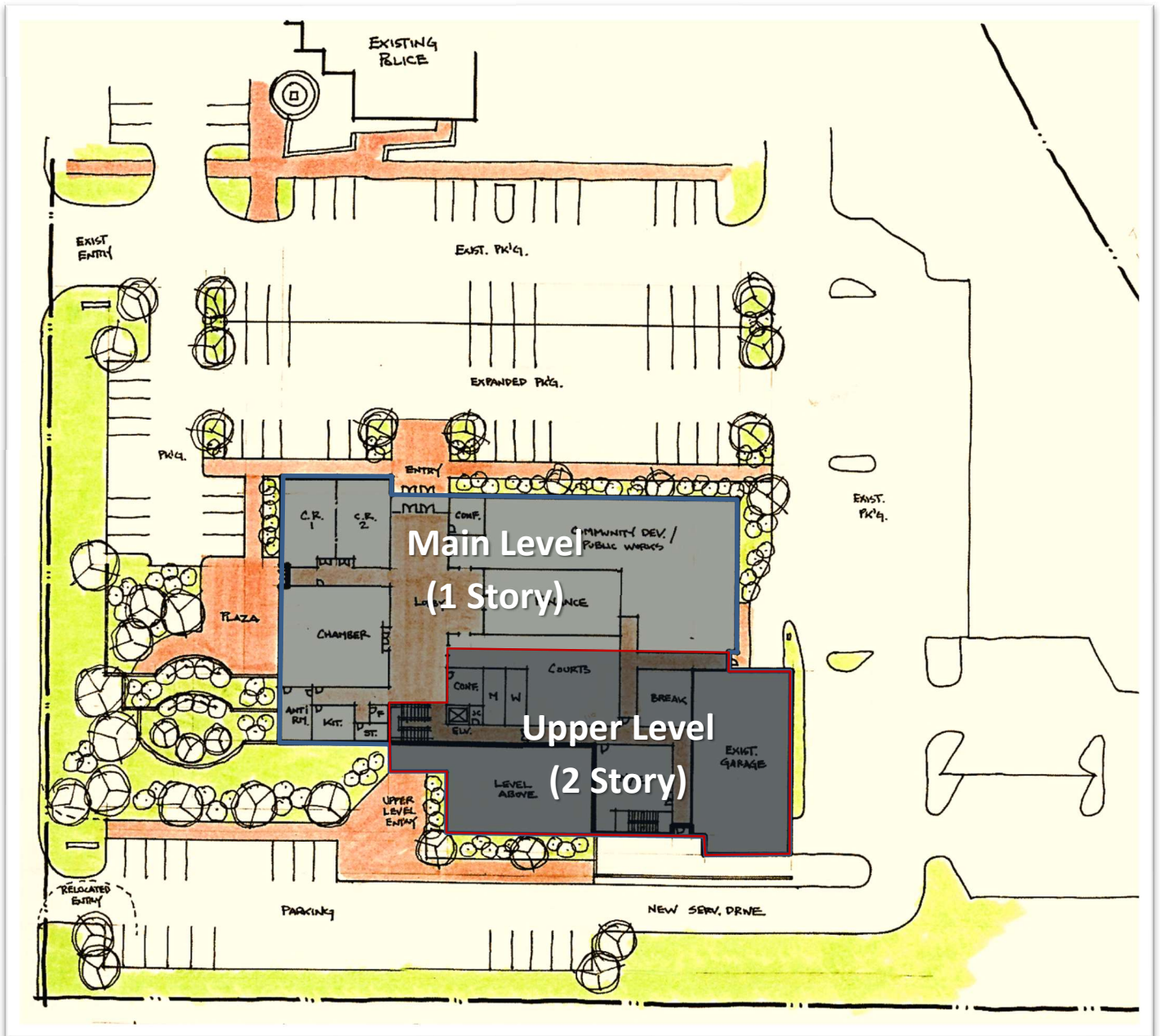
Site Plan (2-Story Version) for “New Construction” approach. This concept removes all the existing structure and builds a new facility with new site design concepts.

Option #3a

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Magna Carta Dr.

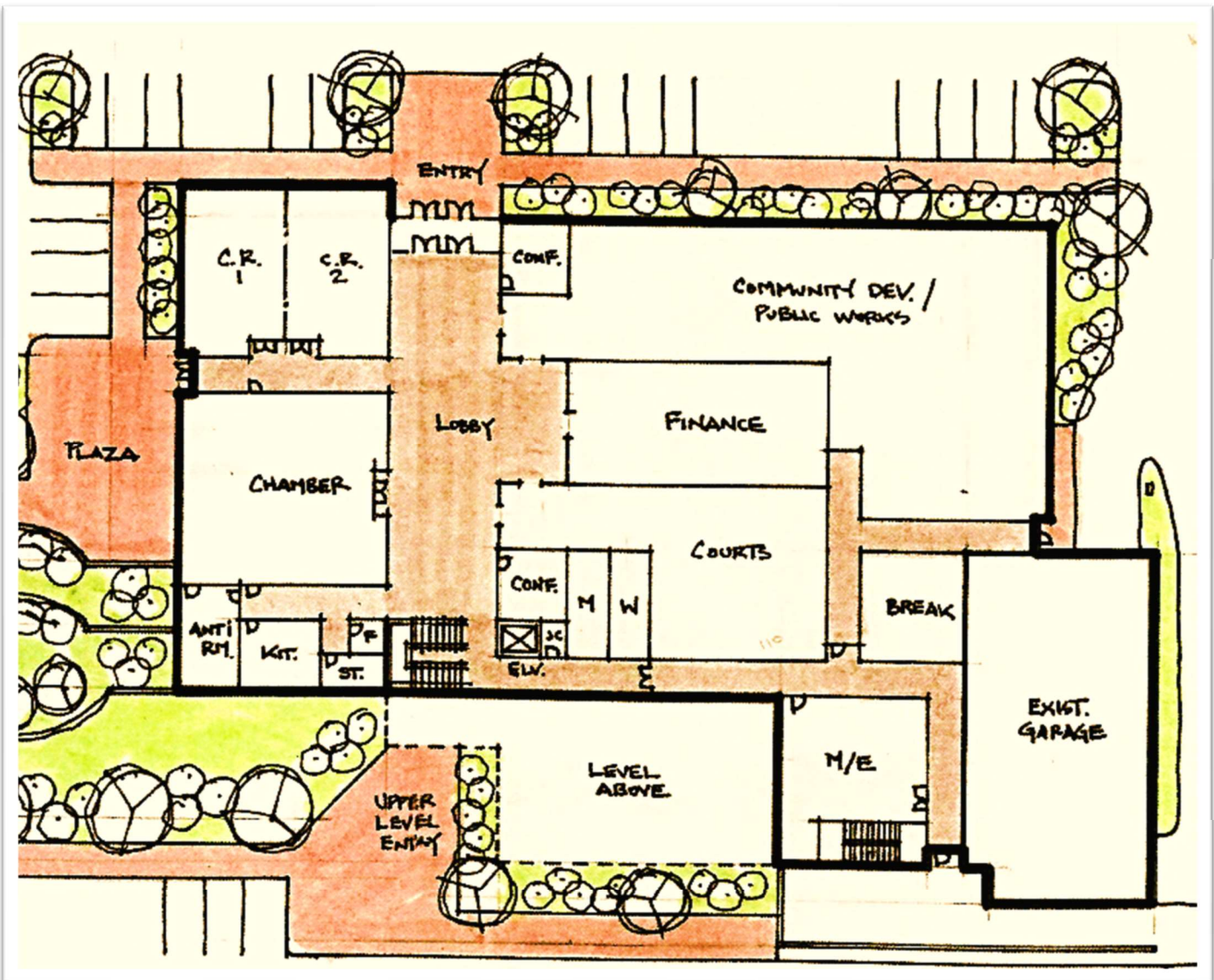
N. New Ballas.



Site Plan (2-Story Version) for "New Construction" approach. This concept removes all the existing structure and builds a new facility with new site design concepts.

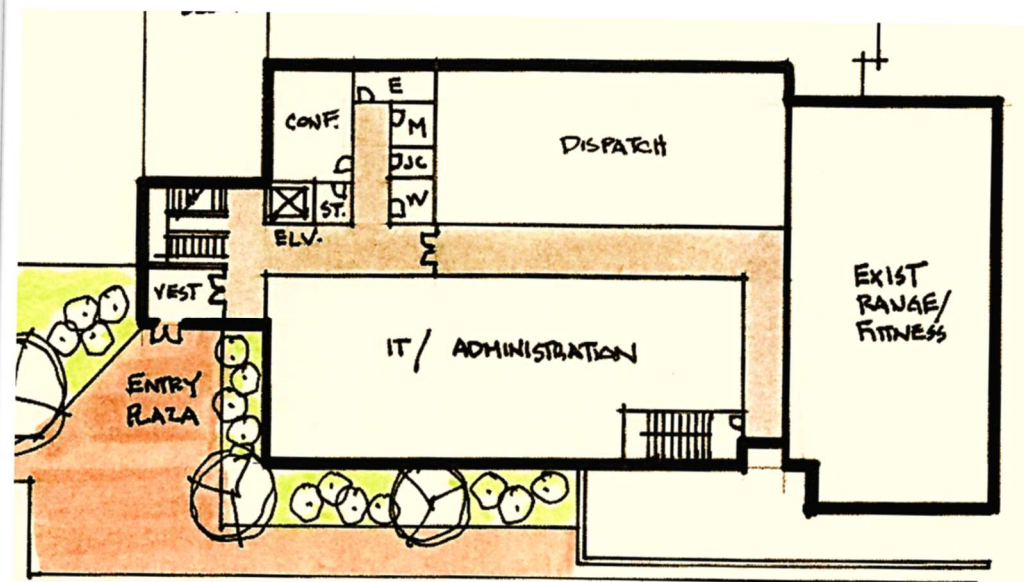
Option #3a

CITY OF CREVE COEUR MISSOURI
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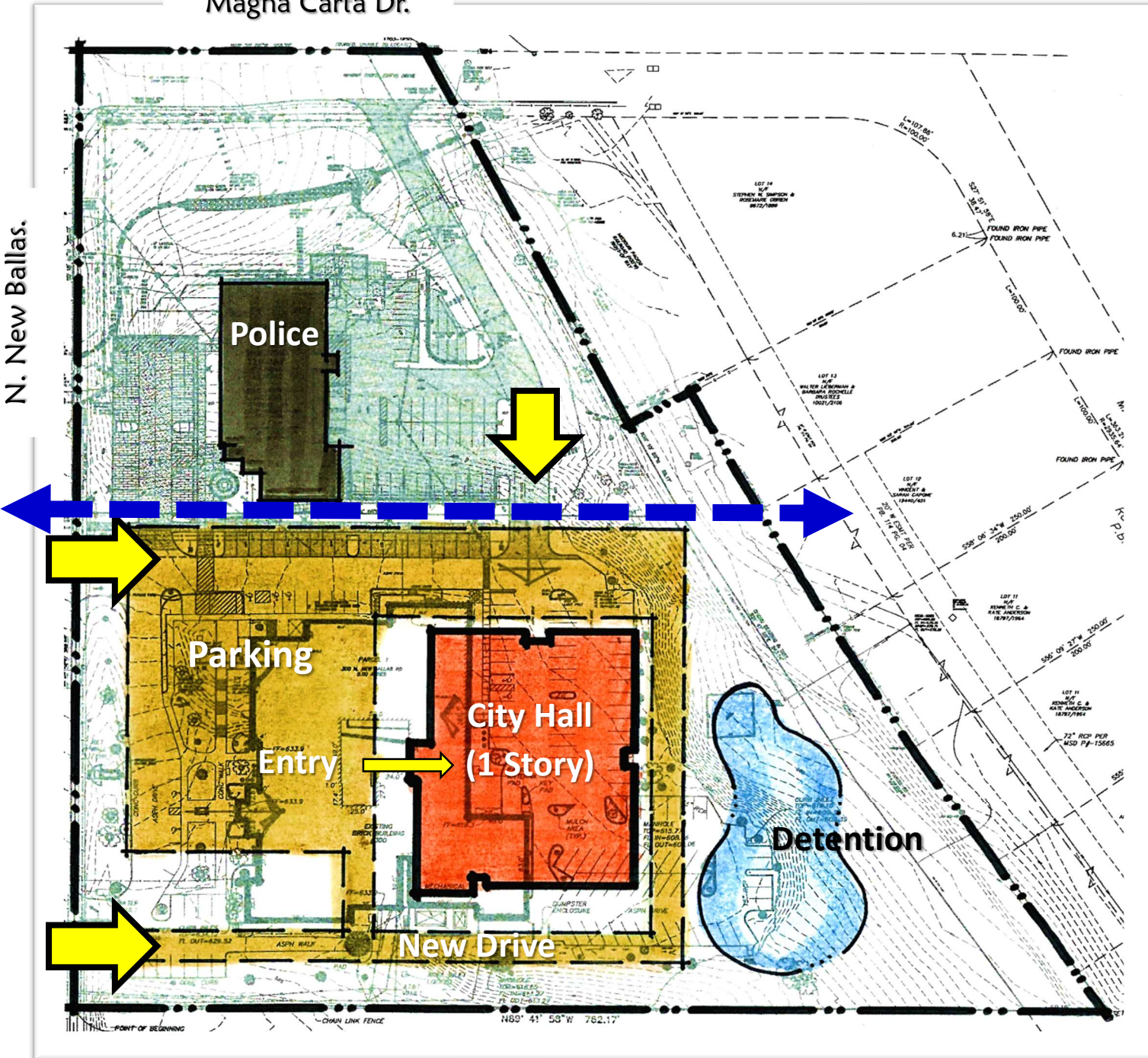
Main Level - (1 Story)

Floor Plans (2-Story Version) for "New Construction" approach. This concept removes all the existing structure and builds a new facility with new site design concepts.



Upper Level - (2 Story)

Option #3a



Site Plan (1-Story Version) for “New Construction” approach. This concept removes all the existing structure and builds a new facility with new site design concepts.

Option #3b

9. CONSTRUCTION COST OPINION

BUILDING AND SITE

The following CONSTRUCTION COST OPINION was generated based historical data that has been collected by NAVIGATE Building Solutions, Inc. and averaged from several current Government Center and municipal type projects. This cost opinion is strictly an opinion presented based on this historical data. These opinions are not considered guarantees of potential market bid values at time of acquiring market bids.

The cost below does reflect typical owner soft costs/budgets or furniture, fixtures, and equipment. Cost for escalation and contingencies are also included in this opinion and should be discussed to finalize project costs. These cost opinions are subject to change with additional information and over time.

DRAFT

DRAFT