



**Project Manual For**  
**Triphahn Center Ice Arena**  
**Ice Rink Floor Replacement**  
**Hoffman Estates Park District, Illinois**

**December 18, 2018**

**Stantec Project No. 193804620**



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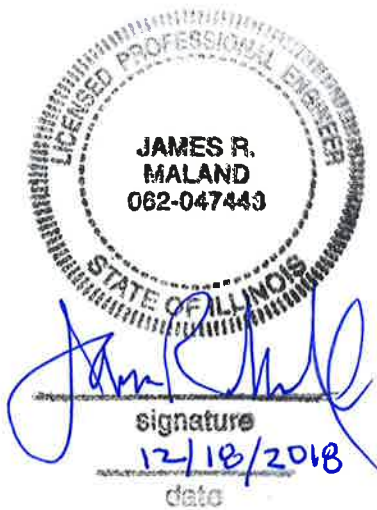
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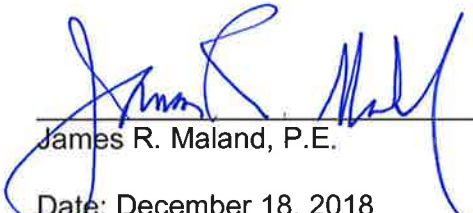
**END OF SECTION**

**SECTION 00 01 15**  
**PROFESSIONAL CERTIFICATION**

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Illinois.



License expires 11-30-2019

  
James R. Maland, P.E.  
Date: December 18, 2018  
Illinois License No. 062-047443  
Expires November 30, 2019

**END OF SECTION**

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Bidder Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone #: \_\_\_\_\_

Facsimile: \_\_\_\_\_

**NAME OF PROJECT**

**Triphahn Center Ice Rink Floor Replacement**

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**BID DATE: 01/08/2019**

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**BID TIME: 10:00AM**

PREPARED BY:

HOFFMAN ESTATES PARK DISTRICT

1685 W. Higgins Road

Hoffman Estates, IL 60169-2998

Telephone: (847) 885-7500

Facsimile: (847) 885-7523

## INVITATION TO BIDS

Sealed bids for the **Triphahn Center Ice Rink Floor Replacement** will be received by the Hoffman Estates Park District at our office; 1685 West Higgins Road, Hoffman Estates, Illinois 60169 until **exactly 10:00A.M., 01/08/2019** and then publicly opened and read. Bids submitted after the closing time will be returned unopened. No oral or telephone proposals or modifications will be considered.

The Hoffman Estates Park District Board of Commissioners will make the final award.

Proposals shall be submitted on the attached Form of Proposal and returned in a sealed envelope, labelled on exterior "Bid for Triphahn Center Ice Rink Floor Replacement". No bidder may withdraw his proposal after the hour set for the opening thereof, or before award of the contract, unless said award is delayed for a period exceeding sixty (60) calendar days.

The Hoffman Estates Park District requires all bidders to comply with all provisions of the Park District Prevailing Wage Ordinance O18-005. This ordinance specifies that no less than the general prevailing rate of wages as found by the Park District or Department of Labor or determined by a court on review shall be paid each draft type of worker or mechanic needed to execute the contract or perform the work.

The Hoffman Estates Park District may reject any or all of the bids on any basis and without disclosure of a reason. The failure to make such a disclosure shall not result in accrual of any right, claim, or cause of action by any unsuccessful Bidder against the Hoffman Estates Park District.

Bid results and the award of the bid will be published on the Hoffman Estates Park District website [www.heparks.org](http://www.heparks.org).

Sincerely,

*Dustin Hugen*

Dustin Hugen  
Director of Parks, Planning & Maintenance  
Hoffman Estates Park District  
[dhugen@heparks.org](mailto:dhugen@heparks.org)  
847-285-5465



HOFFMAN ESTATES PARK DISTRICT

INSTRUCTIONS TO BIDDERS

1. Identification of Project

The official name and location of the project shall henceforth be known as:

Triphahn Center Ice Rink Floor Replacement

The official name and address of the project owner shall henceforth be known as:

HOFFMAN ESTATES PARK DISTRICT  
1685 West Higgins Road  
Hoffman Estates, IL 60169-2998

Bid Opening: DATES **01/08/2019**

Committee Approval: DATES **01/15/2019**

Board Approval: DATES **01/22/2019**

Contract Awarded: DATES **01/25/2019**

Commencement of Work: Commencement of paperwork shall begin immediately upon notification of award. Actual work on the project site shall commence, during **appropriate time set by Contractor and HEPD** and shall continue with due diligence until full completion and acceptance.

Substantial Completion Date: **August 31, 2019**

Final Completion Date: **October 11, 2019**

HOFFMAN ESTATES PARK DISTRICT  
Hoffman Estates, Illinois

**FORM OF PROPOSAL**

Proposal of \_\_\_\_\_, hereinafter called the  
"BIDDER", (a) / (an) \_\_\_\_\_,  
(Corporation, Partnership,  
individual) doing business as \_\_\_\_\_, to Hoffman Estates  
Park District, hereinafter called the "OWNER."

\* \* \*

The Bidder, in response to your advertisement for bids for **Triphahn Center Ice Rink Floor Replacement**, having examined the Specifications and other Documents and being familiar with all of the conditions surrounding the proposed work including availability of materials and labor, hereby proposes to furnish all labor, materials and supplies and to construct the project in accordance with the Contract Documents, within the time set forth therein and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents of which this proposal is a part.

Bidder acknowledges receipt of the following Addenda, which are a part of the Contract

Document: Numbers: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

Bidder hereby agrees to start work within ten (10) days after receipt of "Notice to Proceed" from the Owner.

BASE BID: Bidder agrees to provide all equipment, materials, and labor described in the Drawings and Specifications for the lump sum of:

\_\_\_\_\_ (Dollars) (in writing, insert Base  
Bid Amount)

ALTERNATE BID NO. 1 (ADD) DRAINAGE BOARD FOR RINK SUBGRADE DRAINAGE:  
Bidder agrees to provide all equipment, materials, and labor described in the Drawings and Specifications for the lump sum of:

\_\_\_\_\_ (Dollars) (in writing, insert  
amount to be added to Base Bid if Alternate Bid No. 1 is awarded.)

ALTERNATE BID NO. 2 (ADD) CONCRETE SEALER COATING OVER ENTIRE RINK  
SURFACE: Bidder agrees to provide all equipment, materials, and labor described in the Drawings and Specifications for the lump sum of:

\_\_\_\_\_ (Dollars) (in writing, insert  
amount to be added to Base Bid if Alternate Bid No. 2 is awarded.)

CONTINUED OPERATION COST FOR FROST HEATING SYSTEM: Bidder agrees to provide all equipment, materials, and labor to maintain and operate the frost heating system (including fuel) for each calendar day beyond the 45 days provided in the Base Bid for the per day cost of: \_\_\_\_\_ (Dollars) (in writing, insert amount to be added to Base Bid, per day, if frost heating system specified in Section 13 18 02 must be operated longer than 45 days to adequately remove subsoil frost.)

HOFFMAN ESTATES PARK DISTRICT

FIRM NAME \_\_\_\_\_

BY: \_\_\_\_\_  
(Sign and Date)

ADDRESS \_\_\_\_\_

BY: \_\_\_\_\_  
(Sign and Date)

PHONE \_\_\_\_\_

EMAIL: \_\_\_\_\_

BY: \_\_\_\_\_  
(Sign and Date)

Accompanying this is a \_\_\_\_\_  
(Bid Bond, Certified Check, Bank Draft)

In the amount of \_\_\_\_\_  
(Dollars)

(\$\_\_\_\_\_) being five percent (5%) of the Base Contract Bid, the same being subject to forfeiture in the event of default by the undersigned.

In submitting this bid, it is understood that the right is reserved by the Owner to reject any and all bids and it is agreed that this bid may not be withdrawn during the period of days in the Contract Documents.

The Bidder hereby certifies:

- A. That this bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation.
- B. That he has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid.
- C. That he has not solicited or induced any person, firm, or corporation to refrain from bidding.

- D. That he has not sought by collusion or otherwise to obtain for himself any advantage over any other bidder or over the "Owner."
- E. That he will comply with all provisions of the Prevailing Wage Ordinance #O18-005 adopted by the Hoffman Estates Park District.
- F. That he is in compliance with the Criminal Code Act of 1961, Article 33E-11, Public Contracts, and Public Act 85-1295.
- G. That all materials, methods and workmanship shall conform to the drawings, specifications, manufacturer's standards and specifications, and all applicable Codes and Standards.

**CERTIFICATION**

I, \_\_\_\_\_ (Officer), having been first duly sworn on Oath, do  
depose and state that I presently reside at \_\_\_\_\_ (Address), and  
that I am the duly authorized principal, officer or agent of \_\_\_\_\_  
(Name of Contractor) and do hereby certify to Hoffman Estates Park District, its  
Commissioners, Officers and Employees that neither I nor \_\_\_\_\_  
(Name of Contractor) are barred from bidding on the Contract for which this bid is  
submitted, and as a result of violation of either Section 33E-3 (Bid-rigging") or  
Section 33E-4 ("Bid-rotating") of Article 33E of the Criminal Code of 1961 of the  
State of Illinois approved July 28,1961, as amended.

\_\_\_\_\_  
On behalf of Contractor

Subscribed and sworn to before me

this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
- Notary Public -

My Commission Expires:

\_\_\_\_\_

## SUBCONTRACTORS

The following list includes all Subcontractors who will perform work representing five percent (5%) or more of the total Base Bid. The Bidder represents that the Subcontractors are qualified to perform the work required.

Category	Subcontractor Name	Address
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

## REFERENCES

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Hoffman Estates IL 60169

**References for:**

1. Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City-state: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Contact Person: \_\_\_\_\_
2. Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Contact Person: \_\_\_\_\_
3. Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Contact Person: \_\_\_\_\_
4. Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City/State: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
Contact Person: \_\_\_\_\_

## STATEMENT OF EXPERIENCE

The Bidder shall list all recent projects for which he provided services of a similar nature to the subject project.

Project/Location	Contract Amount	Reference/Phone #
1. _____		
2. _____		
3. _____		
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		
11. _____		
12. _____		
13. _____		
14. _____		
15. _____		



HOFFMAN ESTATES PARK DISTRICT  
Hoffman Estates, Illinois

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Please list all of the equipment you will be using on this specific job.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_

# SUSTAINABILITY STATEMENT

## Introduction

The Hoffman Estates Park District is committed to green and sustainable practices and good environmental stewardship. Consequently, we are asking bidders to provide a Statement of Sustainability to ensure our bidders are also incorporating sustainability into their firm's practices.

## Instructions

Provide a clear description of your firm's sustainable practices, policies or procedures to the below sections or attach a copy of your practice. These practices may include but are not limited to:

Waste Minimization within the office or facilities through recycling programs, double-sided copying, electronic internal communications, recycled content in materials, reusable cups, limited printing, electronic document management, green purchasing policies, green cleaning supplies or reduced packaging in materials procured or supplied. \_\_\_\_\_

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Energy Efficiency within office, facilities or firm through lighting retrofits, photo sensor switches for lighting, use of day lighting, Energy Star rated appliance or equipment, alternative fuel or efficient fleet, anti-idling policy, or indoor temperature management. \_\_\_\_\_

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Water Efficiency in office, facilities or firm through faucet or fixture retrofits, switch individual bottled water to office water coolers or drinking fountains, drought tolerant landscaping. \_\_\_\_\_

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Staff are encouraged to be sustainable and supported by your firm through public transit benefits, bicycle accommodations, telecommuting options, support to attend green seminars, US Green Building Council LEED accredited or the creation of an internal green team. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Education of your staff about green practices, your business peers of your green accomplishments, your community of your sustainability, or any environmental awards your firm has achieved. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_.

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## BID NOTICE

Notice is hereby given that the Hoffman Estates Park District will accept sealed bids for **Triphahn Center Ice Rink Floor Replacement** until the hour of **10:00 a.m., January 8, 2019** at which time bids will be publicly opened and read aloud.

Bids received after that time will not be accepted. Bid documents can be obtained at the Hoffman Estates Park District Web Site [www.heparks.org](http://www.heparks.org).

(ABOUT HE PARKS/Bid Information). The Hoffman Estates Park District encourages minority business firms to submit on all Park District work and encourages all contractors working for the District to utilize minority business and sub-contractors and suppliers. Published by order of Park Commissioners, Hoffman Estates Park District, Cook County, Illinois.

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## SECTION 00 21 30

### BID BOND

#### PART 1 GENERAL

##### 1.01 BID BOND

- A. Bid Bond shall be AIA Document A310-2010, Bid Bond, or another pre-approved form. Bid Bond may also be in the form of a certified check or a bank draft. Free sample previews of the AIA document are available at [www.aiacontracts.org](http://www.aiacontracts.org).
- B. Terms *Architect*, *Engineer*, and *Architect/Engineer* are used interchangeably.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

Not Used.

**END OF SECTION**

Bank draft.

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## **SECTION 00 31 00**

### **AVAILABLE PROJECT INFORMATION**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes
  - 1. Technical Data.

##### **1.02 TECHNICAL DATA**

- A. Bidders are responsible for their own interpretation, verification, and use of the Technical Data contained in the referenced reports and drawings consistent with the General Conditions and Supplementary Conditions.
- B. A copy of the construction drawings used to construct the facility in year 2004 is available for viewing at the Owner's offices at Triphahn Center. These drawings are not Record Drawings, so accuracy of all details cannot be verified. Request a viewing time with the Owner's Project Representative. Full project specifications are not available.
- C. A Ground Penetrating Radar (GPR) analysis of the soil below the South ice rink was performed to assist in approximate determination of the depth of frozen soil. A copy of the analysis report was not yet available to include with this Project Manual. It will be issued as an Addendum item when available.

#### **PART 2 PRODUCTS**

Not Used.

#### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

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**SECTION 00 52 14**  
**AGREEMENT FORM**

**PART 1 GENERAL**

1.01 AGREEMENT FORM

- A. Owner/Contractor agreement form is AIA Document A101-2017, Standard Form of Agreement Between Owner and Contractor. Free sample previews of the document are available at [www.aiacontracts.org](http://www.aiacontracts.org).
- B. Terms *Architect*, *Engineer*, and *Architect/Engineer* are used interchangeably.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

**END OF SECTION**

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## **SECTION 00 60 11**

### **PERFORMANCE AND PAYMENT BONDS AND CERTIFICATES**

#### **PART 1 GENERAL**

##### **1.01 PERFORMANCE AND PAYMENTS BONDS; CERTIFICATES OF INSURANCE**

- A. Furnish the following with executed Owner-Contractor Agreement:
  - 1. Performance and Payment Bonds: Use AIA Document A312-2010, Performance Bond and Payment Bond, or another pre-approved form.
  - 2. Certificates of Insurance: Use ACORD 25 (2016/03), Certificate of Liability Insurance, and ACORD 27 (2009/12), Certificate of Property Insurance, with AIA Document G715-2017, Supplemental Attachment, or another pre-approved form.
- B. Bond Surety Company shall be satisfactory to the Owner.
- C. Include costs for bonds and insurance in Bid.
- D. Attorneys-in-Fact who sign bonds shall file with each bond a certified copy of their Power of Attorney, with effective date.

#### **PART 2 PRODUCTS**

Not Used.

#### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

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## SECTION 00 72 00

### GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

#### PART 1 GENERAL

##### 1.01 GENERAL CONDITIONS

- A. General Conditions are AIA Document A201-2017, General Conditions of the Contract for Construction. Free sample previews of the document are available at [www.aiacontracts.org](http://www.aiacontracts.org).
- B. Terms *Architect*, *Engineer*, and *Architect/Engineer* are used interchangeably.

#### PART 2 PRODUCTS

Not Used.

#### PART 3 EXECUTION

Not Used.

**END OF SECTION**

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## SECTION 00 73 00

### SUPPLEMENTARY CONDITIONS

#### PART 1 GENERAL

##### 1.01 SUPPLEMENTARY CONDITIONS

- A. The following supplementary conditions modify provisions of AIA Document A201-2017, General Conditions of the Contract for Construction. Free sample previews of that document document are available at [www.aiacontracts.org](http://www.aiacontracts.org) Unaltered portions of the General Conditions remain in effect.

##### **Article 1 General Provisions**

Add Subparagraphs 1.1.3.1, 1.1.3.2, 1.1.3.3, and 1.1.3.4.

- 1.1.3.1 **Furnish:** Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- 1.1.3.2 **Install:** Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- 1.1.3.3 **Provide:** Furnish and install, complete and ready for intended use.
- 1.1.3.4 **Rules and Regulations** shall include conventions and agreements within construction industry that control performance of Work.

Add Subparagraph 1.2.4.

- 1.2.4 Sections of Division 01 - General Requirements expand on provisions of these General Conditions and govern the execution of the Work of all sections of the Specification.

Add Subparagraph 1.4.1.

- 1.4.1 Where phases such as "as selected," "as approved," "or equal, " or "or approved equal" are used, it is understood that the selecting or approving party is the Architect/Engineer, unless another is party specifically designated by the Owner.

Add Subparagraph 1.5.3.

- 1.5.3 Any unauthorized use of the Instruments of Service by the Contractor, Subcontractors, Sub-subcontractors, or suppliers shall be at that party's sole risk and that party shall indemnify Architect/Engineer for any liability or legal exposure to Architect/Engineer related to the unauthorized use.

Delete Paragraphs 1.7 and 1.8 and add the following:

- 1.7 -Not Used-
- 1.8 -Not Used-

##### **Article 2 Owner**

Delete Subparagraph 2.3.2 and add the following:

- 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number. The terms "Architect," "Architect/Engineer, " and "Engineer" are used interchangeably.

### **Article 3 Contractor**

Add Subparagraph 3.1.4.

- 3.1.4 *The Contractor is responsible for all obligations related to the Work unless the obligation is specifically attributed to the Owner.*

Add the following to Subparagraph 3.2.2.

- 3.2.2.1 *The Contractor shall not scale drawings to determine dimensions. It is the Contractor's responsibility to verify all field dimensions or request additional information from the Architect when areas cannot be field measured.*
- 3.2.2.2 *The Contractor shall report to the Architect/Engineer any specified Work that, in the opinion of the Contractor, cannot reasonably be constructed as specified.*

Delete Subparagraph 3.5.2 and add the following.

- 3.5.2 *All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner or shall be transferrable to the Owner, shall commence in accordance with Section 9.8.4, and shall not be limited by the period for correction of work established in Paragraph 12.2.*

Add Subparagraph 3.6.1.

- 3.6.1 *The Owner is a tax-exempt organization and is exempt from sales tax on products permanently incorporated in the Work. When making purchases, the Contractor shall certify in writing on the invoice or sales ticket copy to be retained by the vendor that purchases were made for and on behalf of the Owner. The Contractor shall furnish copies of the invoices or sales tickets to the Owner and shall provide separate amounts for labor and materials on the monthly payment requests."*

### **Article 4 Architect**

Delete Subparagraph 4.1.2 and add the following.

- 4.1.2 *Duties, responsibilities, and limitations of authority of the Architect/Engineer as set forth in the Contract Documents may be restricted, modified, or expanded by the Owner and Architect/Engineer without the consent of the Contractor. The Contractor shall be notified of any changes to the duties, responsibilities, or limitations of authority of the Architect/Engineer.*

### **Article 5 Subcontractors**

Add Subparagraph 5.3.1.

- 5.3.1 *Each Subcontractor shall indemnify and hold harmless the Owner, Architect/Engineer, Architect/Engineer's consultants, and agents and employees of any of them, per Paragraph 3.18, to the extent of the Work to be performed by the Subcontractor.*

### **Article 9 Payments and Completion**

Add Subparagraph 9.3.4.

- 9.3.4 *The application for payment form shall be AIA Document G702-1992, Application and Certification for Payment (or a similar form agreed upon by the Owner and Architect), supported by AIA Document G703-1992, Continuation Sheet (or a similar form agreed upon by the Owner and Architect). The first payment application shall include the Contractor's*

*partial waiver of lien for the payment amount. Each subsequent payment application shall include the Contractor's partial waiver of lien for the payment amount and partial waivers of lien of Subcontractors and material suppliers who were included in the immediately preceding payment application, to the extent of that payment. The application for final payment shall include final waivers of lien from the Contractor, Subcontractors, and material suppliers who have not previously furnished final waivers.*

## **Article 10 Protection of Persons and Property**

Add the following to Subparagraph 10.2.6.

*The responsible person shall conduct regularly scheduled meetings with Subcontractors and, in the event of Separate Contracts, with other Contractors to promote compliance with governing safety regulations.*

Add Paragraph 10.5 including Subparagraphs 10.5.1 and 10.5.2.

### **10.5 Use and Control of Moisture**

*10.5.1 The Contractor shall control moisture from construction activities or due to temporary demolition during construction and prevent such moisture from creating or contributing to conditions conducive to deterioration of materials or biological growth. This includes providing temporary weather protection of work areas to reasonably prevent weather from entering the interior or damaging components to remain.*

*10.5.2 The Contractor shall control water runoff and shall not allow contaminated water or debris to enter storm sewers. The Contractor shall comply with local, state, and federal laws and ordinances regarding water runoff*

## **Article 11 Insurance and Bonds**

Add Subparagraph 11.1.4.

*11.1.4 Within three (3) business days of the date the Contractor becomes aware of any impending or actual cancellation of any insurance or substantial change in coverage required by Section 11.1, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide the required coverage throughout the project duration (including statute of limitations period). Upon receipt of the notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. Alternately, the Owner shall have the right, but not the obligation, to independently obtain such insurance. In such case, the Contractor shall repay the Owner immediately upon demand the premium together with interest and all costs and expenses incurred by the Owner without prejudice to any rights or remedies of the Owner under this Agreement. At the Owner's option, all sums due the Owner may be deducted from payments due to the Contractor under this Agreement*

## **Article 12 Uncovering and Correction of Work**

Modify Subparagraphs 12.2.2.1, 12.2.2.2, and 12.2.2.3 as follows:

12.2.2.1 *Change "one year" to "two years" at one location in Line 1. Change "one- year" to "two-year" at one location in Line 7.*

12.2.2.2. *Change "one-year" to "two-year" at one location in Line 1.*

12.2.2.3 *Change "one-year" to "two-year " at one location in Line 1.*

Modify Subparagraph 12.2.5 as follows:

12.2.5 *Change "one-year" to "nm-year" at one location in Line 2.*

## **Article 13 Miscellaneous Provisions**

Add the following to Paragraph 13.6.

*Interest shall not accrue on disputed amounts due until the Owner and Contractor have resolved such dispute.*

## **Article 14 Termination or Suspension of the Contract**

Delete Subparagraph 14.1.1.3 and substitute the following.

14.1.1.3 *Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Subparagraph 9.4.1, or because the Owner has not made payment on a Certificate for Payment certified by the Architect that is undisputed by the Owner within the time stated in the Contract Documents, or*

- B. The following supplementary conditions modify provisions of AIA Document A101 -2017 Exhibit A, Insurance and Bonds. Unaltered portions remain in effect.

Add the following after Subparagraph A.3.2.1 :

*Maintain products-completed operations coverage through statute of limitations for any Project-related claims, including warranty claims.*

Add the following Subparagraph A.3.2.2.3:

*General Aggregate and Per Project Aggregate endorsements shall be added to the General Liability policy.*

A.3.2.2.1 *Commercial General Liability \$1,000,000 each occurrence; \$2,000,000 general aggregate; \$2,000,000 aggregate for products- completed operations hazard*

A.3.2.3 *Automobile Liability \$1,000,000 per accident*

A.3.2.6 *Employer's Liability \$1,000,000 each accident; \$1,000,000 each employee; \$1,000,000 policy limit*

## **END OF SECTION**

## **SECTION 01 10 00**

### **SUMMARY**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Basic description of the Project and Work restrictions.

##### **1.02 SUMMARY OF WORK**

- A. Project Name: Triphahn Center Ice Rink Floor Replacement
- B. Description of Work: Project consists of the demolition and replacement of a 85 ft. by 200 ft. refrigerated, concrete surface rink floor; thawing of frozen soil beneath the existing rink floor; removal, reinstallation, and minor renovations to existing ice rink dasher boards; and associated mechanical work.

##### **1.03 PREVAILING WAGE REQUIREMENTS**

- A. The Hoffman Estates Park District adopted Ordinance O18-005 ascertaining the prevailing rate of wages in accordance with the Prevailing Wage Act, 820 ILCS, at a meeting of the Park Board on the 26th day of June 2018. The original Ordinance, which lists the applicable prevailing rate of wages, is a part of the official records of the Park District and is on file and available for examination at the administrative offices of the Park District, Hoffman Estates, Illinois 60169.
- B. Contractor shall comply with the requirements of the Illinois Prevailing Wage Act (820 ILCS 130/0.01 et seq.) and the Park District's Ordinances requiring payment of prevailing wages. Contractor shall pay or cause to be paid not less than the prevailing rate of hourly wage in the county the work is performed as determined by the Illinois Department of Labor for the month in which the work is performed including but not limited to all laborers, workers and mechanics. All contractors and subcontractors rendering services under this contract must comply with all requirements under the Act, including but not limited to, all wage, notice and record keeping duties.
- C. Contractor is required to verify current prevailing wage prior to the first day of each month and to pay the then-current prevailing wage rate as determined by the Illinois Department of Labor, regardless of the rates contained in the Ordinance or the Contract Documents. Any increases in costs to the Contractor due to the changes in the prevailing wage during the term of this Contract shall be at the expense of Contractor and not at the expense of Owner.
- D. Contractor agrees to indemnify and hold harmless the Park District for any violations of the Prevailing Wage Act.
- E. Contractor shall: (1) insert into each subcontract and the project specifications for each subcontract, a written stipulation that the subcontractor shall not pay less than the

prevailing rate of hourly wage to all laborers, workers, and mechanics performing work under the contract; and (2) require each subcontractor to insert into each lower-tiered contract and the project specifications for each lower-tiered subcontract, a stipulation that the subcontractor shall not pay less than prevailing rate of hourly wage to all laborers, workers, and mechanics performing work under the contract.

- F. Contractor shall include on all bonds and shall cause all subcontractors' bonds required under the Contract Documents to guarantee compliance with the Prevailing Wage Act.
- G. Contractor and each subcontractor shall make and keep, for a period of not less than three years from the date of the last payment on a contract or subcontract, records of all laborers, mechanics, and other workers employed by them on the Project; the records shall include each worker's name, address, telephone number when available, social security number, classification or classifications, the hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending times of work each day. Contractor shall submit monthly, no later than the 10th day of each calendar month, in person, by mail, or electronically a certified payroll to the Park District with each monthly pay request in the form attached to the Contract Documents. The certified payroll shall be accompanied by a statement signed by the Contractor or subcontractor which states that: (i) he or she has examined the certified payroll and such records are true and accurate; (ii) the hourly rate paid to each worker is not less than the general prevailing rate of hourly wages required by this Act; and (iii) the Contractor or subcontractor is aware that filing a certified payroll that he or she knows to be false is a Class A misdemeanor. Contractor may rely on the certification of a lower tier subcontractor, provided the Contractor does not knowingly rely upon a subcontractor's false certification. The records submitted in accordance with this payroll submittal provision shall be considered public records pursuant to Section 5 of the Prevailing Wage Act, 820 ILCS 130/5 (2004, as amended by P.A. 94-515). The Park District may, at its option, immediately terminate the Contract in the event that Contractor violates any provision of this paragraph or the Prevailing Wage Act.
- H. Contractor shall post the prevailing wage rates for each craft or type of worker or mechanic needed to complete the project at either: (1) a location on the project site easily accessible to the workers engaged on the project; or (2) in lieu of posting on the project site, if the Contractor has a business location where laborers, workers, and mechanics may regularly visit, the Contractor may either post the prevailing rate of wages in each county the Contractor works in a conspicuous location or provide the laborers, workers or mechanics engaged on the project a written notice indicating the prevailing rate of wages for the project.
- I. Upon seven business days notice, Contractor and each subcontractor shall make available for inspection and copying at a location within this State during reasonable hours, the records identified in 820 ILCS 130/5(a)(1) to the Owner, its officers and agents.

#### 1.04 COMPLETION DATES

- A. Substantial Completion Date: Friday, August 31, 2019.
- B. Final Completion Date: Friday, October 11, 2019.

## 1.05 WORK RESTRICTIONS

### A. Use of Site:

1. Location of construction facilities, staging areas, product stockpiles, material storage, and temporary construction:
  - a. Will be provided on the Project site inside the existing building or on paved parking lots adjacent the building.
  - b. Contractor is responsible to provide storage facilities, trailers, security fencing, etc. An area of parking lot approximately 75' x 260' in size shall be completely surrounded by a 6 ft height temporary chain link fence with minimum two large lockable equipment gates.
  - c. Shall be reviewed with and approved by the Owner at the preconstruction meeting prior to start of the Work.
  - d. Temporary facilities shall be removed upon completion of the Work.
2. All Work shall be within the affected property limits:
  - a. If Contractor wishes to use additional areas outside the property limits for construction purposes, they shall be solely responsible for all expenses associated with such use.
  - b. Contractor shall provide written proof of permission to utilize lands outside property limits to both Owner and Engineer prior to using such lands.
3. Adjacent private and public properties:
  - a. No trespassing on adjacent private or public properties.
  - b. Keep construction debris from entering adjacent properties.
  - c. Respect the rights of the public and adjacent property owners, especially those living in residential properties affected by the Work:
    - 1) Prohibit use of foul or objectionable language.
    - 2) Avoid display of offensive materials.
    - 3) Treat residents courteously during interactions.
4. Working hours for any work outside the building shall comply with Village of Hoffman Estates noise ordinance of 7:00 A.M. to 7:00 P.M. Monday through Friday, and 8:00 A.M. to 6:00 P.M., Saturday and Sunday, unless written authorization is granted by the Owner and by the Village of Hoffman Estates:
  - a. Includes starting of outdoor machinery in morning for warm-up period.
  - b. Includes use of equipment for loading or unloading of delivery vehicles.

## 1.06 OTHER WORK AT SITE

- A. The replacement of the roofing system at Triphahn Center will occur concurrently with the proposed ice rink replacement work. Contractor shall maintain access for others working on the Project Site to maximum extent feasible.
- B. Contractor shall not perform their operations in a way to hinder or delay improvements made by others under separate projects. Contractor is responsible for coordination as necessary with other Contractors in regards to access, scheduling, utility interruptions, etc.

## 1.07 ARENA AND COMMUNITY CENTER OPERATIONS

- A. The existing north ice rink as well as the adjacent Community Center will remain in full operation throughout the duration of this project. Contractor's operations shall not interfere with the ongoing public activities.
- B. Contractor's employees shall fully cooperate with the Owner's staff and shall adjust scheduling of activities that are loud, dusty, or could otherwise interfere with the ongoing public activities.
- C. Contractor's deliveries and construction routes shall occur to the rear of the building to minimize interaction with the public.
- D. Owner's staff will construct a temporary partition wall inside the ice resurfacer room to separate ongoing ice resurfacing operations from the access travel route necessary for the demolition and construction work. The ice resurfacer that normally is used for the south rink will be removed and stored off-site during the construction period.
- E. Scheduled shutdowns of electricity to the facility and refrigeration system, if required, shall be scheduled to occur when the facility is closed to the public, and shall be no longer than 3 hours duration to minimize effect on the remaining ice sheet.

### **PART 2 PRODUCTS**

Not Used.

### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**



**SECTION 01 20 00**  
**PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Request for payment procedures.

**1.02 PAYMENT PROCEDURES**

- A. Contractor shall estimate and record construction quantities and shall prepare one signed progress payment application for approval by the Owner per month during the active course of the Work. Contractor shall also provide updated construction schedule consistent with Section 01 33 00
- B. Engineer will review the progress payment application, and either sign to signify approval or return to the Contractor for revision.
- C. Engineer will submit the Contractor's progress payment application to the Owner with recommendation for payment.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

**END OF SECTION**

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## **SECTION 01 31 00**

### **PROJECT MANAGEMENT AND COORDINATION**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes:
  - 1. General requirements for overall Project coordination.

##### **1.02 UTILITIES**

- A. Notify JULIE, Inc. (Illinois One Call System) before starting construction or excavation in a given area to request exterior utility locates on the Site. Notify the Owner to locate private utilities on the Site.
- B. Owner requires a 48-hour notice for all utility service interruptions.
- C. Contractor is responsible for the disconnection and reconnection of electric, water, and natural gas to existing equipment if required for demolition or construction.

##### **1.03 PERMITS**

- A. Building permit shall be applied for and obtained by the Contractor from the Village of Hoffman Estates. The Village has waived building permit fees on past Park District projects, however Contractor shall verify whether there will be permit fees for this project and shall include any fees in their Bid.
- B. Apply for, obtain, pay for, and comply with any other utility, structural, mechanical, electrical, and refrigeration permits, licenses, and approvals that may be required for the Project.

##### **1.04 PROJECT MEETINGS**

- A. Administrative Requirements
  - 1. Project Superintendent or persons designated by the Contractor to attend and participate in the Project meetings shall have all required authority to commit the Contractor to solutions agreed upon in the Project meetings.
  - 2. Owner/Engineer will set the time, sites, and prepare the agenda for the meetings.
  - 3. The attendance and cooperation of subcontractors and suppliers may be required.
- B. Preconstruction Conference
  - 1. Meeting date to be determined.
  - 2. Requirements for preconstruction submittals are set forth in the General Conditions. Submittal procedures shall be consistent with Section 01 33 00.

C. Progress Meeting Procedures

1. Owner/Engineer may schedule construction progress meetings throughout the duration of the Project to assess the progress of the Work, to identify and discuss Project related issues, and to discuss near-term construction activities.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

Not Used.

**END OF SECTION**

## **SECTION 01 33 00**

### **SUBMITTAL PROCEDURES**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes
  - 1. General procedures and requirements for submittals during the course of construction.

##### **1.02 SEQUENCING AND SCHEDULING**

- A. Schedule submittals consistent with the Contractor's schedule of shop drawings.

#### **PART 2 PRODUCTS**

Not Used.

#### **PART 3 EXECUTION**

##### **3.01 CONSTRUCTION SCHEDULE**

- A. Submit preliminary schedule at preconstruction meeting.
- B. Prepare schedules on 11 inch by 17 inch sheets showing overall sequence of construction. Organize the schedule by work activity. Identify separate stages of each work activity.
  - 1. List work items in chronological sequence. Show beginning and completion dates of each activity. Include all activities with an estimated duration of 3 days or longer.
  - 2. Format schedule as a horizontal bar chart. Provide separate bars for each activity or trade.
  - 3. Provide space for revisions and notations.
  - 4. Identify interrelations between activities.
  - 5. Include estimated times for preparation of submittals by Contractor, processing and review of submittals by Engineer, fabrication, delivery, installation, testing, start-up, instruction of Owner, and clean-up.
- C. As Work progresses, revise, update, and resubmit schedule as requested by Engineer. At a minimum, update schedule with each Application for Payment. Show all activities started or finished since previous schedule was submitted and show percentage of completion for each activity.

##### **3.02 COST BREAKDOWN OF CONTRACT**

- A. Upon completion of the initial construction schedule, the Contractor shall within 10 working days establish a dollar value for each cost-related activity identified in the construction schedule.

- B. Dollar values shall total the Contract Amount and breakdown shall be subject to approval of Owner/Engineer. Upon, approval, this breakdown shall be considered the approved itemized breakdown of costs for the Contract.
- C. Dollar values of cost-related activities shall be updated as the construction schedule is updated as described above to show an accurate dollar value completed during progression of the work.

### 3.03 SUBCONTRACTOR LIST

- A. Prepare and submit a complete list of all subcontractors. Include the subcontractors name, address, telephone number, and contact person.
- B. The subcontractor list shall be submitted prior to award of the Contract, but after the Bid Date.

### 3.04 SUBMITTAL LIST

- A. Prepare and submit a complete and comprehensive schedule of all submittals anticipated to be made during this Project. This list is due prior to the first request for payment.
- B. Include a list of each item for which Contractor's drawings, shop drawings, product data, samples, guarantees, or other types of submittals are required.

### 3.05 EMERGENCY CONTACT LIST

- A. Before any Work at the Site is started, submit a typed list on 8.5 inch by 11 inch paper outlining 24-hour on-call contacts for the Project. This list shall include the Contractor's safety representative, key representatives from the Contractor, subcontractors, and suppliers. Include the following information for each contact:
  - 1. Company name.
  - 2. Contact person(s) name.
  - 3. Local and mobile phone numbers.
  - 4. Fax number.
  - 5. E-mail Address.

### 3.06 SHOP DRAWINGS AND MANUFACTURERS' INFORMATION

- A. Conform to the requirements of the General Conditions, except as modified herein.
- B. The minimum sheet size shall be 8.5 inches by 11 inches. Non-legible copies will not be reviewed.
- C. Submit a minimum of 3 copies of shop drawings, plus the quantity of copies the Contractor wants returned. Each copy shall contain the following information:
  - 1. Date of submission and date of any previous submittals.
  - 2. Project Title.
  - 3. Names Of: Contractor, subcontractor, supplier, and manufacturer.
  - 4. Identification of product and Specification Section number.
  - 5. Identification of revisions from previous submittals.
  - 6. A 4 inch by 4 inch blank space for the Owner's stamp.

- D. Engineer's review will be in conformance with the requirements of the General Conditions, except as modified herein.
- E. Engineer will stamp shop drawings and indicate requirements for Contractor's review or resubmittal as follows:
  - 1. "Reviewed" – Appears that items covered by the submittal will, after installation or incorporation into the Work, conform to the Contract Documents and appears to be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
  - 2. "Reviewed as Noted" – Appears that items covered by the submittal will, after installation or incorporation into the Work, conform to the Contract Documents and appears to be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, except as noted by Owner.
  - 3. "Revise and Resubmit" – Appears that items covered by the submittal will not, after installation or incorporation into the Work, conform to the Contract Documents and will not be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Work cannot proceed until the submittal is revised and resubmitted conforming to the resubmittal procedures described in the General Conditions.
  - 4. "Seal and Signature Required" – Contractor's review, seal, and signature are required before the submittal can be reviewed by the Engineer.
- F. Engineer will return reviewed submittals to Contractor by U.S. Postal Service general delivery. If Contractor requests Engineer to expedite return delivery, Contractor shall notify Engineer in writing and reimburse Owner for delivery cost plus 15-percent mark-up.

### 3.07 OPERATION AND MAINTENANCE MANUALS

- A. Conform to the requirements of Section 01 78 23.

### 3.08 SAMPLES

- A. Samples shall be clearly identified as to project, contractor, manufacturer, specification section, product, type, color range, texture, finish and other identifying data.
- B. Samples shall be accompanied by a letter of transmittal with the Contractor's approval and other supporting information.
- C. Submit two samples of each item required, unless otherwise specified. The Owner will retain one approved sample and the Engineer will retain one.

### 3.09 TEST REPORTS

- A. Submit three copies of all inspections, tests, and approvals required in the Specification.

### 3.10 MATERIAL AND SAFETY DATA SHEETS

- A. Furnish Owner with current copies of Material Safety Data Sheets for all chemicals and products on Site.

### 3.11 WARRANTIES

- A. Conform to the requirements of Section 01 78 36.
- B. Submit written copies of warranty documents to Owner prior to project Final Completion.  
Warranty documents shall include warranty start and end dates.

**END OF SECTION**



## **SECTION 01 40 00**

### **QUALITY REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Information required for conformance to regulatory requirements.
- B. Quality assurance.
- C. Procedures to measure and report the quality and performance of the Work.

##### **1.02 SUBMITTALS**

- A. Submit copies of laboratory test results or analysis consistent with Section 01 33 00.

#### **PART 2 PRODUCTS**

Not Used.

#### **PART 3 EXECUTION**

##### **3.01 WORKMANSHIP**

- A. Comply with industry standards of the region, except where more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

##### **3.02 TESTING LABORATORY SERVICES**

- A. Cooperate with the Owner-approved testing laboratory and all others responsible for testing and inspecting the work.
- B. The Contractor shall arrange and pay for all specified testing services. See Technical Specification Sections for detailed testing requirements.
- C. When the initial tests indicate noncompliance with the Contract Documents, all subsequent retesting shall be performed by the same testing agency and the costs for retesting shall be paid by the Contractor.

##### **3.03 TESTING STANDARDS**

- A. Tests shall be provided and accomplished in accordance with the standard used as the reference for the particular material or product, unless other test methods or criterion are specified. In the absence of a reference standard, tests shall be accomplished in accordance with applicable ASTM Standards of Test Methods.

### 3.04 QUALIFICATION TESTING

- A. In addition to tests specified, should the Contractor propose a product, material, or method of assembly that is of unknown quality to the Engineer, the Engineer may require and order suitable tests to establish a basis for acceptance or rejection. Such tests will be paid by the Contractor or by the subcontractor requesting approval. "Standard" test reports or reports on "similar" material will not be accepted.
- B. The Owner and Engineer reserve the right to require certification or other proof that the material, assembly, equipment, or other product proposed to be furnished for this Project is in compliance with any test or standard called for. The certificate shall be signed by a representative of the independent testing laboratory or a responsible official of the firm supplying the product, as acceptable to the Owner and Engineer. The certificate shall be a sworn statement and shall be notarized.
- C. Any tests required to qualify the Contractor or any of their workmen for any phase of the work and any test of a method, system, or equipment that may be required by Specification or law to qualify the item use, shall be made or taken without cost to the Owner or Engineer.

### 3.05 INSPECTIONS

- A. Should Specifications, Engineer's instructions, laws, ordinances, or any public authority require any work to be inspected or approved, Contractor shall give timely notice of its readiness for inspection and a reasonable date fixed for such inspection. If any work should be covered up without approval or consent of approving agency or Engineer, it must be uncovered for examination at Contractor's expense.

### 3.06 MANUFACTURER'S CERTIFICATES

- A. If requested by Engineer, submit manufacturer's certificate with shop drawings certifying that products meet or exceed specified requirements executed by responsible officer.

### 3.07 MANUFACTURER'S FIELD SERVICES

- A. Provide qualified representative to observe field conditions; conditions of surfaces and installation; quality of workmanship; start-up of equipment; and test, adjust, and balance of equipment.

## END OF SECTION

**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes
  - 1. Temporary utilities and miscellaneous temporary facilities required during construction.

**1.02 SUBMITTALS**

- A. Construction Staging Plan consistent with Section 01 33 00, including the following information:
  - 1. Sequence of construction.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

**3.01 MOBILIZATION**

- A. Move personnel, equipment, materials, and all other items required to complete the Work at the Site.
- B. Establish Contractor offices, trailer, or other facilities necessary for Work on the Project, if required.

**3.02 TEMPORARY UTILITIES**

- A. Provide and maintain all temporary facilities, utilities, and controls as long as needed for the safe and proper completion of the Work. Remove all temporary facilities, utilities, and controls as rapidly as progress will permit or as directed by the Owner/Engineer.
- B. Temporary Water for Construction
  - 1. Cold domestic water is available for the Contractor's use.
  - 2. Owner will pay the utility cost of the water.
- C. Temporary Electricity
  - 1. Existing permanent electric service is available for the Contractor's use. Owner will pay the utility cost of the electricity.
  - 2. If permanent electric service is inadequate for construction activities, provide all necessary temporary electric service (generator) and temporary wiring needed for construction activities. Contractor shall pay for all temporary electricity and fuel if required.

D. Temporary Heating

1. Provide and pay for temporary heating of outdoor spaces if required. Owner will pay costs to operate and maintain existing indoor permanent heating systems.

3.03 SANITARY FACILITIES

A. Sanitary Facilities

1. Existing restroom facilities located in each of the four Team Rooms adjacent the South Rink will be available for the Contractor's use. Contractor shall clean restrooms used on a weekly basis and at the end of the project, and shall provide toilet paper, paper towels, soap, and any other supplies needed.

3.04 CONTRACTOR'S OFFICE

A. Provide and maintain an office at the Site for the duration of the Project.

1. Keep one complete set of Contract Documents, one copy of all approved shop drawings, and one complete set of up-to-date Record Drawings in the field office for use by the Engineer and Owner.
2. Maintain telephone service to the field office/job superintendent for the use of Contractor, suppliers, and subcontractors. Pay for all costs of the telephone service. Telephone may be hard-wired or cellular.
3. Contractor's office may be a trailer furnished by the Contractor, or Contractor may utilize the Referees Room adjacent the South Rink for their office space.

3.05 TEMPORARY BARRIERS AND ENCLOSURES

A. Temporary Barriers

1. Provide temporary covers, enclosures, and barriers as necessary to protect work.
2. Damage caused by the Contractor, shall be promptly repaired by Contractor. At no time shall the work remain unattended if a dangerous condition exists.
3. See Section 02 41 19 – Selective Demolition for additional requirements.

3.06 TEMPORARY STAIR, LADDERS, RAMPS, RUNWAYS

A. Provide and maintain all equipment, such as temporary stairs, ladders, ramps, runways, chutes, as required for the proper execution of the work.

B. All such apparatus, equipment, and construction shall meet all requirements of OSHA and other state or local laws applicable thereto.

3.07 ACCESS TO SITE

A. Coordinate with the Owner. The Contractor shall be responsible for any damage to all areas and adjacent areas due to delivery of construction material or equipment, construction activities, etc. at no cost to the Owner.

3.08 SECURITY

A. Provide temporary enclosures required for protecting the Project, for providing passageways, for the protection of openings both exterior and interior, and any other location where temporary enclosures and protection may be required.

- B. Take adequate precautions against fire. Keep flammable material at an absolute minimum and ensure that such material is properly handled and stored. Do not permit fires to be built or open salamanders to be used in any part of the work.

**END OF SECTION**

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## **SECTION 01 60 00**

### **PRODUCT REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes
  - 1. Basic requirements for products used in the Work.

##### **1.02 SUBMITTALS**

- A. Submit the following items consistent with Instructions to Bidders:
  - 1. Written request for approval with supporting documentation.
- B. Submit the following items consistent with Section 01 33 00:
  - 1. Shop drawings for named products and “or-equal” products.

##### **1.03 PRODUCT “OR-EQUAL” PROCEDURES**

- A. Procedures During Bidding
  - 1. Conform to the requirements of the Instructions to Bidders.
- B. Procedures During Construction
  - 1. Scheduling of Submittals: Conform to the Contractor’s Schedule of Submittals.
  - 2. Submittal Procedures: Conform to the requirements of Section 01 33 00.
  - 3. Engineer and Owner will review “Or Equal” requests that conform to General Conditions requirements and the following additional supporting documentation:
    - a. Drawings and Specifications.
    - b. Installation lists.
    - c. Performance data, including equipment capacity, strengths, weights, and dimensions.
    - d. Catalog cut-sheets.
    - e. Lists of deviations from and exceptions to the Specifications.
    - f. Detailed information for all buy-out items, including motors and drives.
    - g. Lists of materials of construction.
    - h. Maintenance schedules of equipment, including buy-out items.
    - i. Other information deemed necessary at the discretion of Engineer and Owner.
  - 4. Incomplete submittals will be returned to Contractor without review.
  - 5. Contract times will not be modified due to “or-equal” review process.
  - 6. Owner shall not have to prove that an item is not an “or-equal.”
- C. If an “Or Equal” is allowed, the Contractor shall bear full responsibility for fitting that item into the Project and shall make any necessary adjustments. No extra payment shall be made for extra work made necessary by an “Or Equal” item requested by the Contractor.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

### **3.01 DELIVERY**

- A. Transport and handle products in accordance with the manufacturer's instructions.
- B. Handle and lift products only at designated lift points and by methods to avoid soiling, disfigurement, bending, over stressing, and damage.
- C. Store products on shelves, in bins, or in neat groups of like items with seals and labels intact and legible, and in a manner to provide access for maintenance and inspection.
- D. Store loose granular materials on clean, solid, flat surfaces, and prevent mixing with foreign matter. Store fabricated products supported above the ground on skids or blocking. Provide surface drainage to prevent erosion and ponding of water.
- E. Cover products subject to discoloration or deterioration with impervious sheet covering and protect products from soiling and staining.
- F. Store and protect products which are subject to damage by the elements in weathertight, climate-controlled enclosures, and according to the manufacturer's instructions. Maintain temperature, and humidity within ranges stated in the manufacturer's instructions.
- G. Attach applicable manufacturer's service instructions labeled "STORAGE SERVICE INSTRUCTIONS ENCLOSED" to exterior of each stored product.
- H. Inspect, maintain, and service stored products on a regularly scheduled basis, consistent with the manufacturer's instructions.
- I. Record inspection, maintenance, services performed, and keep log available for review.
- J. Traffic control required for all deliveries to and from the Site shall be the responsibility of the Contractor.

### **3.02 STORAGE AND HANDLING**

- A. Protect from damage all materials and equipment to be used in the completed facility.
- B. The Contractor shall provide the Owner with keys or combinations to any locks that may be used.
- C. Storage areas and hazardous areas shall be protected by use of warning tape around the perimeter of the area.

**END OF SECTION**



## **SECTION 01 70 00**

### **EXECUTION REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes
  - 1. Requirements for overall execution of the Work and closeout of the Contract for Final Payment.

##### **1.02 SUBMITTALS**

- A. Submit the following items consistent with the Conditions of the Contract and Division 01 Sections:
  - 1. Record Documents.
  - 2. Written Notification of Substantial Completion.
  - 3. Executed Certificate of Substantial Completion.
  - 4. Written Notification of Final Completion.
  - 5. Spare Parts, Operation and Maintenance Manuals, instructions, schedules, warranties, guarantees, Bonds, certificates, certificates of inspection, and other documents.
  - 6. Final Application for Payment, including accompanying documentation.

#### **PART 2 PRODUCTS**

Not Used.

#### **PART 3 EXECUTION**

##### **3.01 EXAMINATION**

- A. Acceptance of Conditions: By commencing Work, Contractor construes acceptance of the adjacent work as satisfactory to receive subsequent work.
- B. Existing Conditions: Before commencing Work, inspect work completed by others that is adjacent to Work. If adjacent conditions prevent completion of Work, Contractor will not commence Work until the conditions are corrected.
- C. Inspect each product immediately prior to installation. Remove damaged products from Site.

##### **3.02 PRECONDITION SURVEY**

- A. Assess the pre-construction conditions of the walls, floors, ceilings, utilities, ductwork, existing equipment and other structures potentially influenced by the construction activities. Prepare video logs, still photographs, field observations, survey notes and other documents as required to accurately document the Site conditions immediately prior to the start of construction.

### 3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with the manufacturer's instructions for installation of manufactured products to the extent that these instructions are applicable and more explicit or more stringent than requirements indicated in the Contract Documents.
- B. Secure Work true to line and level, within recognized industry tolerances, with anchorage devices designed and sized to withstand stresses, vibration, and rocking. Allow for expansion and movement of building.
- C. Install each element of work during weather conditions and Project status to ensure coordination of the Work. Isolate each element of work from incompatible work as necessary to prevent deterioration.
- D. Coordinate space requirements and installation of work indicated on Drawings. Follow routing shown for pipes, ducts, and conduit; place runs parallel with line of building where specific routes are not shown on drawings. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and repairs.
- E. Mount individual units of work at industry recognized standard-mounting heights for the particular application indicated, where mounting heights are not indicated.
- F. Conceal pipes, ducts, and wiring within the construction in finished areas, except as otherwise indicated. Coordinate locations of fixtures and outlets with finish elements.
- G. Record installation details and prepare Record Documents consistent with the General Conditions.

### 3.04 EQUIPMENT VARIATIONS

- A. Contractors are advised that because of manufacturer's variations in equipment design changes from Drawings in piping arrangement and layout, electrical and control from Drawings in piping arrangement and layout, electrical and control circuitry, and related dimensions of equipment foundation and anchorage details, may be required for equipment installations.
- B. Equipment requiring minor deviations in the system layout, such as minor piping revisions, will be acceptable; however, the Contractor shall include all costs associated with the deviation in their Bid. Should the deviation require revisions in the design of the facility, the Contractor shall reimburse the Owner for the cost of any redesign.
- C. Electrical and mechanical piping, conduits, and ducts are shown schematically and shall be located by the Contractor to avoid any conflicts. Contractor shall coordinate work of all subcontractors and make minor relocations as necessary at no change to the Contract Price.

### 3.05 SITE MAINTENANCE

- A. Maintain stockpiles, excavations, and all other work areas free from dust. Employ dust abatement techniques whenever a dust nuisance or hazard occurs, or as directed by Owner/Engineer. Comply with local ordinances.

- B. Protect hazardous work areas and hazardous material storage areas.
- C. Protect trees, shrubs, and turf as required.
- D. Clean haul routes with mechanical street sweeper.
- E. If Contractor fails to maintain Site, Engineer will provide Written Notice of Contractor's defective Work. Contractor will be given 12 hours from the Notice to clean Site. After the 12-hour period, Owner may correct the defective Work and deduct costs from the Contract amount.

### 3.06 CLEANING AND PROTECTION

- A. Clean and protect Work in progress and adjoining Work during handling and installation. Apply protective covering on installed Work where it is required to ensure freedom from damage or deterioration.
- B. Clean and perform maintenance as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure operability without damage effects.

### 3.07 FINAL CLEANING

- A. Prior to inspection for Substantial Completion of the work, remove all waste material and rubbish from the building and Site, remove all protective coatings, barriers, and other protective devices, all temporary work and surplus materials.
- B. Provide final cleaning of all interior areas, including sweeping, floor mopping, and cleaning of glass, masonry, and metal surfaces.

### 3.08 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the Site in a clean and orderly condition.
- B. Provide containers with lids. Dispose of waste off the Site periodically.

### 3.09 CUTTING AND PATCHING

- A. Complete all cutting, fitting, and patching as necessary to join the new Work to existing conditions.
- B. Remove or cut existing work only as necessary to join the new Work to the existing construction or as required by the Contract Documents.
- C. Patch defective and incomplete surfaces caused or exposed by Work of the Project.
- D. Repair any damage to existing conditions and patch to match.

- E. Existing construction designated by the Contract Documents to remain that is loosened, cracked, or otherwise damaged or defaced beyond repair as a result of Work by the Contractor will be considered unsuitable for the use intended and shall be removed and replaced by the Contractor.

### 3.10 REINSPECTION FEES

- A. If the Engineer is required to perform re-inspections due to failure of the work to comply with the claims of status of completion made by the Contractor due to problems with the methods or materials of construction:
  - 1. Owner will compensate Engineer for such additional services.
  - 2. Owner will deduct the amount of such compensation from the Final Payment to the Contractor.

### 3.11 SPECIAL TOOLS

- A. Provide any special tools, jigs, fixtures, and lifting tackle which are necessary for assembly, erection, operation, maintenance, and repair of equipment.
- B. Special tools and devices are those the design, purpose, and use of which are peculiar to the equipment furnished and which are not available from normal wholesale or retail outlets. Standard general purpose tools are not included in this requirement.

### 3.12 SPARE PARTS

- A. Required spare parts are listed under the individual Specification Sections.

## **END OF SECTION**

## **SECTION 01 78 23**

### **OPERATION AND MAINTENANCE MANUALS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. General procedures and requirements for Operation and Maintenance Manuals.

##### **1.02 SEQUENCING AND SCHEDULING**

- A. Schedule submittals consistent with Contractor's schedule of submittals.
- B. Operation and Maintenance Manuals must be approved before placing equipment into operation.

#### **PART 2 PRODUCTS**

Not Used.

#### **PART 3 EXECUTION**

##### **3.01 SUBMITTAL PROCEDURES**

- A. Submit two sets of Operation and Maintenance Manuals for review by the Engineer. Engineer will review and return one set to the Contractor marked "Approved," "Make Noted Corrections," or "Amend and Resubmit." After the Operation and Maintenance Manuals have been corrected, submit three final sets as outlined below.
- B. Submit three approved and final sets of detailed equipment drawings and explicit instructions on the operation and maintenance of each piece of equipment furnished on the Project.

##### **3.02 OPERATION AND MAINTENANCE MANUALS**

- A. Manuals are required for all equipment, accessories, devices, etc. that require adjustment, maintenance, operation, or repairs by the Owner's personnel. Manuals for this project shall be provided only for the subsoil heat exchanger, the new subsoil heat pump impellers, and the new curved safety shielding assemblies. All information shall be supplied by the appropriate equipment manufacturers, neatly bound in rigid cover ring type binders by the Contractor, and properly indexed. Each manual shall contain the following information:
  - 1. Operation and Maintenance Manuals shall be clearly identified as operation and maintenance submittal.
  - 2. All performance and design characteristics and unit identification, such as model and serial numbers.
  - 3. All accessories or options furnished with unit.
  - 4. Complete instruction on lubrication, testing, balancing, etc.
  - 5. List of recommended lubricants.

6. Step-by-step instructions for repair or overhaul.
  7. Parts list and parts diagram.
  8. Wiring diagrams for electrically powered items.
  9. Copies of approved/revised shop drawings.
  10. Listing of spare parts the Owner should keep on hand as recommended by the manufacturer.
  11. Name and phone number of local or regional supplier where repair parts or additional information can be obtained.
  12. Temperature control record drawings and narrative on control sequences.
  13. Valve schedules, including numbers and description of each valve referenced to an attached Drawing.
  14. Narrative on controls.
  15. Start-up and shut-down procedures.
  16. Trouble shooting information.
  17. Copies of all warranties.
  18. Records of tests performed to certify compliance with system requirements.
  19. Certificates of inspections by regulatory agencies.
  20. Additional information as indicated in the other Sections of the Specifications.
- B. Each manual shall be specifically for the items actually installed. Where manuals show a number of models or options, the manual shall be clearly marked to indicate what was furnished and which instructions apply to the furnished unit.
- C. Superfluous information pertaining to other models, options, etc. not furnished shall be clearly crossed out or otherwise eliminated. Failure to meet this Section of the Specifications will result in payment reduction.

## **END OF SECTION**

## **SECTION 01 78 36**

### **WARRANTIES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Warranties for the Work of this Project.

##### **1.02 SUBMITTALS**

- A. Table of Contents: Provide neatly typed Table of Contents matching that of the Project Specifications with each item identified with the number and title of the Specification Section in which specified and the name of the product or work item.
- B. Label a cover page with typed or printed title WARRANTIES with title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible principal.
- C. Separate each warranty keyed to the Table of Contents listing. Provide full information using separate typed sheets as necessary. List subcontractor, supplier, and manufacturer with name, address, and telephone number.

##### **1.03 PREPARATION OF WARRANTIES**

- A. Obtain warranties executed in duplicate by responsible subcontractors and suppliers. Leave date of beginning of time of warranty blank until the Date of Substantial Completion is determined.
- B. Verify that documents are in proper form and contain full information.
- C. Co-execute submittals when required.

##### **1.04 DELIVERY**

- A. Within 10 days after Engineer's declared and written confirmation of the Date of Substantial Completion.
- B. For items of work when acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

##### **1.05 LENGTH OF WARRANTY**

- A. Minimum length of all equipment warranties shall extend through the 2-year Warranty Correction Period.
- B. Length of Warranties: Conform to the requirements of the Specifications.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

**END OF SECTION**



**SECTION 01 78 39**  
**PROJECT RECORD DOCUMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General procedures and requirements for Project Record Documents.

**1.02 SUBMITTALS**

- A. At completion of Project, deliver Project Record Documents to the Engineer prior to request for Final Payment.
- B. Accompany submittal with transmittal letter in duplicate containing:
  - 1. Date.
  - 2. Project Title and Project number.
  - 3. Contractor's name and address.
  - 4. Title and number of each record document.
  - 5. Certification that each document as submitted is complete and accurate.
  - 6. Signature of Contractor or his authorized representative.

**PART 2 PRODUCTS**

Not Used.

**PART 3 EXECUTION**

**3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain at the Site one copy of:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. RFI's (Requests for Information) and RFI Responses.
  - 5. Proposal Requests.
  - 6. Change Orders.
  - 7. Reviewed Shop Drawings, Product Data, and Samples.
  - 8. Field Test Records.
  - 9. Other Modifications to the Contract.
- B. Maintain documents in clean, dry, legible condition.
- C. Ensure entries are complete and accurate, enabling future use by Owner.
- D. Record information concurrent with construction progress.
- E. Make documents available for inspection by Engineer and Owner.

F. Record Drawings and Shop Drawings:

1. Required information may, as an option, be entered on a “working set” and then at completion of Project transfer the information to a final submitted “Project Record” set.
2. Legibly mark documents with red pencil or marker to record actual construction:
  - a. Elevations of various elements of new work in relation to finished first floor datum.
  - b. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
  - c. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
  - d. Field changes of dimension and detail.
  - e. Changes made by Change Order or Field Order.
  - f. Details not on original Contract Drawings.

**END OF SECTION**

## **SECTION 02 41 19**

### **SELECTIVE DEMOLITION**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Demolition of ice rink floor, select building floors, select refrigeration equipment, underfloor piping, and related facilities.

##### **1.02 RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Division 00 Procurement and Contracting Requirements and Division 01 – General Requirements Sections apply to work of this Section.
  - 2. Section 13 18 00 - Ice System General.
  - 3. Section 13 18 02 - Ice Rink Subsoil Frost Removal.
  - 4. Section 13 18 13.01 - Ice Rink Floor - Concrete Surface.
  - 5. Section 13 18 16 - Ice Rink Dasher Boards.

##### **1.03 SCHEDULING**

- A. Before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will be temporarily discontinued or disrupt service to the existing building, notify the Owner/Engineer 72 hours in advance and obtain approval before proceeding with this phase of the work.
- B. Demolition of the existing rink floor and floor insulation shall occur immediately after the project notice-to-proceed has been issued and the dasher boards have been removed so that thawing of the subsoil can begin as described in Section 13 18 02 Ice Rink Sub-Soil Frost Removal.

#### **PART 2 PRODUCTS**

Not Used.

#### **PART 3 EXECUTION**

##### **3.01 PROTECTION**

- A. Determine required protective measures before proceeding with demolition and removal. The location of all existing underslab or concealed piping, electrical wires, and conduits that are not proposed to be removed shall be electronically determined and marked by the Contractor prior to proceeding with demolition work.
- B. Provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs, and other items as required for proper protection of the workers engaged in demolition operations, staff/occupants of the building, the public, and adjacent construction.

- C. Provide and maintain temporary protection of the existing structure designated to remain where demolition, removal, and new work is being done, connections made, materials handled, or equipment moved.
- D. Prevent dust and dirt from rising by wetting demolished concrete and similar debris.
- E. Protect unaltered portions of the existing building affected by the operations under this Section by dustproof partitions and other adequate means.
- F. Prior to start of demolition work, the Contractor shall cover all existing bleacher surfaces (including seats, access stairs, and rink-side walkway) with 4-mil clear poly sheeting. The poly covering shall be maintained and repaired as necessary throughout the duration of the demolition and construction phases, and shall be removed and disposed-of upon substantial completion.
- G. Contractor shall carefully remove and store all rubber floor tiles from the perimeter floor around the rink. Tiles shall be numbered and a location drawing prepared so the tiles can be re-laid in their original positions. Tiles shall be replaced prior to project substantial completion.
- H. Contractor shall furnish and install filter fabric over HVAC air intakes in the building to minimize the amount of construction dust and debris entering to protect the existing HVAC systems. Contractor shall monitor HVAC equipment performance, inspect the fabric as well as existing system filters, and clean/furnish & replace as necessary during construction. Upon completion of construction, Contractor shall inspect to verify cleanliness of all existing ductwork and furnish and install new filters for all existing HVAC equipment.
- I. Provide adequate fire protection in accordance with local Fire Department requirements.
- J. Do not close or obstruct exits, walkways, passageways, or stairways without the authorization of the Owner/Engineer.
- K. Do not store or place materials in passageways, stairs, or other means of egress.
- L. Conduct operations with minimum traffic interference.
- M. All demolished materials, unless those described in the Contract Documents to be retained by the Owner, shall become the property of the Contractor and shall be disposed of in an offsite landfill obtained and paid for by the Contractor. All costs for removal, handling, transportation, and disposal shall be included in the Base Bid.

### 3.02 DEMOLITION

- A. Demolition, removal, and alteration work shall be as shown on the Drawings.
- B. Execute the work in a careful and orderly manner with the least possible disturbance to the public and to the occupants of the building.
- C. The existing ice rink dasher boards shall be carefully removed and stored as described in Section 13 18 16 - Ice Rink Dasher Boards. Immediately after dasher board removal,

locations of existing anchors shall be measured and documented for installation of corresponding insert anchors in the new rink slab.

- D. The existing calcium chloride brine solution shall be removed from the existing south ice rink floor and subsoil heat piping and transmission mains, as well as the north rink subsoil heat piping and transmission mains as part of this project. Removal and disposal shall be in full conformance with all applicable local, state, and federal regulations. The local sanitary sewer system operator may consider disposal of the brine solution through the sanitary sewer system. The Contractor shall contact the sewer system operator prior to bidding the project to determine whether this is an option. If disposal in the sanitary sewer system is not an option, the material shall be removed in trucks to an appropriate licensed disposal facility. Any applicable costs of removal, transport, and disposal shall be included in the Contractor's Base Bid. The methods of removal of the calcium chloride brine are at the Contractor's discretion, but are anticipated to include pumping from low points in the piping, blow-out with air compressors, and flushing with water.
- E. To prevent contamination of soil or groundwater on the site, Contractor shall closely monitor materials removed during demolition of the ice rink floor and refrigeration mains to verify they do not contain significant amounts of calcium chloride brine solution. If calcium chloride brine solution is spilled, Contractor shall immediately contain the spill and remove any affected soil. Appropriate pumps, vacuums, and storage containers shall be available on-site throughout the demolition process.
- F. Contractor shall saw cut the existing concrete ice rink slab into sections small enough to be lifted and removed from the building. Sawing shall be with wet saws only. The use of dry saws or pneumatic tools will not be allowed, to reduce dusting and vibration. Sub-slab insulation, heat piping, soil, etc. shall also be removed and disposed of. The existing fill material below the rink insulation is anticipated to be saturated with water or brine solution, and shall not be considered reusable. If the fill material is found to be dry and reusable, Owner and Engineer shall be notified, and all or portions of the material may be salvaged and reused if a suitable change order reduction can be negotiated. Contractor shall prevent damage to existing underground systems that are to remain functional.
- G. Portions of existing building concrete floors shall be removed for installation of new transmission main piping and conduit systems. Edges of concrete floor areas to be removed shall be cleanly saw cut through their full depth.
- H. Any damage to adjacent structure, utilities, or finishes shall be repaired at the Contractor's expense. Repair work shall be approved by the Owner/Engineer.
- I. All demolished materials shall be removed from the building through the routes identified on the Demolition Plan. Contractor shall provide removal equipment capable of operating within the space and openings provided.
- J. When removed piping and equipment passes through walls or floors, those walls or floors shall be patched with materials that match surrounding materials. Wall patches shall be painted to match existing wall color.

- K. The Contractor will be allowed to use a portion of the existing parking area as a lay-down area for demolished materials and for storage of new materials to be installed on the project. Demolished materials temporarily stored in the lay-down area shall be stored for a period no longer than three days after initial demolition.
- L. The existing subsoil heat exchanger shall be removed and replaced with a smaller unit designed for use with ethylene glycol fluid. Removal of the heat exchanger shall include temporary disconnection of both brine and ammonia piping. Contractor shall close valves and salvage/store ammonia vapor/liquid as necessary to isolate the heat exchanger from the remainder of the existing ammonia refrigeration system.

### 3.03 CLEAN UP

- A. Remove debris as the work progresses and maintain the premises in a neat and clean condition. Trash and debris shall be collected and disposed of on a daily basis.

### **END OF SECTION**

## **SECTION 03 30 00**

### **CAST-IN-PLACE CONCRETE**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Furnish and install cast-in-place concrete, including formwork, reinforcement, supports, and accessories. Section applies only to concrete for building floor patches. See Section 13 18 13.01 Ice Rink Floor - Concrete Surface for ice rink floor concrete specification.

##### **1.02 RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Division 00 Procurement and Contracting Requirements and Division 01 – General Requirements Sections apply to work of this Section.
  - 2. Section 13 18 00 - Ice System General.
  - 3. Section 13 18 13.01 - Ice Rink Floor - Concrete Surface.

##### **1.03 REFERENCES**

- A. American Concrete Institute (ACI):
  - 1. 301 – Specification for Structural Concrete for Buildings.
  - 2. 305 – Hot Weather Concreting.
  - 3. 306 – Cold Weather Concreting.
  - 4. 315 – Details and Detailing of Concrete Reinforcement.
- B. American Society for Testing Materials (ASTM):
  - 1. C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  - 2. C33 – Standard Specification for Concrete Aggregates.
  - 3. C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - 4. C143 – Standard Test Method for Slump of Hydraulic Cement Concrete.
  - 5. C150 – Standard Specification for Portland Cement.
  - 6. C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
  - 7. C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
  - 8. C494 – Standard Specification for Chemical Admixtures for Concrete.
  - 9. C618 – Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.

##### **1.04 SUBMITTALS**

- A. Submittals shall conform to Section 01 33 00.
- B. Submit complete shop drawings and bar lists of all reinforcement materials to be furnished and installed under this Section. Show bar and mesh sizes, spacings, locations, and quantities of reinforcing and bending details.

- C. Prepare and submit shop drawings in accordance with Division 01 – General Requirements and in accordance with ACI 315.
- D. Submit concrete mix design at least 14 days prior to placement of concrete.
- E. Submit manufacturer's data for concrete admixtures, curing materials, finishing compounds, expansion joint materials, and adhesive anchoring material.
- F. Submit concrete testing results.

#### 1.05 QUALITY ASSURANCE

- A. Comply with ACI 301, except as modified in this Section.
- B. The design, engineering, and proper construction of all formwork shall be the responsibility of the Contractor.
- C. The Contractor shall hire an independent testing laboratory, approved by the Engineer and Owner, to perform the work listed below. All costs for this testing shall be paid by the Contractor:
  - 1. Test proposed aggregate.
  - 2. Design concrete mixes.
  - 3. Cast and test concrete cylinders for concrete in accordance with ASTM C31 and C39.
  - 4. Determine slump of concrete from each truck in accordance with ASTM C143.
  - 5. Determine air content of concrete from each truck in accordance with ASTM C231.

#### 1.06 PRODUCT HANDLING

- A. Store reinforcement, supports, and accessories at the Site in a manner to prevent damage from water, accumulation of dirt, or construction activities.
- B. Do not store forms, shores, reinforcing, equipment, or other materials on finished slab surfaces.

### **PART 2 PRODUCTS**

#### 2.01 FORMWORK

- A. Form facing materials shall produce a smooth, hard, uniform texture on the concrete.
- B. Facing materials with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used.
- C. Form coatings or release agents shall be commercially formulated chemical release agents containing no lubrication oil, conventional form oil, fuel oil, or kerosene.
- D. The form coating shall not penetrate, stain, or leave a residual film on the concrete surface and shall not attract dirt or other deleterious material.

#### 2.02 CONCRETE REINFORCEMENT

- A. Reinforcing Bars: Deformed billet steel bars conforming to ASTM A615, Grade 60.



## 2.03 CONCRETE MATERIALS

### A. Concrete constituents shall conform to the following minimum requirements:

Cement	Conform to ASTM C150, Type I - From one source of supply.
Aggregate	Conform to ASTM C33 - From one source of supply.
Water	Clean potable and free from deleterious substances.
Air Entraining Admix.	Conform to ASTM C260.
Water Reducing Admix.	Conform to ASTM C494, Type A.
Fly Ash	Conform to ASTM C618, Class C or F.

Aggregates shall not contain lignite, or ferrous material that will cause staining of the concrete surface. Aggregates shall be free of chert or other expansive materials that can cause pop-outs of the concrete surface.

### B. Concrete mixture shall conform to the following minimum requirements:

Coarse aggregate size	ASTM C33 Size No. 67
Minimum compressive strength at 28 days	4,000 psi
Maximum water-cement + pozzolan ratio	0.45
Minimum cement and pozzolan content	564 lb/cu. yd.
Slump	3 inches $\pm$ 1 inch
Entrained air content	6 percent $\pm$ 1-1/2 percent

## 2.04 CONCRETE ACCESSORIES

- A. Burlap-Polyethylene Sheets: Burlap polyethylene sheets for curing shall consist of burlap weighing not less than 10 oz./lin. yd., 40 inches wide impregnated on one side with white opaque reinforced polyethylene 0.006 inch thick.
- B. Curing Compound: Conform to ASTM C309, Type 1-D, Class B, clear or translucent with fugitive dye. Not to be applied to slabs receiving sealer.
- C. Expansion Joint Materials: Closed cell expanded polyethylene sheet.
- D. Interior Joint Filler: One-part, self-leveling, polymer reinforced joint filler, Everjoint manufactured by L&M Construction Chemicals, Inc., or approved equal.
- E. Bonding Agent: Acryl 60 manufactured by Thoro System Products, or approved equal.
- F. Adhesive Anchor: Adhesive for anchoring steel reinforcement dowels and threaded rods in concrete shall be a two-component injected epoxy structural adhesive. Approved products include Hilti RE-500 Adhesive as manufactured by Hilti Fastening Systems, Epoxy-Tie Adhesives as manufactured by Simpson Strong-Tie, or Epogel as manufactured by Sonneborn.

## **PART 3 EXECUTION**

### **3.01 FORMWORK**

- A. Formwork shall be designed and constructed in accordance with ACI 347.
- B. Formwork shall be designed, erected, supported, braced, and maintained to safely support all vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. The design, engineering, and proper construction of all formwork shall be the responsibility of the Contractor.
- C. Construct forms to conform to slopes, lines, and dimensions shown on the Drawings. Earth cuts shall not be used as forms for vertical surfaces.
- D. Install and secure all required openings, bolts, pipes, sleeves, plates, and other embedded items prior to placing concrete.

### **3.02 REINFORCEMENT**

- A. Place reinforcing steel in accordance with the Drawings, approved shop drawings, and as specified herein.
- B. Reinforcing steel shall have the following concrete cover, unless specifically noted differently on the Drawings:
  - 1. Concrete cast against earth 3 inches.
  - 2. All other concrete 2 inches.
- C. Properly position reinforcing steel and wire it together at intersections and supports to ensure against displacement during concrete placing.
- D. All reinforcing steel must be placed and tied securely with wire before concrete is placed.
- E. At the time concrete is placed all reinforcement shall be free of mud, oil or other materials that may adversely affect or reduce the bond.
- F. Provide reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying. Provide lap splice lengths as shown on the Drawings.
- G. Bars shall be placed to the following tolerances:
  - 1. Clear distance to formed surface  $\pm 1/4$  inch.
  - 2. Spacing dimensions  $\pm 1/2$  inch.

### **3.03 CONCRETE PRODUCTION**

- A. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94.
- B. Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall be discarded and shall not be retempered.
- C. Discharge concrete from truck within 60 minutes after cement is added to the mix.

- D. Do not add water at the Site without the permission of the Engineer.

### 3.04 CONCRETE PLACEMENT AT SITE

- A. Formwork shall be completed and all reinforcement and embedded items shall be secured in place.
- B. All snow, ice, and mud shall be removed prior to placing concrete. Do not place concrete on frozen ground or ground with either standing water or when upper 2 inches of ground is saturated.
- C. Deposit concrete continuously or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section.
- D. Concrete which has partially hardened or has been contaminated by hardened materials shall not be deposited.
- E. Remove rejected concrete from the Site.
- F. Deposit concrete as nearly as practicable in its final position to avoid segregation due to handling or flowing.

### 3.05 PLACING CONCRETE SLABS

- A. Deposit and consolidate concrete slabs in a continuous operation.
- B. Consolidate concrete placed in slabs by mechanical vibration or other methods acceptable to the Engineer. Bring slab surfaces to the correct level with a straight edge and then strike off. Use bullfloats or darbies to smooth the surface, leaving it free from bumps and hollows.
- C. Do not leave screed stakes in concrete.
- D. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to start of finishing operations.

### 3.06 COLD WEATHER PLACING

- A. Do not place concrete when the air temperature is less than 40 degrees F without the specific approval of the Engineer.
- B. Cold weather concrete work shall conform to all requirements of ACI 306.1, except as modified the requirements of these Contract Documents.
- C. Concrete shall not be placed against any frozen substrate, including subgrade soils and surfaces of formwork.
- D. Concrete shall not be placed around any embedment, including reinforcing steel that is at a temperature below freezing.

- E. The temperature of the concrete delivered at the Site shall conform to the following limitations:

Minimum Concrete Temperature		
Air Temperature	< 12 Inches Thick	12 to 36 Inches Thick
Above 30 degrees F	60 degrees F	55 degrees F
0 to 30 degrees F	65 degrees F	60 degrees F
Below 0 degrees F	70 degrees F	65 degrees F

- F. If water or aggregate is heated above 100 degrees F, the water shall be combined with the aggregate in the mixer before cement is added. Cement shall not be mixed with water or with mixtures of water and aggregate having a temperature greater than 100 degrees F.
- G. When the mean daily temperature is less than 40 degrees F, the temperature of the concrete shall be maintained between 50 degrees and 70 degrees F for the required curing period.
- H. Arrangements for heating, covering, insulation, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature without injury due to concentration of cold or heat. Protection shall remain in place for a minimum of 3 days.
- I. Combustion heaters shall not be used during the first 24 hours, unless precautions are taken to prevent exposure of the concrete to exhaust gases.
- J. Once the cold weather concrete protection is removed, concrete curing must be continued for the remainder of the 10-day curing period.

### 3.07 HOT WEATHER PLACING

- A. Comply with ACI 305 when hot weather conditions exist.
- B. Maintain concrete temperature at time of placement below 90 degrees F.
- C. When the temperature of the steel is greater than 120 degrees F, steel forms and reinforcement shall be sprayed with water prior to placing concrete.
- D. Keep all surfaces protected from rapid drying. Provide windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering in advance of placement.

### 3.08 CONSOLIDATION

- A. Consolidate all concrete in accordance with provisions of ACI 309.
- B. Consolidate each layer of concrete immediately after placing by use of concrete vibrators. Maintain a frequency of not less than 8,000 vibrations per minute for each vibrator.

- C. Provide adequate number of units and power source at all times. Use a minimum of two vibrators for all work and maintain spare units to ensure adequacy.
- D. Insert the vibrator so as to penetrate the lift immediately below the one being placed. Do not insert the vibrator into lower courses which have begun to set.
- E. Spacing between insertions of the vibrator shall generally be from 12 inches to 18 inches and shall not exceed twice the radius of action as shown in ACI 309 or 18 inches.
- F. Do not use vibrators to transport concrete inside the forms.
- G. Vibration shall be adequate and properly carried out to minimize entrapped air and surface voids on formed surfaces.

### 3.09 CONCRETE SLAB FINISHING

- A. Float Finish:
  - 1. Apply initial float finish to all slab surfaces. Consolidate the surface by hand floating.
  - 2. Check and level the surface plane to a tolerance not exceeding 1/4 inch in 10 feet when tested with a 10-foot straight-edge placed on the surface at not less than 2 different angles.
  - 3. Immediately after leveling refloat the surfaces to a smooth, uniform, granular texture.
- B. Trowel Finish:
  - 1. Apply steel trowel finish to all interior slabs. Exterior slabs shall receive slip-resistant light-broomed finish.
  - 2. Apply initial float finish to slabs as described above.
  - 3. After floating, begin the first trowel finish operation using hand trowels or power-driven trowel. Begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.
  - 4. Consolidate the concrete surface by the final hand troweling operation, free from trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8 inch in 10 feet when tested with a 10-foot straight-edge.

### 3.10 CONCRETE CURING

- A. Immediately after finishing operations are complete, all slabs shall be covered with burlap-polyethylene sheets and kept in place for at least 7 days.
- B. Formed surfaces shall be covered with burlap-polyethylene sheets or sprayed with curing compound immediately after form removal.
- C. All burlap-polyethylene film shall be adequately anchored at the edges to prevent moisture loss.
- D. Rewet all slab surfaces at least once a day during the curing period.

### 3.11 PATCHING AND CLEANING

- A. Repair honeycomb and other defective areas, fill surface voids and similar defects in accordance with Section 5 of ACI 301.
- B. Upon completion, all exposed surfaces shall be thoroughly cleaned of all concrete spatters, form oil, or other foreign material detrimental to appearance.
- C. All excess concrete debris remaining after completion of placement and form removal shall be removed from the Site and disposed of in a proper and legal manner.

**END OF SECTION**

## **SECTION 13 18 00**

### **ICE SYSTEM GENERAL**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. All necessary and incidental labor and materials for the construction and installation of a fully operable ice rink replacement, including concrete surfaced ice rink floor, modifications to sub-soil heating system, refrigeration piping, and other related items as specified in related Sections. This Section outlines only the general requirements of the Ice System Contractor. Detailed materials and installation requirements are included in related Sections to this Specification.

##### **1.02 RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Division 00 Procurement and Contracting Requirements and Division 01 - General Requirements Sections apply to work of this Section.
  - 2. Section 13 18 02 - Ice Rink Subsoil Frost Removal.
  - 3. Section 13 18 13.01 - Ice Rink Floor - Concrete Surface.
  - 4. Section 13 18 14.13 - Ice Rink Subsoil Heat Modifications.
  - 5. Section 13 18 14.15 - Refrigeration System Insulation.
  - 6. Section 13 18 14.17 - Ice System Piping and Fittings.
  - 7. Section 13 18 16 - Ice Rink Dasher Boards.

##### **1.03 SUBMITTALS**

- A. General:
  - 1. The Ice System Contractor shall submit complete shop drawings for all equipment and materials to the Engineer prior to fabrication and installation.
  - 2. All submittals shall be in conformance with Division 1 - General Requirements and Section 01 33 00 Submittal Procedures.
- B. Complete fabrication and shop drawings for all components and accessories.
- C. Literature and Drawings, including dimensions, weights, required electrical wiring, control diagrams.
- D. Recommendations, procedures, and requirements for coordination with the work of other Contractors on the Project site.

##### **1.04 OPERATION AND MAINTENANCE MANUALS**

- A. Prepare and submit manuals in conformance with all Section 01 78 23 Operation and Maintenance (O&M) Manuals requirements. O&M manuals shall be provided only for the new subsoil heat exchanger, the new pump impellers, and the new dasher board curved shielding assemblies.

## 1.05 RECORD DOCUMENTS

- A. Prepare and submit documents in conformance with all Section 01 78 39 Project Record Documents requirements.

## 1.06 QUALITY ASSURANCE

- A. Ice System Contractor shall have responsible design and construction personnel with a minimum 10-years experience on comparable Projects.
- B. Ice System Contractors must provide the Engineer a listing of comparable Projects and must supply certified evidence of at least 5 installations similar to these Specifications that have been operating for a minimum of 2 years. This list shall include the names of the projects, locations, Contract amount, and the names and phone numbers of qualified operating personnel who can give accurate data on the operating history of the system. This information shall be provided on the Contractor's Statement of Experience page attached to the Form of Proposal and shall be submitted at the time of the Bid.
- C. Codes: All labor, materials, services, equipment, and appliances furnished and installed by the Ice System Contractor shall be in accordance with the latest published codes applicable to the Ice System Installation, including but not limited to the following:
  - 1. International Building Code/2015 and Appendix K 2.
  - 2. International Existing Buildings Code/2015
  - 3. International Fire Code/2015.
  - 4. International Mechanical Code/2015.
  - 5. National Electrical Code, NFPA 70/2017.
  - 6. State of Illinois Plumbing Code/Illinois Administrative Code TITLE 77 PART 890.
  - 7. OSHA.
  - 8. ANSI/ASHRAE Standards 15 and 34.
  - 9. American Standard Code of Refrigeration Piping ASA B31.5.
  - 10. American Standard Code for Pressure Piping ASA B31.1.
  - 11. American Standard Code for Pressure Vessels.

## 1.07 WARRANTY

- A. The Ice System Contractor shall provide a two-year materials and labor warranty in conformance with all Section 01 78 36 Warranties requirements. The two-year warranty shall be provided for all new constructed equipment and systems.

## 1.08 DELIVERY, STORAGE AND HANDLING

- A. The Ice System Contractor shall deliver all materials and equipment to the Project Site and shall be responsible for storage and security of all materials and equipment.
- B. Store all materials off the ground and covered to avoid any damage by atmospheric conditions.



## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Materials and equipment shall be in accordance with the Specifications and Drawings for this Project, and as required to provide a complete and working system.

## **PART 3 EXECUTION**

### **3.01 INSPECTIONS**

- A. The Ice System Contractor shall notify the Engineer a minimum of 5 days in advance for all inspections so that necessary inspections can be accomplished.
- B. Minimum Engineer's inspection points will be designated at the Preconstruction Conference.
- C. Cooperate and coordinate with Village of Hoffman Estates building inspection officials.

### **3.02 WORK INCLUDED**

- A. Ice System Contractor shall provide all materials and perform all work required to complete the ice rink floor replacement, including but not limited to the following:
  - 1. Demolish and remove existing reinforced concrete rink floor and other components in conformance with Section 02 41 19 Selective Demolition requirements.
  - 2. Remove, store, modify, and reinstall existing dasher boards in conformance with Section 13 18 16 Ice Rink Dasher Boards requirements.
  - 3. Thaw frozen soil below the south rink floor in conformance with Section 13 18 02 Ice Rink Subsoil Frost Removal.
  - 4. Remove existing granular material and existing subsoil heat piping after the soil thaws. Inspect condition of the existing concrete subslab below and perform surveys to verify if subslab settles to original elevation.
  - 5. Install 4" corrugated poly drain tile on both sides of the header trench and connect outlet to existing drain tile system inside the building. If Alternate Bid No. 1 is awarded provide new drain board over entire rink area.
  - 6. Provide trenching, backfill, compaction, and poly piping for the refrigeration and sub-soil heating mains from the refrigeration equipment room to the south rink. Install new poly subsoil heat transmission mains to the north rink.
  - 7. Furnish and install sub-soil heat supply and return headers and related 1" heat piping over the existing concrete subslab.
  - 8. Provide and install 8 inches clean sand backfill over heat piping, including compaction and fine grading to a  $\pm 1/4"$  tolerance.
  - 9. Furnish and install rink floor insulation and two layers 6 mil poly vapor barrier, one layer below the insulation and the other above.
  - 10. Furnish and install ice rink refrigeration piping and headers, reinforcement, spacer/supports, and concrete for a complete refrigerated floor as shown on the Drawings. Install concrete sealer over rink slab surface if Alternate Bid No. 2 is awarded.
  - 11. Furnish and install new subsoil heat exchanger and new circulation pump impellers in conformance with Section 13 18 14.13 Ice Rink Subsoil Heat Modifications.

12. Remove calcium chloride brine from south and north rink subsoil heat systems and replace with 40% ethylene glycol solution.
13. Insulate above and below grade piping and equipment as specified and shown on the Drawings.
14. Provide all testing.
15. Furnish and install 1.21 SG calcium chloride brine secondary refrigerant charge. New or salvaged existing brine may be used.
16. Provide two-year project warranty.
17. Furnish and install expansion joint with compression seal around ice rink perimeter.
18. Furnish and install the conduit runs and related signal cables from the existing temperature monitors located in the equipment room to the rink floor and rink subsoil temperature sensors as shown on the Drawings.
19. Furnish and install R-717 ammonia refrigerant for changes to the primary refrigeration system. Contractor may salvage and reuse existing ammonia refrigerant or provide new material as necessary to complete the subsoil heat exchanger replacement work.
20. Start refrigeration system and slowly cool new rink floor down to operating temperature over a minimum 48-hour period. Rink shall not be cooled until a minimum of 28 days after the rink concrete placement date.
21. Provide Owner's operating personnel with 8 hours of hands-on instructions. Review operation and maintenance material with Owner and staff at time of instructions.

### 3.03 COORDINATION OF WORK

- A. The Ice System Contractor shall make every effort to cooperate and coordinate with all other contractors working on the Project Site.

### 3.04 PERMITS

- A. The Ice System Contractor shall be required to apply for, obtain, and pay for all permits and licenses necessary for the completion of the work.

### 3.05 PREVAILING WAGE REQUIREMENTS

- A. Ice system work by the ice system contractor and their subcontractors shall be in conformance with the Prevailing Wage requirements described in the Specifications.

## **END OF SECTION**

**SECTION 13 18 02**  
**ICE RINK SUB-SOIL FROST REMOVAL**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Thawing of frozen sub-soils below existing rink floor and perimeter edges.

**1.02 RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Conditions of the Contract and Division 01 Sections apply to work of this Section.
  - 2. Section 02 41 19 - Selective Demolition.
  - 3. Section 13 18 00 - Ice System General.
  - 4. Section 13 18 13.01 - Ice Rink Floor - Concrete Surface.
  - 5. Section 13 18 16 - Ice Rink Dasher Boards.

**1.03 SCHEDULING**

- A. Before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will be temporarily discontinued or disrupt service to the existing facility, notify the Owner/Engineer 72 hours in advance and obtain approval before proceeding with this phase of the work.
- B. Removal of the sub-soil frost shall be coordinated with the rink demolition operations described in Section 02 41 19.
- C. Sub-soil frost removal shall start immediately after dasher boards and existing concrete rink floor/subfloor insulation are removed, and shall be scheduled to allow sufficient time to complete the new rink floor and dasher board construction work prior to the specified project substantial completion date.

**1.04 PAYMENT FOR UTILITIES**

- A. The Owner will pay the utility costs for any electricity utilized by the Contractor for the sub-soil frost removal operations. The Contractor shall pay the cost of any natural gas, propane, gasoline, diesel, or other fuel used. The Contractor shall arrange and pay for any necessary connections to or modifications of existing utilities.
- B. The Contractor shall use electricity only for operation of pumps, fans, or blowers. The heating equipment shall utilize natural gas, propane, gasoline, or diesel as its primary energy source.
- C. The Contractor shall provide insulation blankets over all floor areas that are heated to reduce waste of heating energy. Blankets shall include closed-cell foam to provide minimum R-value of 3.0. Blankets shall be continuous over heated area, and a continuous vapor barrier shall be provided on the outside surface of the blankets to reduce leakage of heated air to the arena space.

## 1.05 BASIS OF PAYMENT

- A. The project Base Bid shall include design, installation, and removal of the frost heating system, and well as all costs (including fuel) to operate the system for a period up to 45 calendar days.
- B. Contractor shall provide on the Form of Proposal the per-calendar-day cost to maintain and operate the frost heating system (including fuel) for each calendar day beyond the initial 45 days provided in the Base Bid.

## PART 2 -PRODUCTS

Not Used.

## PART 3 -EXECUTION

### 3.01 EXISTING SOIL AND FROST CONDITIONS

- A. The depth of existing frost below the rink floor was measured using ground penetrating radar (GPR) by Pegasus Environmental Co. of Spencerport, NY. Contact at Pegasus is Zeke Hurd, Owner, (585) 278-0103, <http://www.pegasusenvironmental.com/>. The GPR testing results were not yet available on the printing date of these Specifications. They will be issued as an Addendum item when available.
- B. Additional frost penetration beyond what has been measured should be expected since the rink refrigeration system will be operated until the arena shutdown date in the spring of 2019.
- C. Upon completion of the frost removal process beneath the rink, the Contractor shall arrange and pay for a full GPR scan of the entire rink area to verify that all frost has been removed. In addition, four split-spoon soil borings to a minimum depth of 15 feet shall be performed near the central portion of the rink to verify the GPR results. If the GPR scan or soil borings indicate that frost remains, then additional heating and GPR retesting shall be performed as necessary until all frost is removed. GPR testing may be performed by Pegasus Environmental Co., or another qualified GPR testing firm obtained and paid for by the Contractor, and approved by the Engineer. An Independent Geotechnical Engineering Consultant approved by the Engineer and Owner shall travel to the project site and shall make the determination that frost has been adequately removed, and shall document their findings in a report that is provided to the Project Engineer and Owner. The Contractor shall arrange for and pay all costs for the four 15-foot depth soil borings and the Geotechnical Engineering Consultant's services.

### 3.02 FROST REMOVAL HEATING SYSTEM

- A. Contractor shall be responsible to design and size the sub-soil frost removal process and equipment. Process and equipment shall be adequately sized to remove frost from the ground within a duration that also allows the rink floor and dasher board construction work to be completed within the specified completion dates. Contractor shall include all costs to design, install, operate, and remove the frost removal

equipment and piping in their Bids, except for the cost of electricity, which will be paid by the Owner as described in paragraph 1.04 above.

- B. Contractor shall submit to the Engineer and Owner a written description of the proposed frost removal process and equipment prior to start of the work. An estimate of frost removal time shall also be provided.
- C. Common ice rink sub-soil frost removal systems generally consist of the following styles:
  - 1. Fluid heating system utilizing temporary hoses or piping installed over the rink subgrade after the existing rink concrete surface, insulation, and piping is removed. This style system includes a natural gas, propane, gasoline, or diesel fired liquid heater or boiler to heat a circulation fluid (either water, glycol solution, or calcium chloride brine) that is then circulated through a hose or pipe circulation system installed over the rink area. The contractor shall provide their own temporary pumping system. Insulation blankets shall be provided and installed as described in paragraph 1.04.C above.
  - 2. Air heating system that warms the air above the soil surface. This style system uses a natural gas or propane fired air heater to heat air that is then blown with fans over the soil surface of the rink floor. The heating would commence after the existing rink floor, insulation, and piping are removed. The contractor shall provide all necessary air heating and circulation equipment and ducting. Insulation blankets and poly vapor barrier shall be provided and installed as described in paragraph 1.04.C above.
  - 3. Excavation, removal, and replacement of frozen soils. This style system does not utilize a heating system. Instead heavy excavation equipment is used to excavate frozen soils, which are removed from the site and disposed of, and new non-frozen soil is brought in as a replacement. Due to the structural design details of the Triphahn Center arenas, it is not an option to excavate and remove the frozen soils below the rink. A reinforced concrete sub-slab exists below the rink floor and the sub-slab is proposed to remain in place. Even if the sub-slab were to be removed and replaced, the excavation of the frozen soil would cause severe undermining of the structure footings, which would compromise the structural stability and potentially cause a structure failure.
- D. If either ground thawing method number 1 or number 2 described above is utilized, the number and sizing of heating devices shall be determined by the Contractor, however, to help ensure that the devices are not undersized the total system heat output shall be a minimum of 84,000,000 BTU per 24-hour day of operation. Additional system output above this level may be necessary depending on the Contractor's proposed schedule, and shall be included in the Contractor's Base Bid.
- E. If either ground thawing method number 1 or number 2 described above is utilized, a temperature monitoring well shall be installed near the center of the rink prior at the start of the heating operation. The well shall include a 16' depth drilled hole into which a 1/2" diameter capped steel pipe filled with glycol shall be placed. A thermocouple temperature sensor shall be attached to a rod that will allow movement of the sensor upwards and downwards in 1' depth increments. A digital display shall be provided that can be used to read the temperature at each of the sensor depth increments. The monitoring well shall be checked daily, and temperatures at each 1' depth increment

recorded. Copies of the temperature readings shall be sent to the Engineer on a weekly basis.

- F. Soil heating system shall not include the installation of grids of vertically drilled holes into which heating circulation piping is inserted. This style system can provide uneven drying of surrounding soil, resulting in irregular settling and movement of the soil in the months after the procedure is completed.
- G. Using any frost melting option, it is anticipated that melting of frost could occur relatively quickly, but that the thawed soil could be saturated, and could require adequate time after removal of the rink surface to allow the moisture to escape sufficiently for settlement to occur and so the surface is acceptably stable to work on. The Contractor's schedule shall include a minimum 14 calendar day period for soil drying and consolidation after the frost has been proven to have been melted. At the end of this 14-day period, the Contractor's Geotechnical Engineering Consultant shall inspect the soil to determine if the soil moisture content and density is acceptable for work to proceed. The Contractor shall arrange and pay for a minimum of six split-spoon soil borings to a depth of 15 feet within the rink that the Contractor's Geotechnical Engineering Consultant can use to make this determination. If the Contractor's Geotechnical Consultant determines that the soil is acceptable for construction, then the work shall proceed immediately. If the soil is not ready for construction after the 14-day drying/consolidation period, then a meeting will be held within 2 days, with the Contractor, the Contractor's Geotechnical Engineering Consultant, Owner, and Engineer attending, to determine the course of action, which could include a change in the project completion date.
- H. If the proposed soil heating system includes fuel burning equipment that is located inside the arena space, or that utilizes hot air heated by an outdoor gas burner, Contractor shall provide and maintain air quality sensing equipment within the arena space being heated that is capable of continuously monitoring contaminant levels in the air, and providing a visual and audible alarm when contaminant levels in excess of OSHA standards are measured. Monitoring procedure shall comply with applicable OSHA requirements, and shall include as a minimum monitoring of carbon monoxide levels.
- I. Where required soil borings pass through the existing concrete sub-slab, contractor shall include costs to core-drill holes through the subslab, and patch the openings with concrete after the borings are completed.

### 3.03 SOIL CONSOLIDATION AND COMPACTION

- A. It is anticipated that moderate compaction of the existing soils will occur naturally as the frost is melted and the soils subside.
- B. After the frost thawing operation is completed, existing granular fill and subsoil heat piping shall be removed to expose the existing concrete sub-slab located at an elevation 1'-4" below the building floor elevation. The exposed concrete surface shall then be subjected to repeated passes of a large vibrating drum compactor. The contractor shall perform before and after surveys of the sub-slab on a 12' grid spacing to determine if the compaction operation results in measurable settlement of the

concrete surface, and to determine if the concrete surface has returned to it's pre-frost heave position.

### 3.04 PEST CONTROL & SECURITY

- A. It is anticipated that installation and operation of the frost removal system will require that some existing building doors be left open for extended periods, including overnight when no Contractor or Owner staff are present.
- B. The Contractor is required to secure building openings as necessary to provide acceptable building security at all times. Acceptable security measures may include lockable temporary plywood doors, fenced barriers, electronic security systems, or posted security guards. A written description of the proposed building security measures shall be submitted to the Owner and Engineer for approval prior to start of the frost removal operations.
- C. The Contractor is required to secure all building openings as necessary to prevent entrance of rodents, insects, or other pests at all times. If ground thawing Method 1 is utilized, multiple round hoses will pass through doorways, and the gaps between the hoses would allow easy access for pests. Contractor shall utilize spray foam, or other acceptable material, to fill gaps between hoses to prevent pest passage. If pests do enter the building because the Contractor's prevention methods are inadequate, the Contractor shall be required to retain and pay for a qualified extermination firm to remove the pests from the building.

### END OF SECTION

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## **SECTION 13 18 13.01**

### **ICE RINK FLOOR - CONCRETE SURFACE**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Rink subgrade drainage
- B. Sub-soil heating grid.
- C. Insulation and vapor barrier.
- D. Concrete rink floor design and installation criteria.
- E. Ice rink perimeter expansion joint.

##### **1.02 RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Division 00 Procurement and Contracting Requirements and Division 01 - General Requirements Sections apply to work of this Section.
  - 2. Section 02 41 19 - Selective Demolition.
  - 3. Section 03 30 00 - Cast-in-Place Concrete.
  - 4. Section 13 18 00 - Ice System General.
  - 5. Section 13 18 02 - Ice Rink Subsoil Frost Removal.
  - 6. Section 13 18 16 - Ice Rink Dasher Boards.

##### **1.03 SUBMITTALS**

- A. Submit survey of subgrade concrete slab before installing subgrade drainage system and sub-soil heat piping.
- B. Submit gradations of the clean sand to be placed below the insulation.
- C. Submit survey of finished rink piping elevations.
- D. Shop Drawings and samples of the piping, tubing, headers, spacers, reinforcement, insulation, and vapor barrier shall be submitted as required in Section 13 18 00 - Ice System General.
- E. Concrete mix design shall be submitted for approval a minimum of 2 weeks prior to the scheduled rink concrete placement date.

##### **1.04 QUALITY ASSURANCE**

- A. Shall be as required in Section 13 18 00 - Ice System General.

## 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Shall be as required in Section 13 18 00 - Ice System General.

## PART 2 PRODUCTS

### 2.01 CLEAN SAND BASE

- A. The material shall be sound, durable particles of pit-run or washed sand with 100 percent of the material passing the #4 sieve, less than 50 percent passing the #40 sieve, and not more than 8 percent passing the #200 sieve. Screenings from stone crushing will be acceptable, provided the material meets the gradation requirements stated.
- B. Existing sand/aggregate material removed from below existing rink floor shall not be re-used, unless approved by the Engineer and Owner and if an acceptable deduct price is negotiated. The existing material is assumed to be partly or fully saturated with water or brine solution.

### 2.02 SUB-SOIL DRAINAGE SYSTEM

- A. Drainage Piping and Fittings (BASE BID):
  - 1. Manufacturer shall be Prinsco, Advanced Drainage Systems, Inc., or approved equal.
  - 2. Piping shall be 4-inch diameter, perforated, heavy duty, corrugated polyethylene piping meeting AASHTO Standard M-252.
  - 3. Prefabricated fittings and components shall be used for all connections, fittings, and accessories. All fittings and components shall be provided by the same manufacturer as the drainage piping.
  - 4. Drainage piping shall be surrounded with pea gravel to a minimum depth of 3". Pea gravel shall be max. 1/4" naturally rounded stone particles, 100% passing the #40 sieve. Pea gravel shall be covered with geotextile filter fabric that extends minimum 12" beyond gravel edges.
- B. Outlet Piping (BASE BID):
  - 1. Piping between the new perforated drainage piping and existing building drain tile system shall be 4" PVC, Schedule 40.
  - 2. A PVC backwater valve/observation assembly shall be installed on the outlet piping line. Assembly shall allow servicing or replacement of operating parts without excavation. Oatey Product No. 43906, or approved equal.
- C. Drainage Boards (ALTERNATE BID NO. 1):
  - 1. Geocomposite drainage board shall be Mel-Drain 7955 Rolled Matrix Drainage System, as manufactured by W.R Meadows, Inc., or approved equal.
  - 2. Drainage board shall consist of a dimple-raised moulded polypropylene core bonded to a high-strength woven geotextile fabric. Supplied in 6'-0" x 50'-0" rolls.
  - 3. Drainage board core properties shall be minimum 0.40 inch thickness, 18,000 psf compressive strength, 21 gpm/ft in-plane flow rate, non-perforated.
  - 4. Drainage board fabric properties shall be minimum 365 x 200 Lb grab tensile strength, 145 gpm/sf water flow rate, 40 sieve apparent opening size.

## 2.03 PIPE MATERIAL - RINK FLOOR, HEADERS, AND TRANSMISSION MAINS

- A. Pipe material shall be high-density virgin polyethylene, PE4710 resin. Piping using PE3408 resin is not acceptable.
- B. Minimum density of piping shall be 955 gm/cc, measured using ASTM test method D4883.
- C. Working pressure rating shall be at minimum 160 psi (DR13.5) for 1" piping, and minimum 125 psi (DR17) for 3" and 8" piping.
- D. Minimum pipe dimensions in inches shall conform to the following:

<u>Nominal O.D.</u>	<u>1 Inch</u>	<u>3 Inch</u>	<u>8 Inch</u>
Actual O.D.	1.315	3.500	8.625
Wall thickness	0.097	0.206	0.507
Actual I.D.	1.101	3.063	7.540
Weight, Lb/Ft	0.169	0.937	5.680

- E. All piping and tubing connections shall be by fusion welding. Welds shall be performed on the Project Site by personnel fully trained and experienced in the required procedures.

## 2.04 FITTING MATERIAL

- A. Material shall be high-density virgin polyethylene using resin compatible with and fusible to the specified piping.
- B. Butt Heat Fusion Fittings shall conform to ASTM D3261 (latest edition).
- C. Socket-Type fittings shall conform to ASTM 2683 (latest edition).
- D. Return bends shall be fabricated from high-density virgin polyethylene to 3-1/2" centers. Return bends shall be a single piece 180-degree bend, or may be fabricated using two 90-degree bends. Steel or PVC return bends with clamped connections are not acceptable.
- E. All fittings shall be manufactured, not field fabricated.
- F. Minimum density of fitting material shall be 58 lbs/ft<sup>3</sup> (.955 gm/cc).
- G. Maximum working pressure rating shall be at minimum equal to the rating of the pipe.
- H. Service Saddles:
  - 1. Shall conform to the above requirements.
  - 2. Shall be socket-type fittings with a minimal restriction equal to the actual I.D. of the pipe.

## 2.05 FLOOR INSULATION

- A. Insulation Material: Two layers of 1-1/2 inch thickness extruded polystyrene, ASTM C578-85, Type IV, 25 PSI strength, 4'-0" x 8'-0" square edge sheets.

- B. Mastic: Dow Chemical Company General Purpose Mastic No. 11.
- C. Vapor Barrier: 6 mil thick clear polyethylene sheeting. Provide in rolls of maximum width and length to minimize seams. Supply with compatible 2" to 3" width poly tape for taping holes and all seams. Two layers of vapor barrier shall be provided, one below the insulation and another above.

## 2.06 TUBING/REINFORCEMENT SUPPORTS

- A. Approved Manufacturers: Hunter Wire Products, Ltd, or approved equal.
- B. Style: Combination type for 5" thickness rink floor, functioning as 3.5" on center tubing spacers, as well as longitudinal rebar supports.
- C. Wire Material: #7 gauge (.187 inch), no coating.
- D. Base Plate: Continuous, 3-inch width 24 gauge cold rolled steel.
- E. Length Per Support: Minimum 6 feet.

## 2.07 REINFORCING

- A. Reinforcing Bars: Deformed billet #4 steel bars conforming to ASTM A615, Grade 60.
- B. Welded Wire Fabric: WWF 6 x 6 - W2.0 x W2.0 (8 gauge wire) conforming to ASTM A185. Welded wire fabric shall be supplied in minimum 8'-0" x 20'-0" flat sheets. Smaller flat sheets or rolled mesh are not acceptable substitutes.
- C. Tie Wire: Black annealed wire, 16 gauge, or heavier.
- D. Reinforcement bars shall be supported over header trench with steel channels and accessories as shown on the Drawings.

## 2.08 EXPANSION JOINT MATERIALS

- A. Expansion Joint Material:
  - 1. ¾" and 1" thickness Ceramar cellular, non-vegetable expansion material, or approved equal.
- B. Compression Seal:
  - 1. Seal: Multi-cellular elastomeric seal, manufactured from extruded neoprene compound. Designed for 1.0" joint width at installation. Supplied in longest length possible to minimize end joints. Joints to be spliced with the adhesive recommended by the seal manufacturer. Wabo Compression Seal "WA-175" as manufactured by Watson Bowman Acme, D.S. Brown Delastic Pavement Seal "E-2000", or approved equal.
  - 2. Lubricant Adhesive: One-part moisture-curing polyurethane and aromatic hydrocarbon solvent mixture that complies with ASTM D4070. Prima-Lub Adhesive, DSB 1516/1520, or approved equal.

## 2.09 CONCRETE MATERIALS

- A. General: The concrete design mix shall be submitted for approval 3 weeks prior to scheduled pour.
- B. Cement: All cement shall be type 1 Portland cement and shall conform to the "Standard Specification for Portland Cement" (ASTM C150). All cement shall be of recent manufacture. Once a manufacturer is selected, only that manufacturer's product shall be used. At the Contractor's option, up to 15 percent of the cement in the mix may be replaced with fly ash.
- C. Normal Weight Aggregates: ASTM C33, and as herein specified. Provide aggregates from a single source. Aggregates shall not contain lignite or ferrous material that will cause staining of the concrete surface. All aggregates shall be minimum 99.8 percent free of chert or other expansive materials that would cause surface staining or degradation.
- D. Fine Aggregate: Clean, sharp, natural sands free from loam, clay, lumps, or other deleterious substances.
- E. Coarse Aggregate: Clean uncoated, processed aggregate containing no clay, mud, loam, or foreign matter as follows:
  - 1. Crushed stone or crushed gravel processed from natural rock or stone with maximum size of 3/4 inch for pumped mix.
- F. Water: Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substance that may be deleterious to concrete or steel, and must not contain more chloride ions than are present in municipal drinking water, but not more than 0.1 percent.
- G. Admixtures:
  - 1. Responsibility: The Testing Laboratory employed shall be charged with full control of the use of the admixture under the direction of the manufacturer's representative. The design mix shall include the admixture, and the quantity of concrete ingredients shall be based on the influence of the admixture. All admixtures shall conform to ASTM C494. Notify the admixture manufacturer not less than 14 days before pouring concrete on how the admixture is being used. When an admixture is approved for this Project, no change shall be made in the brand or quality of the admixture without the written approval of the Architect/Engineer and Ice System Contractor, and if a change is granted then a new design mix shall be determined by the laboratory.
  - 2. Water Reducing Admixture: Eucon WR-75 by the Euclid Chemical Company, Pozzolith 200N by Master Builders, Plastocrete 160 by Sika Chemical Corporation, or approved equal. The admixture shall conform to ASTM C494, Type A, and not contain more chloride ions than are present in municipal drinking water, but not more than 0.1 percent.
  - 3. High Range Water Reducing Admixture, HRWRA (Superplasticizer): Eucon 37 by Euclid Chemical Company or Sikament by Sika Chemical Corporation. The admixture shall conform to ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water, but not more than 0.1 percent. The use of superplasticizer varies with every application; therefore, the Engineering Department of the supplier must be in attendance at the time of pouring to vary mixture as required. The HRWRA shall be added on-site.

4. Air Entraining Admixture: Air entraining admixture shall not be utilized in the design mix.

H. Proportioning and Design of Mixes:

1. Prepare design mix for the type and strength of concrete in accordance with applicable provisions of ASTM C94, Alternative No. 3.
2. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture that will readily work into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate, honeycomb, or allow excess free water to collect on the surface.
3. Select the size of coarse aggregate suitable for the size and amount of reinforcement in the rink slab. The Contractor shall use blends of Nominal Commercial Grades of coarse aggregate where necessary in order to produce the results required by these Specifications.
4. All concrete for this Project shall be furnished by a Ready-Mixed concrete plant approved by the Architect/Engineer before delivery of any concrete. All ready-mix concrete shall meet the ASTM C94 (latest edition).
5. The required strength of the concrete specified shall be produced in the actual construction in not more than 28 days after placing.
6. The rink slab shall be standard Portland with compression strength of 4,000 psi at 28 days. The cementitious content shall not be less than 564 lbs. per cubic yard. Water-cement ratio shall not exceed 0.42 and mix shall contain a high range water-reducing admixture as specified to produce the required properties.
7. Slump: Provide as follows:
  - a. All concrete containing water reducing and air-entraining admixture shall not exceed 3 inches on trucks prior to addition of the high range water-reducing admixture (superplasticizer).
  - b. All concrete containing the high range water-reducing admixture (superplasticizer) shall have a maximum slump of 8 inches, unless otherwise directed by the Engineer.

## 2.10 ICE FLOOR AND SUB-SOIL TEMPERATURE SENSORS

- A. Sensors: Three wire RTD 100 ohm platinum as manufactured by Pyromation, Omega Engineering, or approved equal.
- B. Control Wire: 3/C #18, 100 percent shielded with PVC jacket, Beldon 8770, or approved equal.
- C. Conduit: PVC, Schedule 40. Bends shall be long radius style.
- D. Junction Box: Malleable iron conduit body with malleable iron, cover with gasket.

## 2.11 ICE FLOOR AND SUB-SOIL TEMPERATURE MONITORS

- A. Existing temperature monitor/controllers in the refrigeration equipment room shall be reused.

## 2.12 CIRCULATION FLUID CHARGE

- A. Refrigeration Floors (Cold): 1.21 Specific Gravity Calcium Chloride Brine Solution. At the Contractor's option, the brine solution may consist of all new material, salvaged existing material, or a combination of new and salvaged material. If salvaged material is reused, the material shall be passed through a fine screen to remove debris.
- B. The deionized water used to mix the solution shall contain no more than 100-ppm calcium carbonate hardness, 50-ppm calcium plus magnesium ions, or 50-ppm chloride plus sulfate ions.
- C. Organic corrosion inhibitor shall be provided at a dosage rate recommended by the inhibitor manufacturer. Corrosion inhibitor shall be Hood Chemical phosphonate-based formula WM8699, or approved equal.
- D. Tag shall be attached near the system's fill point containing the following information:
  - 1. Date of original system charge.
  - 2. Description of fluid, including manufacturer's name, address, and phone number.
  - 3. Freezing point and burst point.
  - 4. Total system gallons.
  - 5. Reference to Material Safety Data Sheet.

## 2.13 CONCRETE SEALER (PROVIDE IF ALTERNATE BID NO. 2 IS AWARDED ONLY)

- A. Approved Manufacturers and Product: Sonneborn Lapidolith, or approved equal.
- B. Sealer shall be penetrating magnesium fluorsilicate hardener/dustproofers. Sealer shall not leave a visible film on the surface of the concrete.
- C. Sealer shall be designed to allow application to new concrete after a 16-day curing period.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. The Ice System Contractor shall notify the Engineer a minimum of 5 days in advance of the covering of any sub-soil heat or rink refrigeration pipe or tubing so that necessary inspections can be accomplished. The Engineer's authorized representative must have inspected, witnessed pressure testing, and approved of all piping systems prior to covering them with sand or concrete.

### 3.02 SUBGRADE DRAINAGE

- A. Install the rink subsoil drainage system and prepare the rink concrete subfloor at elevation 98'-8". Install drain board over the subfloor if Alternate No. 1 is awarded. Connect drain board sections and cover ends in conformance with the manufacturer's instructions.

### 3.03 SUB-SOIL HEATING GRID

- A. All jointing shall be accomplished by fusion welding.

- B. There shall be no joints in the heat tubing, except at the connections to the headers.
- C. The sub-soil heat piping shall be installed as shown on the Drawings.
- D. The sub-soil heat grid shall be covered with clean, compacted sand, and fine graded to elevation  $99'-4" \pm 1/4$  inch over the entire rink surface except at the main header trench. Sand compaction shall be to minimum 95% of the standard Proctor Density.
- E. Pressure testing of piping shall be performed and approved before covering the pipe with sand. Apply a pressure of 60 psig for a period of 24 hours. After the 24 hours test has passed, increase the pressure to 75 psig for 10 minutes. Maintain the pressure in the system at minimum 40 psig until the rink concrete placement is completed. Check gauge pressure on a daily basis to verify no leakage has occurred.
- F. The sub-soil heating system shall be filled with 40% ethylene glycol circulation fluid as specified in Section 13 18 14.13 Ice Rink Subsoil Heat Modifications.

### 3.04 FLOOR INSULATION

- A. Insulation board shall be installed as indicated on the Drawings by mechanics skilled in the trade.
- B. Joints shall be offset as detailed on the Drawings.
- C. Top layer of insulation board shall be secured with mastic where necessary at ends and trenches.
- D. All cuts and miters shall be made by saw cutting.
- E. Apply 6 mil thick clear polyethylene sheeting both under and over insulation layers.
- F. Overlap poly sheeting 12 inches in all directions when installing.
- G. Tape all joints of poly sheeting continuously with compatible tape.

### 3.05 TUBING SPACER/SUPPORTS

- A. Spacers shall be installed 3 feet on center across the long dimension of the rink and overlapped at least 2 tubing runs for a continuous run across the short distance of the rink.
- B. Fasten any piping not sufficiently held in place with wire or nylon ties.

### 3.06 RINK FLOOR REINFORCEMENT

- A. Install steel rebar and mesh as shown on the Drawings.
- B. The rebar shall be installed so that the lower bars run the long dimension of the rink and the upper bars run the short dimension of the rink. Bars shall be tied at every other crossing and the ends of the ties turned downwards. Minimum 25 inches spliced rebar lap length.



- C. Wire mesh shall be installed with a 6 inches lap on all edges. Mesh shall be tied a maximum 2 feet on center, or more if necessary to firmly fasten the mesh to the underlying piping and rebar. Ends of all ties shall be turned down.

### 3.07 RINK FLOOR TUBING

- A. All tubing shall be continuous. Joints will be allowed only at connections to headers and return bends.
- B. Tubing shall be tied at each support with wire or nylon ties. Ends of ties are to be turned downward so as not to protrude above finished floor.
- C. The interior piping at fusion welded joints, wherever possible, shall be visually inspected to verify joints are formed to manufacturer's specifications. All joints between the header, riser pipes, and the tees shall be inspected before fusion welding rink tubing to the tees to assure there is no blockage.
- D. Tolerance:
  - 1. All refrigerant piping shall be within +/- 1/4 inch of the specified elevations shown on the Drawings.
  - 2. 4 inch by 4 inch plastic shims shall be used if necessary for adjusting elevations of pipe supports to the specified tolerances.
- E. Pressure testing of pipe shall be completed before placing the concrete. Apply a pressure of 60 psig for a period of 24 hours. After the 24 hours test has passed, increase the pressure to 75 psig for 10 minutes. Maintain the pressure in the system at minimum 40 psig until the rink concrete placement is completed. Check gauge pressure on a daily basis to verify no leakage has occurred.

### 3.08 CONCRETE FLOOR

- A. General:
  - 1. The entire rink floor shall be made in one continuous pour. The concrete criteria shall be as herein specified and as noted on the Drawings and details.
  - 2. All concrete used in the floor slab shall be placed by a method approved in every detail by both the Engineer and the Ice System Contractor.
  - 3. The concrete supplier shall provide one or more standby trucks to cover the possibility of breakdown or load rejection.
  - 4. The Contractor shall have standby pumping equipment on the Project Site in the event of primary equipment breakdown. Hand pushed wheelbarrows or powered buggies are not an acceptable standby method.
  - 5. Provide rubber tires and plywood under pump piping couplings located across unpoured rink area if concrete placement is by pumping method.
- B. Pre-Placement Inspection and Tests:
  - 1. Ice System Contractor: Before placing of concrete, inspect the formwork installation, reinforcing steel, and pipe, and all items to be embedded or cast-in. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work, as required.

2. Owner's Representative: After completion of all installations and inspection by Ice System Contractor, all work will be inspected by the Engineer to the placement of concrete. Ice System Contractor shall plan and coordinate the work to provide 5 days advance notice that the work will be ready for the concrete placement.
  3. Tests:
    - a. All testing of the ice rink piping shall be completed as specified elsewhere in these Specifications. Maintain the pressure in the subsoil heating piping and rink piping systems at minimum 40 psig until the rink concrete pour is completed. Check gauge pressure on a regular basis to verify no leakage has occurred.
    - b. Ice System Contractor shall coordinate the proposed pouring schedule to permit ample time for completion of tests and corrective measures, if required, and re-testing as necessary.
    - c. Prior to concrete placement a certified survey shall be performed by the Ice System Contractor, in an 8-foot grid pattern over the entire ice rink surface area and recorded in permanent format which correctly identifies each elevation with its location in the rink. This data shall be submitted to the Engineer.
  4. Acceptance: Concrete shall not be placed until authorization to proceed is furnished by the Engineer.
- C. Concrete Placement: Comply with ACI 304, and as herein specified:
1. Before depositing concrete, the rink area shall be free of water, frost, loose or softened earth; the area shall be cleaned of all debris.
  2. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation of aggregate due to re-handling or flowing. No concrete that has been partially hardened or been contaminated by foreign materials shall be deposited in the rink area, nor shall re-tempered concrete be used.
  3. All concrete delivery trucks shall include drum revolution counters that are automatically activated when the drum is at mixing speed. For truck-mixed loads, the concrete mixture shall be mixed at full mixing speed for a minimum of 70 revolutions and maximum of 100 revolutions after all ingredients, including water, are in the drum. For central plant batching, the batch shall be mixed before filling the trucks, at the rate recommended by the plant manufacturer. If additional water, cement, or admixtures are added after the initial batching, with approval of the Engineer, the batch shall be mixed an additional 30 revolutions at full mixing speed. The truck drum shall be operated at slower agitating speed at all other times.
- D. Hot Weather Placing: When hot weather conditions exist and the daytime temperature is expected to reach or exceed 80 degrees F or more, place concrete in compliance with ACI 305 and as herein specified. Cool ingredients before mixing to maintain concrete temperature at time of placement below 75 degrees F. Wet forms thoroughly before placing concrete.
- E. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures in compliance with ACI 306.
- F. Concrete Testing: Contractor shall coordinate, perform, and pay for all of the following tests:
1. Concrete Strength Tests:
    - a. Mold and cure three specimens from each sample in accordance with ASTM C31. Any deviations from the requirements of ASTM C31 shall be recorded in the test report.

- b. Test specimens in accordance with ASTM C39. Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information. The acceptance test results shall be the average of the strengths of the two specimens tested at 28 days.
    - c. Make at least one strength test for each 100 cu. yds., or fraction thereof, of each mixture design of concrete placed in any day.
    - d. A copy of the test results shall be furnished to the Engineer as soon as available.
    - e. All costs of concrete testing shall be paid by the Contractor.
  - 2. Concrete Slump Tests:
    - a. Determine slump of concrete before and after adding superplasticizer from trucks in accordance with ASTM C143. The first three truck loads shall be tested and every third truck load thereafter.
    - b. If slump does not meet Specifications, remove batch from work and dispose of offsite.
  - 3. Concrete Air Content Tests:
    - a. Determine air content of concrete before and after adding superplasticizer from trucks in accordance with ASTM C231. The first three truck loads shall be tested, and every third truck loaded thereafter.
    - b. If air content does not meet Specifications, remove batch from work and dispose off-site.
  - 4. Concrete Temperature:
    - a. Determine temperature of concrete from trucks. The first three truck loads shall be tested, and every third truck loaded thereafter.
- G. Consolidation: Where a surface mortar is to be the basis of the finish, the coarse aggregate shall be worked back from the forms with a suitable tool to bring a full surface of mortar without the foundation or excessive surface voids. All concrete shall be consolidated by vibration at point of placement so that the concrete is thoroughly worked around the reinforcement, around embedded items, into corners of forms, eliminating all air or stone pockets which may cause honey-combing, pitting, or planes of weakness to insure total encasement. Road, Morrison, and vibrating screeds will not be acceptable. Mechanical vibrators (2 required) shall have a minimum frequency of 8000 revolutions per minute and shall be operated by competent personnel. Over-vibrating and the use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at many points, from 18 to 30 inches apart. At each insertion, the duration shall not be sufficient to cause segregation, generally from 5 to 15 seconds' duration. A spare vibrator (3 total) shall be kept on the Project Site during all concrete placing operations.
- H. Finishing: Entire rink pour level must be maintained by the constant use of a laser level. No water may be added to the concrete at any time. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when bleed water has disappeared. Floating operation to be either machine or hand finished to make surface smooth by means of a rigid surface float. Cut down high spots and fill low spots. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. It shall be the Contractor's responsibility to provide a fogging system or chemical finishing aids if required to prevent rapid surface moisture loss which may cause blistering of concrete.
- 1. Trowel Finish: Apply trowel finish to slab surface. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Use of water without finishing agent

during final trowel finish is not acceptable. Consolidate concrete surface by final power troweling operation, free of trowel marks, uniform in texture and appearance.

2. Provide a slightly textured "light fuzz" finish as directed by the Engineer. Elevation of top of rink slab must be set by use of a laser level to within a tolerance of plus or minus 1/4 inch from a true level plane.
- I. Curing and Protection:
1. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures, and maintain without drying at a relatively constant temperature for a period of time necessary for hydration of cement and proper hardening, a minimum of 14 days. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
  2. Curing Method: Perform curing of concrete by moist curing. Entire rink slab shall be covered with 6 mil poly sheeting as soon as possible after finishing and maintained in a covered condition for a minimum of 14 days. After the moist curing period is completed, the poly sheeting may be removed, however the rink slab shall not be refrigerated for a minimum 28 days after the pour.

### 3.09 CONCRETE SEALER (INSTALL ONLY IF ALTERNATE BID NO. 2 IS AWARDED)

- A. Install sealer in conformance with manufacturer's recommendations. Allow minimum 14-day curing period plus sufficient time for the concrete surface to thoroughly dry prior to application of sealer. Sealer shall be applied prior to installation of dasher boards.
- B. Apply sealer with roller, sprayer, brush, or squeegee at coverage rate and number of coats recommended by the manufacturer.
- C. Sealer shall be applied prior to installation of the expansion joint seal and the dasher boards. Prior to installation of the expansion joint seal, any sealer on the vertical edges of the concrete joint shall be removed by using a wire brush, scrapers, sandblasting, or other acceptable means.

### 3.10 TEMPERATURE MONITORING

- A. Sensors, conduits, and cables to be installed in the rink as shown on the Drawings.
- B. Connect new conduits and wires to the existing temperature monitors in the equipment room.

### 3.11 COMPRESSION SEAL

- A. Cut back filler joint material to required depth and prepare concrete surface in conformance with seal manufacturer's instructions. If Alternate Bid No. 2 is awarded, the compression seal shall not be installed until after concrete sealer is applied and has cured.
- B. Install compression seal in conformance with manufacturer's instructions.

## END OF SECTION

## **SECTION 13 18 14.13**

### **ICE RINK SUBSOIL HEAT MODIFICATIONS**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

###### **A. SECTION INCLUDES**

1. Modifications to the existing subsoil heat mechanical system.

###### **B. GENERAL REQUIREMENTS**

1. General Description: The existing subsoil heat mechanical systems include a single ammonia/brine heat exchanger, two circulation pumps, expansion tanks, piping, valves, and controls. The systems circulate heated calcium chloride brine solution through the subsoil heating piping networks under both existing ice rink floors.
2. System Operational Status: The circulation pump for the south rink has not regularly operated for over 3-years, and the pump for the north rink has not regularly operated for approximately one year. Both pumps were tested in December 2018 and were operable when power was applied. The heat exchanger steel tubes may be corroded since it is not full of liquid and is susceptible to corrosion due to air and brine residue in the vessel.
3. Proposed Modifications: Several modifications to existing are proposed as part of the current project, including:
  - Remove and replace the existing calcium chloride brine solution with new 40 percent ethylene glycol solution, which is less susceptible to corrosion.
  - Replace the existing heat exchanger with a new heat exchanger designed for operation with ethylene glycol rather than brine. Replacement of the heat exchanger will include minor modifications to glycol and ammonia piping connections to the vessel.
  - Replace the impellers on both existing circulation pumps.

##### **1.02 RELATED SECTIONS**

###### **A. Related Work Specified Elsewhere:**

1. Division 00 Procurement and Contracting Requirements and Division 01 - General Requirements Sections apply to work of this Section.
2. Section 13 18 00 - Ice System General.
3. Section 13 18 14.15 - Refrigeration System Insulation.
4. Section 13 18 14.17 - Ice System Piping and Fittings.

##### **1.03 SUBMITTALS**

- ###### **A. Submit shop drawings, Operation and Maintenance Manuals, and/or all equipment and materials as required in Section 13 18 00 - Ice System General.**

##### **1.04 WARRANTY/SERVICE**

- ###### **A. Shall be as required in Section 13 18 00 - Ice System General.**

## 1.05 QUALITY ASSURANCE

- A. Shall be as required in Section 13 18 00 - Ice System General.

## 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Shall be as required in Section 13 18 00 - Ice System General.

# PART 2 PRODUCTS

## 2.01 PIPING

- A. As specified in Section 13 18 14.17 - Ice System Piping and Fittings.

## 2.02 HEAT SYSTEM PUMP REPLACEMENT IMPELLERS (FOR TWO EXISTING PUMPS)

- A. Existing Pumps: Armstrong Model 4280, 3 x 2 x 8, 5 HP 1750 RPM 460/3/60 motors. Designed for operation with 21% CaCl brine, 150 GPM @ 52' head.
- B. New impellers shall be sized and provided by Armstrong. Impellers shall be cast bronze, or another material if recommended by Armstrong for use with 40% ethylene glycol fluid. Impellers shall be trimmed to operate at 100 GPM at 58' head for the south rink pump and at 140 GPM at 56' head for the north rink pump. Flowrates to the two rinks vary because the subsoil heat piping configurations are different, and a higher flowrate is required to the north rink in order to maintain adequate flow velocity through the tubes. Existing 5 HP motors shall remain.

## 2.03 HEAT EXCHANGER

- A. Approved Manufacturers: HT Industrial or approved equal.
- B. Heat exchanger shall be a shell and tube condenser designed for the following conditions:

Primary refrigerant	R-717 ammonia
Secondary refrigerant	40% ethylene glycol/water solution
Heat exchanged	18.0 tons (216,000 BTU/hr)
Ethylene glycol flowrate	240 GPM
R-717 condensing temp.	90°F
Ethylene glycol temp. in	40.0°F
Ethylene glycol temp. out	42.0°F ±
Ethylene glycol pres. drop	Max. 2.5 psi.
Fouling resistance	0.0005
Shell side pressure rating	300 PSI
Tube side pressure rating	150 PSI
Tubes	0.75" OD plain carbon steel

## 2.04 CIRCULATION FLUID

- A. Circulation fluid shall be a 40% by volume solution of inhibited ethylene glycol and deionized water. Fluid shall be Dowtherm SR-1 or approved equal.

- B. The fluid shall be an industrial heat transfer fluid specifically designed for use in HVAC systems.
- C. The fluid shall contain corrosion inhibitors, buffers, and antifoam agents. Automotive antifreeze, uninhibited glycol, or field/distributor-inhibited solutions are not acceptable.
- D. Fluid properties of the glycol/water mix shall conform to the following:
 

Freezing point	-9.4°F
pH	9.0 to 10.5
Reserve alkalinity	12.0 ml
Specific gravity	1.065 at 50°F
Specific heat	0.821 BTU/lb degrees F at 50°F
Thermal conductivity	0.2342 BTU/hr-ft² (degrees F/ft) at 50°F
Viscosity	4.05 centipose at 50°F
- E. The deionized water used to mix the solution shall contain no more than 100 ppm calcium carbonate hardness, 50 ppm calcium plus magnesium ions, or 50 ppm chloride plus sulfate ions.
- F. A tag shall be attached near the system fill point containing the following information:
  1. Date of original system charge.
  2. Descriptions of fluid including manufacturer's name, address, and phone numbers.
  3. Freezing point.
  4. Total system gallons.
  5. Reference to Material Safety Data Sheet.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install new heat exchanger in accordance with manufacturer's instructions.  
Access/service space around unit shall not be less than minimum space recommended by manufacturer and by mechanical codes.
- B. Revise adjacent glycol, ammonia, and relief vent piping as necessary to connect to new heat exchanger connection points.
- C. Disassemble exiting circulation pumps and install new pump impellers in conformance with manufacturers recommendations. Install new pump seals and gaskets where existing are removed or disturbed.
- D. Remove existing CaCl brine solution from both rink floors, transmission mains, and equipment as described in Section 02 41 19 Selective Demolition. Install full charge of specified 40 percent ethylene glycol solution to fill new heat exchanger, new south rink subsoil heat piping, existing north rink subsoil heat piping, and transmission mains. Circulate fluid for a minimum 5 days and remove air from the system as necessary. Pressure test system as described in Section 13 18 13.01 Ice Rink Floor - Concrete Surface.

### **3.02 PAINTING**

- A. Touch-up damaged coatings with touch up kit provided by equipment manufacturer.
- B. All vessels, piping, and other system components subject to rust or corrosion, and not provided with a factory finish, shall be field primed and painted with two coats of alkyd egg-shell enamel.

### 3.03 START-UP

- A. A factory trained service representative shall be present at the time when the new heat exchanger and revised pumps are placed into service and turned over to the Owner.

### **END OF SECTION**



## **SECTION 13 18 14.15**

### **REFRIGERATION SYSTEM INSULATION**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes
  - 1. Pipe and equipment insulation.

##### **1.02 RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Division 00 Procurement and Contracting Requirements and Division 01 - General Requirements Sections apply to work of this Section.
  - 2. Section 13 18 00 - Ice System General.
  - 3. Section 13 18 14.13 - Ice Rink Subsoil Heat Modifications.
  - 4. Section 13 18 14.17 - Ice System Piping and Fittings.

##### **1.03 SUBMITTALS**

- A. Submit shop drawings on all materials as required in Section 13 18 00 - Ice System General.

##### **1.04 WARRANTY/SERVICE**

- A. Shall be as required in Section 13 18 00 - Ice System General.

##### **1.05 QUALITY ASSURANCE**

- A. Shall be as required in Section 13 18 00 - Ice System General.

##### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Shall be as required in Section 13 18 00 - Ice System General.

#### **PART 2 PRODUCTS**

##### **2.01 PIPING AND EQUIPMENT INSULATION**

- A. Manufacturers: Armstrong World Industries – Armaflex II, Owens-Corning, Manville, DOW Knauf, Certainteed, or approved equal.
- B. Materials:
  - 1. Materials or accessories containing asbestos will not be accepted.
- C. Use composite insulation systems (insulation, jackets, sealants, mastic, and adhesives) that have a flame spread rating of 25 or less and smoke developed rating of 50 or less, with the following exceptions:

1. Outdoor mechanical insulation may have a flame spread rating of 75 and a smoke developed rating of 150.
  2. Pipe insulation that is not located in an air plenum may have a flame spread rating not over 25, and a smoke developed rating no higher than 150.
  3. Materials shall be compatible and shall not contribute to corrosion, softening, or otherwise attack surfaces to which applied. Materials to be used on stainless surfaces shall meet ASTM C795 requirements. Specification of a specific manufacturer and products of other manufacturers are acceptable provided that they are essentially identical in properties and performance.
- D. Insulating materials shall be fire retardant, moisture and mildew resistant, and vermin proof.
- E. Insulation shall be suitable to receive jackets, adhesives, and coatings as indicated.
- F. Type:
1. Type 3, Flexible Elastomeric Thermal Pipe Insulation:
    - a. Suitable for service from -40 degrees F to +220 degrees F.
  2. Type 5, Extruded Polystyrene:
    - a. 1.8 lb/cubic feet density, Dow Styrofoam, or approved equal.
- G. Protective Jackets:
1. Type 2, PVC Jacket:
    - a. ASTM C921, 1 piece molded type fitting covers and sheet material, color as specified.
    - b. Minimum service temperature of 0 degrees F. Maximum service temperature of 150 degrees F.
    - c. Moisture vapor transmission ASTM E96; 0.002 perm inch.
    - d. Maximum flame spread ASTM E84; 25. Maximum smoke developed ASTM E84; 50.
    - e. Thickness of 30 mil with connections being brush-on welding adhesive. Cover adhesive mastic shall be compatible with insulation.
  2. Type 3, PVC Jacket:
    - a. ASTM D1784, Grade 1. High impact seamless PVC jacket, color as specified.
- H. Accessories:
1. All products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of the systems to which they are applied.
  2. Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.
  3. Insulation bands to be 3/4 inch wide, constructed of aluminum, or stainless steel. Minimum thickness to be .015 inch for aluminum and .010 inch for stainless steel.
  4. Insulating cement to be ANSI/ASTM C195, hydraulic setting mineral wool.
  5. Finishing cement to be ASTM C449.
  6. Bedding compounds to be non-shrinking, and permanently flexible.
  7. Vapor barrier coatings to be non-flammable, fire resistant, polymeric resin.
  8. Wire mesh reinforcing shall be corrosion resistant metal with a hexagonal pattern.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. The Contractor shall notify the Engineer a minimum of 5 days in advance of placing insulation so that necessary inspections can be performed.
- B. Do not insulate systems or equipment that are specified to be pressure tested or inspected until testing and inspection have been successfully completed.

### 3.02 GENERAL INSTALLATION

- A. Insulation, jackets or accessories shall only be installed under ambient temperatures or conditions recommended by the manufacturer of the material.
- B. Insulation and jackets shall be provided as indicated in Schedules 3.03.F and 3.04.E. Schedules apply to both exposed and concealed applications, unless noted otherwise.
- C. Install insulation with smooth and even surfaces, and on clean and dry surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled terminations at all nameplates, un-insulated fittings, or at other locations where insulation terminates.
- D. Use full-length material (as delivered from manufacturer) wherever possible.
- E. Provide removable insulation sections to permit easy access, where inspection service or repair, are required.
- F. Install jackets with longitudinal joints facing wall or ceiling.
- G. Insulation shall be continuous through sleeves and openings except where partitions or assemblies are fire rated. Penetrations through rated assemblies shall be sealed with fireproofing insulation.

### 3.03 PIPING, VALVES, AND FITTING INSULATION

- A. Fittings and valves may be insulated with factory molded or built up insulation. Built up insulation must have the same thickness as adjoining insulation.
- B. Provide inserts of high-density block insulation at hanger or support locations. Insert must be installed under the finish jacket on piping 2 inches and larger to prevent insulation from sagging or compressing at support points. Inserts shall be heavy density insulating material suitable for the operating temperature range of the system being insulated. Wood blocks will not be accepted. Insulation inserts shall not be less than the following lengths:

<u>Pipe Size</u>	<u>Length</u>
Through 2-1/2 inches	10 Inches
3 Inches to 6 Inches	12 Inches
8 Inches to 10 Inches	16 Inches
12 Inches and larger	22 Inches

- C. Insulation shall be applied to piping with butt joints and longitudinal seams closed tightly.
- D. All seams and butt joints must be sealed with an adhesive recommended by the insulation manufacturer.
- E. Type 2 and Type 3 insulation shall be applied to piping with bonding adhesive and staggered joints. Fill all joints and seams with vapor barrier sealant.
- F. Provide and install pipe insulation as indicated in the following schedule:

PIPING TYPE	INSULATION TYPE	THICKNESS	JACKET
Exposed Cold Brine Piping	Type 5	2"	Type 2
Exposed Subsoil Heat Piping	None	N.A.	None
Buried Cold Brine Piping	Type 5	3"	Type 3
Buried Subsoil Heat Piping	None	N.A.	None

### 3.04 EQUIPMENT INSULATION

- A. Where equipment is specified to be leak tested prior to operation, do not install insulation until testing and any necessary repairs have been successfully completed.
- B. Insulation shall be applied to equipment shells with bonding adhesive and staggered joints. Fill all open joints and seams with vapor barrier sealant.
- C. Provide insulated boxes with protective jacket where access is required for cleaning, repair, or inspection. Boxes must be easily removable without causing damage to insulation, or equipment.
- D. Provide and install equipment insulation as follows:

EQUIPMENT	INSULATION TYPE	THICKNESS	JACKET
Heat Pumps (2)	None	N.A.	None
Subsoil Heat Exchanger	None	N.A.	None

**END OF SECTION**

## **SECTION 13 18 14.17**

### **ICE SYSTEM PIPING AND FITTINGS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Piping and fittings for ice systems outside the rink floor.

##### **1.02 RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Division 00 Procurement and Contracting Requirements and Division 01 - General Requirements Sections apply to work of this Section.
  - 2. Section 13 18 00 - Ice System General.
  - 3. Section 13 18 13.01 - Ice Rink Floor - Concrete Surface.
  - 4. Section 13 18 14.13 - Ice Rink Subsoil Heat Modifications.
  - 5. Section 13 18 14.15 - Refrigeration System Insulation.

##### **1.03 SUBMITTALS**

- A. Shall be as required in Section 13 18 00 - Ice System General.
- B. Submit results of all pressure tests.

##### **1.04 WARRANTY/SERVICE**

- A. Shall be as required in Section 13 18 00 - Ice System General.

##### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Shall be as required in Section 13 18 00 - Ice System General.

#### **PART 2 PRODUCTS**

##### **2.01 POLYETHYLENE PIPE**

- A. As specified in Sections 13 18 13.01 - Ice Rink Floor - Concrete Surface.
- B. Polyethylene piping shall be utilized for below grade glycol transmission piping for the ice rink chilling and subsoil heat systems.

##### **2.02 STEEL PIPE**

- A. Steel pipe shall be Schedule 40 carbon steel.
- B. Joints shall be full penetration welded.
- C. Fittings shall be ANSI 11.9 carbon steel welding type.

- D. Steel piping shall be used for above grade glycol piping for the ice rink subsoil heat systems.

## 2.03 PVC PIPE

- A. PVC Piping shall be Schedule 40, as described on the drawings.
- B. Solvent welded, threaded, or flanged fittings and connections.
- C. PVC piping shall be used only for the outlet piping from the subsoil drainage system. PVC piping is not acceptable for above grade or below grade glycol piping for ice rink chilling or subsoil heat systems.

## PART 3 EXECUTION

### 3.01 GENERAL INSTALLATION

- A. Seal annular space around pipe penetrations through existing fire-rated walls, ceilings, or floors with fire-rated sealant.
- B. Provide drain lines and valves in locations necessary for complete drainage of the system, including all low points in the piping system and equipment.
- C. All piping shall be supported in such a way to eliminate swaying and vibration transmission.
- D. Dielectric couplings shall be installed wherever dissimilar metal pipes, fittings, or equipment items are joined.

### 3.02 INSTALLATION AND BACKFILLING OF BURIED PIPE

- A. Remove overlying concrete floors above trench routes. Sawcut all trench edges for full depth of concrete slab.
- B. Verify locations of existing utility lines prior to excavation. Protect existing piping and conduits from damage.
- C. Backfill using material removed from the excavation. Fill material shall be compacted to minimum 95 percent of the Standard Proctor Density.

### 3.03 BRINE AND GLYCOL PIPING PRESSURE TESTS

- A. The Engineer shall witness the testing. Provide 5 days' notice to allow the Engineer to be on the Project Site.
- B. Buried glycol and brine piping, headers, transmission mains, and rink floor piping and tubing shall be tested as described in Section 13 18 13.01– Ice Rink Floor – Concrete Surface.
- C. New above ground glycol piping shall be tested simultaneously with buried piping.

### 3.04 AMMONIA REFRIGERANT PIPE PRESSURE TEST

- A. At the completion of the ammonia refrigerant pipe modifications, any new or modified steel piping systems shall be pressure tested.
- B. Testing: Piping systems shall be evacuated and leak tested in accordance with ASHRAE 15.

### 3.05 PRIMARY REFRIGERANT CHARGING

- A. After the piping system has been evacuated, the system shall be evacuated and then filled with ammonia refrigerant as specified in Section 13 18 00 - Ice System General to the optimum operating level.

### 3.06 INSULATION

- A. Pipes and equipment shall be insulated as specified in Section 13 18 14.15 - Refrigeration System Insulation.

**END OF SECTION**

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**SECTION 13 18 16**  
**ICE RINK DASHER BOARDS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes:
  - 1. Removal, storage, replacement, and renovations to existing dasher board system.

**1.02 RELATED SECTIONS**

- A. Related Work Specified Elsewhere:
  - 1. Division 00 Procurement and Contracting Requirements and Division 01 – General Requirements Sections apply to work of this Section.
  - 2. Section 02 41 19 - Selective Demolition.
  - 3. Section 13 18 00 - Ice System General.
  - 4. Section 13 18 13.01 - Rink Floor - Concrete Surface.

**1.03 SUBMITTALS**

- A. Where revisions to existing dasher boards are proposed at the player box corners as described later in this section, the contractor shall prepare shop drawings that itemize sizes and materials, as well as construction details for installation.
- B. Polyethylene samples shall be submitted for Owner/Engineer approval of color and quality of new red poly caprail material.

**1.04 QUALITY ASSURANCE**

- A. All materials shall be per Drawings and Specifications, and constructed, manufactured, and installed per Drawings and Specifications. All materials supplied under these Specifications shall be new and of the best grade material and construction. Contractor must have at least five installations in the past 5-years similar in construction to the following Specifications. A list of these installations including names, addresses, contacts, and telephone numbers is to be included with requests for prior approval of contractors other than those listed in Paragraph 13 18 16.2.01.A below.

**1.05 GUARANTEE**

- A. Contractor shall guarantee all new components and equipment from defects in materials and/or workmanship for a period of two years from substantial completion.

**1.06 SCHEDULE**

- A. Existing dasher board components shall be removed from the rink immediately after the project Notice to Proceed is issued, so the demolition of the existing rink floor can proceed.

- B. Installation of the dasher board cast-in-place insert anchors shall be coordinated to occur immediately prior to the new rink concrete placement date.
- C. Modification and reinstallation of the dasher board components shall be arranged to coordinate with the Substantial Completion Date of the Project.

## **PART 2 PRODUCTS**

### **2.01 ACCEPTABLE SUPPLIER/INSTALLERS**

- A. Dasher Board Systems:
  - 1. Becker Arena Products.
  - 2. Athletica, Inc.
  - 3. Rink Systems, Inc.
  - 4. Others by prior approval only.

### **2.02 MATERIALS AND EQUIPMENT**

- A. Demountable Dasher Board Sections:
  - 1. Existing galvanized, welded steel frame work and poly facing shall be reused. Existing dasher boards were manufactured by Integrated Fabrication (no longer in operation) in year 2004.
  - 2. Standard size of the existing dasher panels is 96" long by 42" high.
  - 3. Contractor shall inspect and repair steel dasher frames as described later in this section. Dasher boards appear to be in generally good condition, however the extreme depth of ice adjacent the boards has pushed them outwards, which may have caused deformation of members, failed welds, or damaged hardware.
- B. Floor Anchors:
  - 1. The Contractor shall supply all new cast-in-place insert anchors and hardware required for the installation of the dasher boards and boxes around the perimeter of the new ice rink floor. Installation of the anchors within the concrete rink slab shall be by the Dasher Board Contractor. Rink floor anchors shall be 3/4" zinc-plated steel internally threaded inserts, with minimum 4" x 4" x 1/4" steel base plates. Drilled-in 5/8" epoxy-set zinc-plated insert anchors shall be used for box walls located off the refrigerated rink floor.
  - 2. Existing steel hold down plates shall be re-used.
  - 3. Each anchor shall be supplied with a new zinc-plated steel bolt and washer to fasten dasher board foot plates to floor.
- C. Caprail:
  - 1. New high-density 1" thickness polyethylene caprail shall be provided at the 4 locations where new curved shielding is installed on the ends of the player boxes. The caprail shall be attached to the new and existing dasher frames using 1/4" by 1-3/4" Phillips flat head machine screws, flat washers, and 1/4" nylon insert lock nuts. Heads of screws to be painted to color match caprail. All exposed edges of the caprail shall have smooth and radiused edges. Grooves shall be cut to receive glass shielding bases, but not for the curved acrylic sections.
  - 2. Color of caprail shall be red, to match caprail on existing dasher board panels.

- D. Equipment, Skaters and Player Gates:
1. Existing welded steel gate frames, poly facing, and hardware shall be re-used.
  2. Contractor shall inspect and repair steel dasher frames, hinges, latches and hardware as described later in this section.
- E. Spectator Shield Mounting:
1. New aluminum spectator shield support posts shall be installed where new curved shielding is installed at ends of player boxes. Spring-loaded posts shall be provided as required by the NHL approved design.
  2. Existing aluminum spectator shield support posts shall be re-used at all other locations.
- F. Spectator Shielding:
1. Existing 6'-6" height tempered glass shielding shall be re-used at all locations, except where new curved acrylic shielding is installed at ends of player boxes, and where new sections of tempered glass are required directly adjacent the new curved shielding.
- G. Protective Netting:
1. Existing protective netting shall remain in place on the ends, spectator side, and all four radii of the rink. Netting shall be rolled up and secured to the ceiling structure while the demolition and new construction occurs.
  2. Existing netting shall be securely connected to top edge of the re-installed shielding and support posts.
- H. Curved Safety Shielding:
1. New curved shielding assemblies shall be installed at the ends of the existing player boxes (four locations).
  2. New curved shielding assemblies shall be a design that has been formally approved by the National Hockey League (NHL) and manufactured by a supplier who has provided identical mechanisms on past projects. Assemblies shall include spring loaded flex mechanisms in addition to the curved shielding component.
  3. New curved shielding sections shall be 6'-0" height, 3/8" thickness acrylic, not 6'-6" height, and not tempered glass.
  4. Installation of the new curved shielding will require the removal of existing shielding, support posts, caprail, and pads, as well as installation of new sections of tempered glass shielding, aluminum support posts, and caprail as necessary to accommodate the new curved acrylic shielding assemblies and to result in a complete continuous shielding system.
  5. Installation of new curved shielding on the outside corners of the player boxes (2 locations) will require installation of new divider wall sections that extend into the box area approximately 2'-0".

## **PART 3 EXECUTION**

### **3.01 REMOVAL AND REPAIRS**

- A. Existing dasher board frames, shielding, boxes and other components shall be removed from the rink floor and transported to a storage location within the facility. Available storage locations include the four team rooms and the corridor below the bleachers

adjacent the south rink. All components shall be labelled as necessary prior to removal to ensure they are reassembled in their original configuration. The Contractor shall provide all carts, racks, or devices necessary for the transportation and storage of the components. Where components are proposed to be stored on edge at areas with rubber flooring, minimum ½" thickness plywood shall be placed over the rubber flooring to prevent deformation or damage to the flooring.

- B. Any components that are not proposed to be re-used shall be removed and disposed of, except the four existing shielding pads shall be given to the Owner for their use.
- C. Once the existing dasher boards are removed, each welded steel frame section and gate shall be closely inspected by the Contractor to determine the extent of repairs that are necessary. Prior to performing repair work, the Contractor shall send a descriptive memo with photos to the Engineer and Owner with a cost estimate of the necessary repair work. Repairs shall not take place until the Engineer and Owner have authorized the repair scope and cost in writing. Once the exact extent of frame repair work is determined, a Change Order will be written to adjust the Contract Amount as necessary.
- D. Where existing dasher frames are damaged or corroded, repairs shall include rewelding to original design standards. Existing galvanized finish shall be removed by grinding prior to welding. After welding is completed, the repair areas shall be finished with cold-applied galvanizing paint.

### 3.02 INSTALLATION

- A. Contractor shall construct, fabricate, and deliver all materials to Site per Drawings and Specifications. All materials shall be installed to result in a complete dasher board system, with all dasher boards and spectator shielding to be straight and true to line and properly braced. Installation shall be done under the direct supervision of a manufacturer representative at all times. The use of installation subcontractors without full time manufacturer supervision is not acceptable.
- B. Installation shall be in strict conformance with manufacturer's requirements and instructions. Erect units rigid, straight, level, plumb, and true with horizontal and vertical lines level, securely anchored in place. Whether shown on the Drawings or not, this Contractor shall provide all trim, scribes, fillers, and other accessory materials for a complete, finished installation. No defective, scratched, marred, or otherwise damaged equipment and materials shall be installed.
- C. To insure skater safety, the vertical gaps between poly facing panels and poly kickplates will be measured after the dasher boards are installed, the ice rink floor is refrigerated, and the arena space has been cooled down to its normal operating temperature. Gaps between adjacent panels shall be no more than 3/16" in width. Where gaps exceed 3/16", the full adjacent facing panel or kick plate shall be removed and replaced with larger panels that will reduce the gap dimension below 3/16".

### 3.03 ADJUSTMENTS

- A. Put all items of equipment and systems through at least five complete cycles of operation, verifying that each item is properly installed and properly operating, and making required adjustments to achieve optimum operation.

### 3.04 CLEANING

- A. Clean all surfaces with spray-detergent and glass cleaner to remove surface dirt and debris. Intensive cleaning to remove old staining and puck marks will not be required.
- B. Replace all materials damaged during the removal, storage, and replacement operations at no cost to the Owner.

**END OF SECTION**

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