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ADDENDUM NO. 1

DATE OF ISSUANCE:	**JUNE 20, 2023**
PROJECT:	**MONTAGUE HIGH SCHOOL PERFORMANCE GYMNASIUM** **4900 Stanton Blvd** **Montague, MI 49437**
OWNER:	**Montague Area Public Schools**
ARCHITECT'S PROJECT NO.:	**22-136.20**
ORIGINAL BID ISSUE DATE:	**June 9, 2023**

SCOPE OF WORK

This Addendum includes changes to, or clarifications of, the original Bidding Documents and any previously issued addenda, and shall be included in the Bid. All of these Addendum items form a part of the Contract Documents. The Bidder shall acknowledge receipt of this Addendum in the appropriate space provided on the Bid Form. Failure to do so may result in disqualification of the Bid.

DOCUMENTS INCLUDED IN THIS ADDENDUM

This Addendum includes **2** pages of text and the following documents:

- Specification Sections: **23 0923**
- Drawings: **G 100A, G 101, G 101A, A 301, A 321, A 322, A 323, A 401, A 423, A 501**
- **GEOTECHNICAL REPORT & BORING LOGS**
- **Pre-Bid Meeting Minutes**

CHANGES TO PREVIOULSY ISSUED ADDENDA

None.

CHANGES TO SPECIFICATIONS

ADD-1 Item No. S-1 - Updated the Controls for the HVAC with correction for Schneider Controls

Refer to Specification Section: 23 0923 – DDC Controls for HVAC

1.3 APPROVED SYSTEM MANUFACTURER AND INSTALLATION

A. Use a specialized company to supply and install the system. Acceptable component manufacturing companies are:

1. Schneider Energy Management System
2. Other Manufacturers may submit pricing by voluntary alternate only.

CHANGES TO DRAWINGS

ADD-1 Item No. D-1 - Clarified Fire-Rating Key for Code official

Refer to Sheet(s): G 100, G 101, G 101A

1-Hour (existing wall, formerly not fire-rated)

ADD-1 Item No. D-2 - Clarified FR linework and added existing egress paths

Refer to Sheet(s): G 101, G 101A

Added the existing egress paths from the existing kitchen and cafeteria

ADD-1 Item No. D-3 - Elevation Key and drawing updated to correlate with Spec

Refer to Sheet(s): A 301, A 323

MP-1, Metal Panel is MBCI Style FW-120 in custom color to match Montague Blue school color and MSO Metal soffit is MBCI Style Flexloc in color to match Montague Blue school color. Drawing A 323 now has MSO Soffit Panel called out on the barrel shape of the canopy.

ADD-1 Item No. D-4 - Locations of 2-inch Acoustic Dovetail Deck & 1 ½-inch Metal Deck Clarified

Refer to Sheet(s): A 321, A 322

The 2-inch acoustic dovetail deck is only used on the high roof over Gymnasium 001 and the 1 ½-inch metal deck is used on the high roof of the Lobby 101 and all of the low roof. Refer to structural.

ADD-1 Item No. D-5 - Removed second layer of HD Coverboard from roof assembly and removed angles from Prebuck support

Refer to Sheet(s): A 321, A 322

ADD-1 Item No. D-6 - Accessory matrix updated

Refer to Sheet(s): A 401

Scoreboards will be owner purchased, owner installed

ADD-1 Item No. D-7 - Updated floor finish material in ST-2

Refer to Sheet(s): A 423

Floor finish in ST-2 at the main level is CPTL

ADD-1 Item No. D-8 - Glazing clarified

Refer to Sheet(s): A 501

Door Schedule Glazing types now include IG -2 Acid Etched with IG-2 to be used on the west elevation of Gymnasium 001 and frame 10 glazing is now GL-1 clear safety glass, and

ADD-1 Item No. D-9 - Wood doors 108A, 112, and 114 to be 90-min FR

Refer to Sheet(s): A 501

Wood door leaves 108A, 112, and 114 are to be 90-min FR and the hollow metal frames are to be 120-min FR

END OF ADDENDUM.

SECTION 23 0923 - DDC CONTROLS FOR HVAC

PART 1 - GENERAL

SCHEDULE 0 - SUMMARY

A. The Temperature Control Contractor (TCC) shall furnish and install a Building Management System (BMS), utilizing web based direct digital controls.

B. The control system shall be complete with all necessary panels, control devices, thermostats, transmitters, switches, dampers, motors and relays, workstation, and software to provide the functions described under sequence of operation, regardless of whether or not specifically specified.

C. The BMS shall consist of a DDC data communication network consisting of a primary peer-to-peer network, with optional secondary peer-to-peer networks connected to the primary. All system components and data points shall be accessible via a web browser. The internet web enabled graphical front end user interface shall have the ability to make custom programming changes via a web browser. Custom programming shall be defined as the alteration of actual control logic, not simply modifications to setpoints.

D. All DDC devices shall be BACnet NATIVE devices.

E. All Primary data network devices shall use TCP/IP Protocol for data communications and be IP addressable.

F. Provide a complete Building Management System comprising:

1. Sensors and actuators.
2. Controllers
3. System software.
4. Interconnecting wiring to the required termination points.
5. Testing and commissioning.
6. Maintenance during Warranty period.
7. Workstation and associated equipment, as required.

G. System Architecture

1. Provide as many controllers necessary to achieve the required control and monitoring functions, including the required spare points, and provision for system expansion.
2. The BMS shall be based on a distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on a true peer-to-peer, token passing Local Area Network (LAN). Small point/application specific controllers shall not be used for major plant items.
4. Each installation shall comply with local, state, and federal code requirements as applicable.

H. Operating Environment

1. Ambient temperature: 32-110 degrees F.
2. Relative humidity: 10-90% non-condensing.
3. Electrical supply: +/-10% of mains power.

I. Products Supplied by TCC but Not Installed Under This Section:

1. Control valves.
2. Flow switches.
3. Wells, sockets and other inline hardware for water sensors (temperature, pressure, flow).
4. Automatic control dampers, where not supplied with equipment.
5. Terminal unit controllers and actuators, when installed by terminal unit manufacturer.
6. Fan and Pump variable frequency drives. (This does not include VFDs integral to equipment).

J. Products Not Furnished or Installed by TCC but Integrated with the Work of This Section:

1. Rooftop HVAC control systems (BACnet compatible).
2. Boiler control systems.
3. Sewage pump control packages.
4. In-line meters (gas, water, power).
5. Chemical water treatment.
6. Smoke detectors (through alarm relay contacts).

K. Work Required Under Other Divisions Related to This Section:

1. Power wiring to line side of motor starters, disconnects or variable frequency drives.
2. Provision and wiring of smoke detectors and other devices relating to fire alarm system.
3. Campus LAN (Ethernet) connection adjacent to JACE network management controller.

1.2 QUALITY ASSURANCE

A. Uniformity and Supply

1. Provide a system of consistent architecture and control philosophy, with similar components of uniform manufacture. Provide Control Units from a single manufacturer.

B. Standards and Codes

1. Only use system components that are UL listed, CE compliant for Electromagnetic Compatibility (EMC) and comply with FCC Part-15 as applicable.

1.3 APPROVED SYSTEM MANUFACTURER AND INSTALLATION

A. Use a specialized company to supply and install the system. Acceptable component manufacturing companies are:

1. Schneider Energy Management System.
2. Other manufacturers may submit pricing by voluntary alternate only.

1.4 SUBMISSIONS

A. General

1. Provide a submittal for approval before any field installation is started, to include:

a. English language description of system operation.
b. Input/output schedules and controller configurations.
c. A copy of the database put into logical groups, which represents how information will be displayed to the user.
d. Floor plans showing location of all controllers and sensors.
e. Co-ordination drawings showing interface terminal numbers and cross-referenced wire numbers for all connections between the DDC and other equipment.
f. Details of all actuators, control devices and sensors.
g. Full details of each control station including equipment and wiring diagrams/terminal layouts.
h. Schematic diagrams of all systems to be controlled
i. A complete sequence of operation for each system
j. Schematic diagram for total DDC system layout
k. Points list summary
l. Itemized list of all graphic displays to be provided
m. Submittals done on CAD
n. Valve Schedule.

PART 2 - PRODUCTS

2.1 MULTIBLADE DAMPERS AND CONTROLS

A. Motorized low leakage control dampers that will not be integral to the equipment shall be furnished by the TCC . Control damper frames shall be constructed of galvanized steel, formed into channel and welded or riveted. Dampers shall be galvanized, with nylon bearings. Blade edge seals shall be vinyl. Blade edge and tip seals shall be included for all dampers. Blades shall be 16-gauge minimum and 6 inches wide maximum and frame shall be of welded channel iron. Damper leakage shall not exceed 4 CFM per square foot, at 1.0 inches water gauge static pressure.

B. Control damper actuators shall be furnished by the TCC . Two-position or proportional electric actuators shall be direct-mount type sized to provide a minimum of 5 in-lb torque per square foot of damper area. Damper actuators shall be spring return type. Operators shall be heavy-duty electronic type for positioning automatic dampers in response to a control signal. Motor shall be of sufficient size to operate damper positively and smoothly to obtain correct sequence as indicated. All applications requiring proportional operation shall utilize truly proportional electric actuators.

2.2 CONTROL VALVES

A. Control Valves: Characterized control valves shall be 2-way or 3-way pattern as shown and constructed for tight shutoff at the pump shut-off head. Control valves shall operate satisfactorily against system pressures and differentials. Two-position valves shall be ' line' size. Control valves shall be sized for a maximum pressure drop of 5.0 psi at rated flow (unless otherwise noted or scheduled on the drawings).

Valves with sizes up to and including 2 inches shall be "screwed" configuration and 2-1/2 inches and larger valves shall be "flanged" configuration. All control valves, including terminal unit valves, less than 2 inches shall be globe valves. Electrically-actuated control valves shall include spring return type actuators sized

for tight shut-off against system pressures (as specified above) and, when specified, shall be furnished with integral switches for indication of valve position (open-closed).

B. Control Valve Actuators: Actuators for VAV terminal unit heating coils shall be "drive-open; drive-closed" type. All actuators shall have inherent current limiting motor protection. Valve actuators shall be 24-volt, electronic type, modulating or two-position as required for the correct operating sequence. Actuators on valves needing ' fail-safe' operation shall have spring return to Normal position. Modulating valves shall be positive positioning in response to the signal. All valve actuators shall be UL listed.

2.3 OTHER CONTROL SYSTEM HARDWARE

A. Wall Mount Room Temperature sensors: Each room temperature sensor shall provide temperature indication to the digital controller, provide the capability for a software-limited occupant set point adjustment (warmer-cooler slider bar or switch) and limited operation override capability. Room Temperature Sensors shall be 20,000-ohm thermistor type with a temperature range of -40 to 140 degrees F. The sensor shall be complete with a decorative cover and suitable for mounting over a standard electrical utility box. These devices shall have an accuracy of 0.5 degrees F over the entire range. Sensors shall be housed in a high impact plastic enclosure.

B. Duct-mounted and Outside Air Temperature Sensors: 20,000-ohm thermistor temperature sensors with an accuracy of ±; 0.2 degrees C. Outside air sensors shall include an integral sun shield. Duct-mounted sensors shall have an insertion measuring probe of a length appropriate for the duct size, with a temperature range of -40 to 160 degrees F. The sensor shall include a utility box and a gasket to prevent air leakage and vibration noise. For all mixed air and preheat air applications, install bendable averaging duct sensors with a minimum 8 feet long sensor element. These devices shall have accuracy of 0.5 degrees F over the entire range.

C. Humidity sensors shall be thin-film capacitive type sensor with on-board nonvolatile memory, accuracy to plus or minus two percent (2%) at 0 to 90% RH, 12 - 30 VDC input voltage, analog output (0 - 10 VDC or 4 - 20mA output). Operating range shall be 0 to 100% RH and 32 to 140 degrees F. Sensors shall be selected for wall, duct or outdoor type installation as appropriate housed in a high impact plastic enclosure.

D. Carbon Dioxide Sensors (CO2): Sensors shall utilize Non-dispersive infrared technology (N.D.I.R.), repeatable to plus or minus 20 PPM. Sensor range shall be 0 - 2000 PPM. Accuracy shall be plus or minus five percent (5%) or 75 PPM, whichever is greater. Response shall be less than one minute. Input voltage shall be 20 to 30 VAC or DC. Output shall be 0 - 10 VDC. Sensor shall be wall or duct mounted type, as appropriate for the application, housed in a high impact plastic enclosure.

E. Current Sensitive Switches: Solid state, split core current switch that operates when the current level (sensed by the internal current transformer) exceeds the adjustable trip point. Current switch to include an integral LED for indication of trip condition and a current level below trip set point.

F. Differential Analog (duct) Static Pressure Transmitters Provide a pressure transmitter with integral capacitance type sensing and solid-state circuitry. Accuracy shall be plus or minus 1% of full range; range shall be selected for the specific application. Provide zero and span adjustment capability. Device shall have integral static pickup tube.

G. Differential Air Pressure Switches: Provide SPDT type, UL-approved, and selected for the appropriate operating range where applied. Switches shall have adjustable set points and barbed pressure tips.

H. Water Flow Switches: Provide a SPST type contact switch with bronze paddle blade, sized for the actual

pipe size at the location. If installed outdoors, provide a NEMA-4 enclosure. Flow switch shall be UL listed.

I. Temperature Control Panels: Furnish temperature control panels of code gauge steel with locking doors for mounting all devices as shown. All electrical devices within a control panel shall be factory wired. Control panel shall be assembled by the BMS in a UL-Certified 508A panel shop. A complete set of ' as-built' control drawings (relating to the controls within that panel) shall be furnished within each control panel.

J. Pipe and Duct Temperature sensing elements: 20,000-ohm thermistor temperature sensors with and accuracy of ±1% accuracy. Their range shall be -5 to 250 degrees F. Limited range sensors shall be acceptable provided they are capable of sensing the range expected for the point at the specified accuracy. Thermal wells with heat conductive gel shall be included.

K. Low Air Temperature Sensors: Provide SPST type switch, with 15 to 55 degrees F, range, vapor-charged temperature sensor. Honeywell model L482A, or approved equivalent.

L. Variable Frequency Drives: The variable frequency drive (VFD) shall be designed specifically for use in Heating, Ventilation, and Air Conditioning (HVAC) applications in which speed control of the motor can be applied. The VFD, including all factory installed options, shall have UL & CSA approval. VFD's shall include communications capability with DDC BMS via built-in interface card (MODBUS or BACnet). Honeywell SmartVFD is basis of design.

M. Relays: Start/stop relay model shall provide either momentary or maintained switching action as appropriate for the motor being started. All relays shall be plugged in, interchangeable, mounted on a sub base and wired to numbered terminals strips. Relays installed in panels shall all be DPDT with indicating lamp. Relays installed outside of controlled devices shall be enclosed in a NEMA enclosure suitable for the location. Relays shall be labeled with UR symbol. RIB-style relays are acceptable for remote enable/disable.

N. Emergency Stop Switches: Provide toggle-type switch with normally-closed contact for boilers. Switch shall be labeled "BOILER EMERGENCY SHUTOFF" and located in boiler room, adjacent to exit door.

O. Transducers: Differential pressure transducers shall be electronic with a 4-20 mA output signal compatible to the Direct Digital Controller. Wetted parts shall be stainless steel. Unit shall be designed to operate in the pressure ranges involved.

P. Control Power Transformers: Provide step-down transformers for all DDC controllers and devices as required. Transformers shall be sized for the load, but shall be sized for 50 watts, minimum. Transformers shall be UL listed Class 2 type, for 120 VAC/24 VAC operation.

Q. Line voltage protection: All DDC system control panels that are powered by 120 VAC circuits shall be provided with surge protection. This protection is in addition to any internal protection provided by the manufacturer. The protection shall meet UL, ULC 1449, IEEE C62.41B. A grounding conductor, (minimum 12 AWG), shall be brought to each control panel.

2.4 BAS SERVER & WEB BROWSER GUI - SYSTEM OVERVIEW

A. The TCC shall provide system software based on server/thin-client architecture, designed around the open standards of web technology. The BAS server shall communicate using Ethernet and TCP. Server shall be accessed using a web browser over Owner intranet and remotely over the Internet.

B. The intent of the thin-client architecture is to provide the operator(s) complete access to the BAS system via a web browser. The thin-client web browser Graphical User Interface (GUI) shall be browser and operating system agnostic, meaning it will support HTML5 enabled browsers without requiring proprietary operator interface and configuration programs or browser plug-ins. Microsoft, Firefox, and Chrome browsers (current released versions), and Windows as well as non-Window operating systems.

C. The BAS server software shall support at least the following server platforms (Windows 7, 8.1, 10, Server 12). The BAS server software shall be developed and tested by the manufacturer of the system stand-alone controllers and network controllers/routers.

D. The web browser GUI shall provide a completely interactive user interface and shall provide a HTML5 experience that supports the following features as a minimum:

1. Trending.
2. Scheduling.
3. Electrical demand limiting.
4. Duty Cycling.
5. Downloading Memory to field devices.
6. Real time 'live' Graphic Programs.
7. Tree Navigation.
8. Parameter change of properties.
9. Set point adjustments.
10. Alarm / event information.
11. Configuration of operators.
12. Execution of global commands.
13. Add, delete, and modify graphics and displayed data.

E. Software Components: All software shall be the most current version. All software components of the BAS system software shall be provided and installed as part of this project. BAS software components shall include:

1. Server Software, Database and Web Browser Graphical User Interface.
2. ~~5 Year Software Maintenance license. Labor to implement not included.~~
3. Embedded System Configuration Utilities for future modifications to the system and controllers.
4. Embedded Graphical Programming Tools.
5. Embedded Direct Digital Control software.
6. Embedded Application Software.

F. BAS Server Database: The BAS server software shall utilize a Java Database Connectivity (JDBC) compatible database such as: MS SQL 8.0, Oracle 8i or IBM DB2. BAS systems written to Non -Standard and/or Proprietary databases are NOT acceptable.

G. Thin Client - Web Browser Based: The GUI shall be thin client or browser based and shall meet the following criteria:

1. Web Browser's for PC's: Only the current released browser (Explorer/Firefox/Chrome) will be required as the GUI and a valid connection to the server network. No installation of any custom software shall be required on the operator's GUI workstation/client. Connection shall be over an intranet or the Internet.
2. Secure Socket Layers: Communication between the Web Browser GUI and BAS server shall offer

encryption using 128-bit encryption technology within Secure Socket Layers (SSL). Communication protocol shall be Hyper-Text Transfer Protocol Secure (HTTPS).

2.5 WEB BROWSER GRAPHICAL USER INTERFACE

A. Web Browser Navigation: The Thin Client web browser GUI shall provide a comprehensive user interface. Using a collection of web pages, it shall be constructed to "feel" like a single application, and provide a complete and intuitive mouse/menu driven operator interface. It shall be possible to navigate through the system using a web browser to accomplish requirements of this specification. The Web Browser GUI shall (as a minimum) provide for navigation, and for display of animated graphics, schedules, alarms/events, live graphic programs, active graphic set point controls, configuration menus for operator access, reports and reporting actions for events.

B. Login: On launching the web browser and selecting the appropriate domain name or IP address, the operator shall be presented with a login page that will require a login name and strong password. Navigation in the system shall be dependent on the operator's role-based application control privileges.

C. Navigation: Navigation through the GUI shall be accomplished by clicking on the appropriate level of a navigation tree (consisting of an expandable and collapsible tree control like Microsoft's Explorer program) and/or by selecting dynamic links to other system graphics. Both the navigation tree and action pane shall be displayed simultaneously, enabling the operator to select a specific system or equipment and view the corresponding graphic. The navigation tree shall as a minimum provide the following views: Geographic, Network, Groups and Configuration.

1. Geographic View shall display a logical geographic hierarchy of the system including: cities, sites, buildings, building systems, floors, equipment and objects.
2. Groups View shall display Scheduled Groups and custom reports.
3. Configuration View shall display all the configuration categories (Operators, Schedule, Event, Reporting and Roles).

D. Action Pane: The Action Pane shall provide several functional views for each subsystem specified. A functional view shall be accessed by clicking on the corresponding button:

1. Graphics: Using graphical format suitable for display in a web browser, graphics shall include aerial building/campus views, color building floor-plans, equipment drawings, active graphic set point controls, web content and other valid HTML elements. The data on each graphic page shall automatically refresh.
2. ~~Dashboards: User customizable data using drag and drop HTML5 elements. Shall include Web Charts, Gauges, and other custom developed widgets for web browser. User shall have ability to save custom dashboards. See Section 2.13 below.~~
3. Search: User shall have multiple options for searching data based upon Tags. Associated equipment, real time data, Properties, and Trends shall be available in result.
4. Properties: Shall include graphic controls and text for the following: Locking or overriding objects, demand strategies, and any other valid data required for setup. Changes made to the properties pages shall require the operator to depress an 'accept/cancel' button.
5. Schedules: Shall be used to create, modify/edit and view schedules based on the systems hierarchy (using the navigation tree).
6. Alarms: Shall be used to view alarm information geographically (using the navigation tree), acknowledge alarms, sort alarms by category, actions and verify reporting actions.

7. Charting: Shall be used to display associated trend and historical data, modify colors, date range, axis and scaling. User shall have ability to create HTML charts through web browser without utilizing chart builder. User shall be able to drag and drop single or multiple data points, including schedules, and apply status colors for analysis.
8. Logic - Live Graphic Programs: Shall be used to display' live' graphic programs of the control algorithm, (micro block programming) for the mechanical/electrical system selected in the navigation tree.
9. Other actions such as Print, Help, Command, and Logout shall be available via a drop-down window.

E. Color Graphics: The Web Browser GUI shall make extensive use of color in the graphic pane to communicate information related to set points and comfort. Animated .gifs or .jpg, vector scalable, active set point graphic controls shall be used to enhance usability. Graphics tools used to create Web Browser graphics shall be non-proprietary and conform to the following basic criteria:

1. Display Size: The GUI workstation software shall graphically display in a minimum of 1024 by 768 pixels 24 bit True Color.
2. General Graphic: General area maps shall show locations of controlled buildings in relation to local landmarks.
3. Color Floor Plans: Floor plan graphics shall show heating and cooling zones throughout the buildings in a range of colors, as selected by Owner. Provide a visual display of temperature relative to their respective set points. The colors shall be updated dynamically as a zone's actual comfort condition changes.
4. Mechanical Components: Mechanical system graphics shall show the type of mechanical system components serving any zone through the use of a pictorial representation of components. Selected I/O points being controlled or monitored for each piece of equipment shall be displayed with the appropriate engineering units. Animation shall be used for rotation or moving mechanical components to enhance usability.
5. Minimum System Color Graphics: Color graphics shall be selected and displayed via a web browser for the following:

    a. Each piece of equipment monitored or controlled including each terminal unit.
    b. Each building.
    c. Each floor and zone controlled.

F. Hierarchical Schedules: Utilizing the Navigation Tree displayed in the web browser GUI, an operator (with proper access credentials) shall be able to define a Normal, Holiday or Override schedule for an individual piece of equipment or room, or choose to apply a hierarchical schedule to the entire system, site or floor area. For example, Independence Day ' Holiday' for every level in the system would be created by clicking at the top of the geographic hierarchy defined in the Navigation Tree.

No further operator intervention would be required and every control module in the system with would be automatically downloaded with the ' Independence Day' Holiday. All schedules that affect the system/area/equipment highlighted in the Navigation Tree shall be shown in a summary schedule table and graph.

1. Schedules: Schedules shall comply with the LonWorks and BACnet standards, (Schedule Object, Calendar Object, Weekly Schedule property and Exception Schedule property) and shall allow events to be scheduled based on:

a. Types of schedule shall be Normal, Holiday or Override.
b. A specific date.
c. A range of dates.
d. Any combination of Month of Year (1-12, any), Week of Month (1-5, last, any), Day of Week (M-Sun, Any).
e. Wildcard (example, allow combinations like second Tuesday of every month).

2. Schedule Categories: The system shall allow operators to define and edit scheduling categories (different types of "things" to be scheduled; for example, lighting, HVAC occupancy, etc.). The categories shall include: name, description, icon (to display in the hierarchy tree when icon option is selected) and type of value to be scheduled.
3. Schedule Groups: In addition to hierarchical scheduling, operators shall be able to define functional Schedule Groups, comprised of an arbitrary group of areas/rooms/equipment scattered throughout the facility and site. For example, the operator shall be able to define an ' individual tenant' group - who may occupy different areas within a building or buildings. Schedules applied to the ' tenant group' shall automatically be downloaded to control modules affecting spaces occupied by the ' tenant group'.
4. Intelligent Scheduling: The control system shall be intelligent enough to automatically turn on any supporting equipment needed to control the environment in an occupied space. If the operator schedules an individual room in a VAV system for occupancy, for example, the control logic shall automatically turn on the VAV air handling unit, chiller, boiler and/or any other equipment required to maintain the specified comfort and environmental conditions within the room.
5. Partial Day Exceptions: Schedule events shall be able to accommodate a time range specified by the operator (ex: board meeting from 6 pm to 9 pm overrides Normal schedule for conference room).
6. Schedule Summary Graph: The schedule summary graph shall clearly show Normal versus Holiday versus Override Schedules and the net operating schedule that results from all contributing schedules. Note: In case of priority conflict between schedules at the different geographic hierarchy, the schedule for the more detailed geographic level shall apply.

G. Alarms: Alarms associated with a specific system, area, or equipment selected in the Navigation Tree, shall be displayed in the Action Pane by selecting an ' Alarms' view. Alarms, and reporting actions shall have the following capabilities:

1. Alarms View: Each Alarm shall display an Alarms Category (using a different icon for each alarm category), date/time of occurrence, current status, alarm report and a bold URL link to the associated graphic for the selected system, area or equipment. The URL link shall indicate the system location, address and other pertinent information. An operator shall easily be able to sort events, edit event templates and categories, acknowledge or force a return to normal in the Events View as specified in this section.
2. Alarm Categories: The operator shall be able to create, edit or delete alarm categories such as HVAC, Maintenance, Fire, or Generator. An icon shall be associated with each alarm category, enabling the operator to easily sort through multiple events displayed.
3. Alarm Templates: Alarm template shall define different types of alarms and their associated properties. As a minimum, properties shall include a reference name, verbose description, severity of alarm, acknowledgement requirements, and high/low limit and out of range information.
4. Alarm Areas: Alarm Areas enable an operator to assign specific Alarm Categories to specific Alarm Reporting Actions. For example, it shall be possible for an operator to assign all HVAC Maintenance Alarm on the 1st floor of a building to email the technician responsible for maintenance. The Navigation Tree shall be used to setup Alarm Areas in the Graphic Pane.

5. Alarm Time/Date Stamp: All events shall be generated at the DDC control module level and comprise the Time/Date Stamp using the standalone control module time and date.
6. Alarm Configuration: Operators shall be able to define the type of Alarm generated per object. A ' network' view of the Navigation Tree shall expose all objects and their respective Alarm Configuration. Configuration shall include assignment of Alarm, type of Acknowledgement and notification for return to normal or fault status.
7. Alarm Summary Counter: The view of Alarm in the Graphic Pane shall provide a numeric counter, indicating how many Alarms are active (in alarm), require acknowledgement and total number of Alarms in the BAS Server database.
8. Alarm Auto-Deletion: Alarms that are acknowledged and closed shall be auto-deleted from the database and archived to a text file after an operator defined period.
9. Alarm Reporting Actions: Alarm Reporting Actions specified shall be automatically launched (under certain conditions) after an Alarm is received by the BAS server software. Operators shall be able to easily define these Reporting Actions using the Navigation Tree and Graphic Pane through the web browser GUI. Reporting Actions shall be as follows:

    a. Print: Alarm information shall be printed to the BAS server's PC or a networked printer.
    b. Email: Email shall be sent via any POP3-compatible e-mail server (most Internet Service Providers use POP3). Email messages may be copied to several email accounts. Note: Email reporting action shall also be used to support alphanumeric paging services, where email servers support pagers.
    c. File Write: The ASCII File write reporting action shall enable the operator to append operator defined alarm information to any alarm through a text file. The alarm information that is written to the file shall be completely definable by the operator. The operator may enter text or attach other data point information (such as AHU discharge temperature and fan condition upon a high room temperature alarm).
    d. Write Property: The write property reporting action updates a property value in a hardware module.
    e. SNMP: The Simple Network Management Protocol (SNMP) reporting action sends an SNMP trap to a network in response to receiving an alarm.
    f. Run External Program: The Run External Program reporting action launches specified program in response to an event.

H. Trends: As system is engineered, all points shall be enabled to trend. Trends shall both be displayed and user configurable through the Web Browser GUI. Trends shall comprise analog, digital or calculated points simultaneously. A trend log's properties shall be editable using the Navigation Tree and Graphic Pane.

1. Viewing Trends: The operator shall have the ability to view trends by using the Navigation Tree and selecting a Trends button in the Graphic Pane. The system shall allow y- and x-axis maximum ranges to be specified and shall be able to simultaneously graphically display multiple trends per graph.
2. Local Trends: Trend data shall be collected locally by Multi-Equipment/Single Equipment general-purpose controllers, and periodically uploaded to the BAS server if historical trending is enabled for the object. Trend data, including run time hours and start time date shall be retained in non-volatile module memory. Systems that rely on a gateway/router to run trends are NOT acceptable.
3. Resolution. Sample intervals shall be as small as one second. Each trended point will have the ability to be trended at a different trend interval. When multiple points are selected for displays that have different trend intervals, the system will automatically scale the axis.
4. Dynamic Update. Trends shall be able to dynamically update at operator-defined intervals.
5. Zoom/Pan. It shall be possible to zoom-in on a particular section of a trend for more detailed

examination and ' pan through' historical data by simply scrolling the mouse.

6. Numeric Value Display. It shall be possible to pick any sample on a trend and have the numerical value displayed.
7. Copy/Paste. The operator shall have the ability to pan through a historical trend and copy the data viewed to the clipboard using standard keystrokes (i.e. CTRL+C, CTRL+V).

I. Security Access: Systems that Security access from the web browser GUI to BAS server shall require a Login Name and Strong Password. Access to different areas of the BAS system shall be defined in terms of Role-Based Access Control privileges as specified:

1. Roles: Roles shall reflect the actual roles of different types of operators. Each role shall comprise a set of ' easily understood English language' privileges. Roles shall be defined in terms of View, Edit and Function Privileges.

   a. View Privileges shall comprise: Navigation, Network, and Configuration Trees, Operators, Roles and Privileges, Alarm/Event Template and Reporting Action.
   b. Edit Privileges shall comprise: Set point, Tuning and Logic, Manual Override, and Point Assignment Parameters.
   c. Function Privileges shall comprise: Alarm/Event Acknowledgement, Control Module Memory Download, Upload, Schedules, Schedule Groups, Manual Commands, Print and Alarm/Event Maintenance.

2. Geographic Assignment of Roles: Roles shall be geographically assigned using a similar expandable/collapsible navigation tree. For example, it shall be possible to assign two HVAC Technicians with similar competencies (and the same operator defined HVAC Role) to different areas of the system.

PART 3 – EXECUTION

3.1 GENERAL

A. Install system and materials in accordance with manufacturer's instructions, and as detailed on the project drawing set.

B. Line and low voltage electrical connections to control equipment shown specified or shown on the control diagrams shall be furnished and installed by the TCC in accordance with these specifications.

C. Equipment furnished by the Mechanical Contractor that is normally wired before installation shall be furnished completely wired. Control wiring normally performed in the field will be furnished and installed by the TCC .

D. All control devices mounted on the face of control panels shall be clearly identified as to function and system served with permanently engraved phenolic labels.

3.2 WIRING

A. All electrical control wiring to the control panels shall be the responsibility of the TCC .

B. All wiring shall be in accordance with the Project Electrical Specifications (Division 16), the National Electrical Code and any applicable local codes. All control wiring shall be installed in raceways.

C. Excess wire shall not be looped or coiled in the controller cabinet.

D. Incorporate electrical noise suppression techniques in relay control circuits.

E. There shall be no drilling on the controller cabinet after the controls are mounted inside.

F. Careful stripping of wire while inside the cabinet is required to ensure that no wire strand fragments land on circuit boards.

G. Use manufacturer-specified wire for all network connections.

H. Use approved optical isolation and lightning protection when penetrating building envelope.

I. Read installation instructions carefully. Any unavoidable deviations shall be approved by owner's rep prior to installation.

3.3 ACCEPTANCE TESTING

A. Upon completion of the installation, the TCC shall load all system software and start-up the system. The TCC shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications.

B. The TCC shall perform tests to verify proper performance of components, routines and points. Repeat tests until proper performance results. This testing shall include a point-by-point log to validate 100% of the input and output points of the DDC system operation.

C. System Acceptance: Satisfactory completion is when the TCC has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's Representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

3.4 OPERATOR TRAINING

A. During system commissioning and at such time acceptable performance of the Control System hardware and software has been established, the TCC shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall be done during normal working hours and shall be performed by a competent representative familiar with the system hardware, software and accessories.

B. The TCC shall provide 16 total hours of comprehensive training in multiple sessions for system orientation, product maintenance and troubleshooting, programming and engineering. These classes are to be spread out during the 1st year warranty period. The first class starting after final commissioning and the last class is to be in the last month of 1-year warranty period.

3.5 WARRANTY PERIOD SERVICES

A. Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance.

B. Within this period, upon notice by the Owner, any defects in the BMS due to faulty materials, methods of installation or workmanship shall be promptly repaired or replaced by the TCC at no expense to the Owner.

C. Maintenance of Computer Software Programs: The TCC shall maintain all software during the standard first year warranty period. In addition, all factory or sub-vendor upgrades to software during the first year warranty period shall be added to the systems, when they become available, at no additional cost. In addition to first year standard warranty, software provided by TCC shall come with a 5 Year Software Maintenance license. All SNC and BAS Servers are included in this coverage. Labor to implement upgrades in years two through five are not included in standard warranty.

D. Maintenance of Control Hardware: The TCC shall inspect, repair, replace, adjust, and calibrate, as required, the controllers, control devices and associated peripheral units during the warranty period.
The TCC shall then furnish a report describing the status of the equipment, problem areas (if any) noticed during service work, and description of the corrective actions taken. The report shall clearly certify that all hardware is functioning correctly.

E. Service Period: Calls for service by the Owner shall be honored within 24 hours and are not to be considered as part of routine maintenance.

F. Service Documentation: A copy of the service report associated with each owner-initiated service call shall be provided to the owner.

3.6 WARRANTY ACCESS

A. The Owner shall grant to the TCC reasonable access to the BMS during the warranty period. Remote access to the BMS (for the purpose of diagnostics and troubleshooting, via the Internet, during the warranty period) will be allowed.

3.7 OPERATION & MAINTENANCE MANUALS

A. See Division 1 for requirements. O&M manuals shall include the following elements, as a minimum:

B. As-built control drawings for all equipment.

C. As-built Network Communications Diagram.

E. General description and specifications for all components.

F. Completed Performance Verification sheets.

G. Completed Controller Checkout/Calibration Sheets.

3.8 PROTECTION

3.9 Protect installed products until completion of project.

3.10 Touch-up, repair or replace damaged products before Substantial Completion.

3.9 MAINTENANCE SERVICE

A. The Contractor shall perform complete maintenance of the Automatic Building Management System for a period of one calendar year, at no additional cost to the Owner, commencing with the date when the system is accepted so that the said controls may be operated 24 hours a day, 7 days a week.

B. The Contractor shall repair, replace and re-program as soon as possible, any part or parts of the controls and system, which become unsuitable for continued use.

The service performed by the Contractor shall include but not be limited to the following:

1. Monthly and systematically examine, adjust, calibrate and clean all sensor, temperature controls, pressure controls, valves, relays, motors and accessories.

2. Monthly and systematically, furnish lubricants and lubricate such components as valve packing glands, damper bearings, linkages and switches pertaining to the control package.
3. Replace valve-packing materials of control valves as often as may be necessary in order to maintain the valves without leakage.
4. Update all software and correct all “bugs”. Modify presentation graphics based on Owner's operating experience.

C. The Contractor shall submit to the Owner a detailed record of all maintenance and servicing performed under this Contract and shall notify the Owner if during the performance of services, additional repairs or replacements have to be scheduled.

3.10 OPERATOR TRAINING

A. The Contractor shall conduct formal operator training on site and shall include the following with a minimum dedicated instructor time of 8 hours.

1. Level 1 - 2 Hours: Basic data display and interpretation of graphics, addresses, and alarm and status descriptors. The operators shall be trained to interpret all alarm displays and printouts, request all data displays, and acknowledge and reset alarms.
2. Level 2 - 2 Hours: Intermediate command and program change operations. This level of operators shall be trained to execute all manual commands (start/stop, control point adjustment), and request all logs, change analog alarm limits, and change time based on/off program times and load assignments.
3. Level 3 - 4 Hours: Total system programming. This level of operators shall be trained to install all other programs and program changes specified herein to be keyboard programmable. This training program shall allow for a complete understanding of all application packages, custom data files and user programs, and the ability to write and change new and existing specified programs. Emphasis shall be placed on maintenance management system allowing the user to be thoroughly familiar with all aspects of the maintenance and inventory control programs.

   Additionally, Level 3 personnel shall be given sufficient instruction to allow: (1) in-house diagnostics and troubleshooting of the operating system and all peripherals and to perform routine preventive maintenance; (2) ability to change DCP circuit boards and associated hardware; (3) ability to install all DCP equipment; and (4) installation of all monitor and control points.

3.11 SEQUENCE OF OPERATION

A. Sequence #1 – AHU-1 VAV air handling unit with demand control ventilation, hot water heating coil, remote condensing unit, DX coil, mixing box.

1. Supply Fan Control:

a. The variable speed supply fan will be started based on an optimum start program and occupancy schedule. When the supply fan status indicates the fan started, the control sequence will be enabled. The supply fan will modulate to maintain duct static pressure. The duct static pressure shall be reset based on VAV box damper position. Upon a loss of airflow, the system will automatically restart. When the supply fan frequency converter fault input is activated, the system will shutdown. When the fault condition clears, the system shall restart as required.
b. The heating coil circulation pump shall run whenever the outdoor temperature drops below 40 deg. F and the heating coil valve shall modulate to maintain 55 F minimum air handling unit cabinet temperature.

2. Warm-up / Cool-down mode

a. Warm-up: The optimum start program will energize the supply fan with the return air damper open and outdoor air damper closed with 2-way heating valve in the full heat position in a warm-up cycle until the space temperature reaches occupied setpoint.
b. Cool-down: The optimum start program will energize the supply fan with the return air damper closed and the outdoor air damper open in a cool down cycle if enabled by economizer enthalpy control until the space temperature reaches occupied setpoint.

3. Economizer Control:

a. When the enthalpy of the outdoor air is less than the return air, the economizer will act as the initial stage of cooling. As the outside air damper modulates open, the relief air damper modulates open, the return air modulates closed.

4. Minimum OA Control:

a. The OA damper will modulate to maintain the minimum OA flow setpoint. Demand control ventilation allows OA damper to modulate open and relief air damper to modulate open in sequence to maintain setpoint. The fresh air intake of the unit will be limited to prevent the preheat temperature from falling below the mixed air low limit setpoint.

5. Temperature Control:

a. The unit will control to maintain a constant discharge air temperature reset between heating and cooling season. Above 55 F outside air temperature, the discharge shall be 55 F. Below 50 F, the discharge shall be 60 degrees F.

6. Occupied Mode:

a. The occupancy mode will be controlled via a network input. The occupancy mode can also be

overridden by the network input

7. Unoccupied Mode:

   a. The supply fan will cycle on and off with return air damper open, outside air damper closed, relief air damper closed, relief air fan off, and heating valve open to maintain unoccupied setpoint.

8. Heating Coil:

   a. The heating coil will modulate in sequence to maintain the zone setpoints.

      When the unit is shutdown, the heating coil will modulate to maintain AHU cabinet to a mimimum temperature.

9. Cooling Coil:

   a. The cooling coil / condensing unit will enable cooling stages in sequence to maintain setpoint. When the unit is shutdown, the condensing unit will be off.

10. Safety Controls & Alarms

    a. The low limit thermostat, located on the discharge airside of the heating coil, will prevent fan operation and open heating coil fully when the air temperature falls below its setpoint. An alarm is activated at the BMS workstation. Fan operation is resumed and the alarm cleared when the low limit is manually reset. Alarm will cause the heating valve and chilled water valve to fully open.
    b. Duct smoke detectors will prevent fan operation when an alarm condition is detected. A contact closure for alarm is wired to the AHU controller and displayed at the EMS workstation.
    c. An automatic reset mixed-air low-limit cycle to prevent freeze-stat trips shall override the normal economizer control sequence to prevent the mixed air plenum from dropping below 40°F.

B. RTU-1 & RTU-2, Single Zone VAV rooftop unit with factory BACnet controls, DX cooling, enhanced dehumidification hot gas reheat and demand control ventilation.

1. Supply Fan Control:

   b. The variable speed supply fan will be started based on an optimum start program and occupancy schedule. The supply fan startup sequence will begin by enabling the Supply Fan Start / Stop Command and setting the supply fan speed command to 50% for the initial 30-seconds of operation.

   c. Supply air flow is adjusted to maintain space temperature. Typically, it operates at minimum air flow until the discharge air setpoint reaches minimum or maximum, indicating that the heating/cooling demand is high, at which point the supply air flow is increased to meet the demand. With single zone VAV operation, supply fan speed command is adjusted to maintain the supply fan air flow to the supply fan air flow setpoint. If the discharge air temperature setpoint (which adjusts based on space conditions) reaches the discharge air temperature

setpoint minimum (Cooling) or maximum (Heating), the supply fan air flow setpoint will begin to adjust up by comparing the space temperature to the space temperature setpoint. As the air flow setpoint rises above minimum, the discharge setpoint is set to the respective minimum/maximum setpoint. Supply fan air flow minimum setpoint is a program-determined point based on factory settings, mode of operation, outdoor air flow setpoints, or other factors.

d. Heating and Cooling Mode: Modes are determined using a series of time-delay latches that vary based on distance from setpoint and a variable deadband. Generally, the mode of operation will be changed from cooling to heating whenever the cooling capacity is at 0% and the temperature is below the setpoint minus the deadband, occupied offset. Vice-versa when switching from heating to cooling mode. Each of the various heat capacity stages or cooling stages are modulated to the discharge air and wall sensor temperature setpoint.

e. Economizer mode and powered exhaust with VFD: Units equipped with modulating outdoor/return air dampers have factory installed outdoor and return air temperature/humidity sensors for determining economizer mode. Before allowing economizer mode, unit must be in cooling or dehumidification mode. Economizer Mode is enabled whenever the outdoor air enthalpy falls below the return air enthalpy (1.5 btu/lb. deadband). During economizer mode, the outdoor air damper position opens and exhaust fan VFD sequences from minimum to maximum.

a. Ventilation Mode is used during neutral outdoor air conditions when there isn't a need for heating, cooling, or dehumidification. A demand for dehumidification locks out ventilation mode. Single zone VAV ventilation mode is enabled when the outdoor air temperature is between the high and low ventilation setpoints (adj.), and the space temperature is within 2 deg of setpoint. During ventilation mode, all forms of heating and cooling are disabled, and the supply fan runs at minimum air flow.

f. Dehumidification Mode: A space dewpoint setpoint is calculated using space temperature setpoint and space dehumidification setpoint (relative humidity). Dehumidification Mode is enabled when the space dewpoint rises above the space dewpoint calculated enable setpoint or when the outdoor air dewpoint rises above 60deg (3deg deadband). Dehumidification Mode is terminated based on the setpoint deadbands for the space dewpoint or the outdoor air dewpoint. During Dehumidification Mode, cooling is controlled to the dehumidification temperature setpoint and hot gas reheat controls to the discharge air temperature setpoint active. Dehumidification temperature setpoint is reset by comparing the space dewpoint to the space dewpoint calculated enable setpoint but is limited to not rise above the discharge air temperature setpoint. The discharge air temperature setpoint and supply fan speed are reset based on space temperature. If the hot gas reheat remains at 100% and there is insufficient reheat to meet the discharge temperature setpoint, the first circuit compressor capacity may be increased to provide additional reheat. If the reheat boost is still not able to meet the discharge air temperature setpoint and the space becomes overcooled for an extended period, dehumidification mode will be terminated to allow the heat to warm the space back to setpoint.

g. Evaporator Coil Frost Protection: All units equipped will have a suction pressure transducer on at least the first circuit.

h. Compressor Low Ambient lockout: Compressor operation will be locked out when the outdoor air

temperature is below the compressor cooling low ambient lockout setpoint.

i. Hot Gas Reheat: Hot gas reheat is fully modulating from 0-100%, utilizes waste energy absorbed from the evaporator coil on circuit 1, and is used to temper the discharge air temperature during dehumidification or some cases, during cooling mode. Because it uses waste heat that would have been rejected through the condenser, it requires the refrigerant circuit to be operational to provide heat. The hot gas reheat coil is located downstream of the evaporator before the supply fan.

j. A low limit thermostat will prevent fan operation when the air temperature falls below its setpoint. An alarm is activated at the BMS . Fan operation is resumed and the alarm cleared when the low limit is manually reset.Alarm will cause the heating valve to fully open to prevent coil freezing. Duct smoke detectors will prevent fan operation when an alarm condition is detected. A contact closure for alarm is wired to the AHU controller and displayed at the EMS.

k. A condensate overflow switch in the condensate pan shall active an alarm in the BMS.

C. VAV Cooling, Dual Minimum Flows with Hot Water Reheat:

1. In the cooling mode, as the room temperature increases, the unit thermostat modulates the cold airflow from the lower minimum to the maximum setting.
2. During morning warm-up, the unit modulates 100% open.
3. In the heating mode, the unit references the alternate (higher) minimum airflow. As the room temperature decreases, the unit modulates the airflow from the maximum to the higher minimum, and then modulates the hot water coil valve toward the open position. The hot water coil valve operates only in the heating mode.
4. When the BMS signals occupied temperature setpoint, but an occupancy sensor signals unoccupied, the VAV box will be closed to prevent the need for reheat, and modulate open to maintain occupied setpoint.
5. Using VAV box damper position as zone loads are satisfied and VAV box dampers begin to shut, the system static pressure setpoint will be lowered until a particular number of VAV box dampers are at a pre-determined position. The reverse is true when zone loads increase and VAV box dampers begin to open up to cool the space. This control strategy requires that the system has full DDC control and feedback on VAV box damper.

C. Cabinet Unit Heater and Unit Heater Control:

1. Space thermostat shall cycle fan on and off and modulate coil control valve to maintain temperature setting.

D. General Exhaust Fan Control

1. EF-1 & EF-2 exhaust fans are started during occupied times and shall be off during unoccupied times. Exhaust fan damper shall open when fan is started and close when fan is off.

E. Boiler Control

1. Boiler controls shall be by the boiler manufacturer. Heating system shall be enabled by BMS when

OAT is below 55 F. Boiler B-1 and Pump P-1, Boiler B-2 and Pump P-2 shall operate in sequence to provide heating hot water and domestic hot water. BMS shall monitor HWS and HWR temperature and any alarm conditions. Boiler reset schedule: 0 F OAT / 140 F LWT 50 F OAT / 115 F LWT (adj).

2. Boiler #1 shall provide domestic hot water heating through the indirect tank by energizing pump P-3 and enabling the boiler controls' domestic water heating sequence.
3. Boiler emergency shutdown switch near exit door shall de-energize the boiler controls when switch is pushed. DDC control system shall monitor the switch circuit and activate alarm condition when shutdown condition occurs.

F. Heating Hot Water Pumps P-1 and P-2

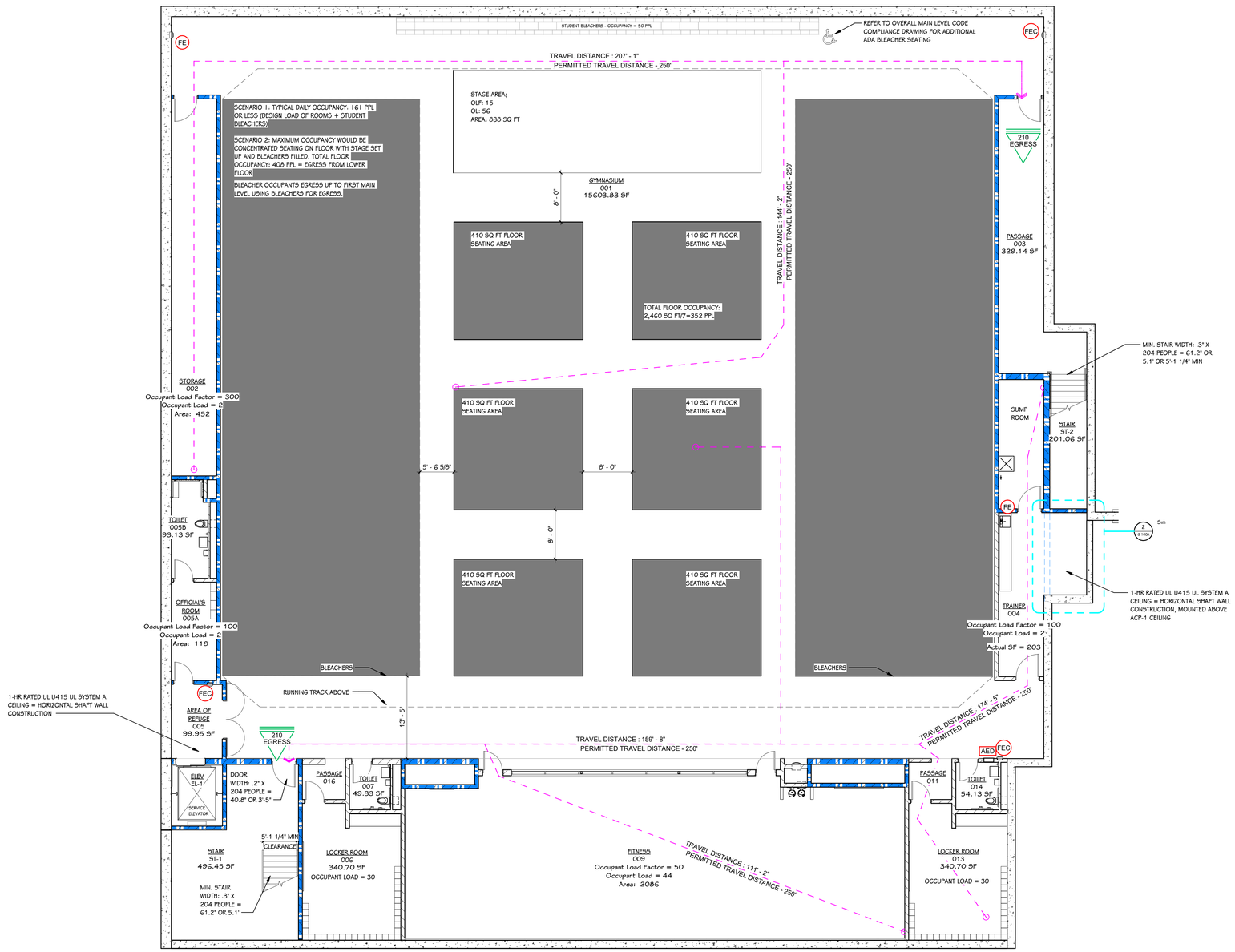
1. Pumps shall energize when the outdoor air temperature is below 55 deg. F. Controls shall prevent pumps from starting simultaneously.
2. The pumps will be operated on a weekly lead/lag schedule. The VFD will modulate the pump to maintain the hot water system pressure at setpoint.
3. If the lead pump fails, the lag pump will be started and an alarm indicated.
4. Provide differential pressure switch across pump to prove flow. Pipe the reference tubing for the DPT on a 45 deg angle from the bottom of the HS and HR piping mains so sediment in the piping does not settle at the bottom of the piping and cause intermittent problems with the DPT readings.

G. Sewage Ejectors

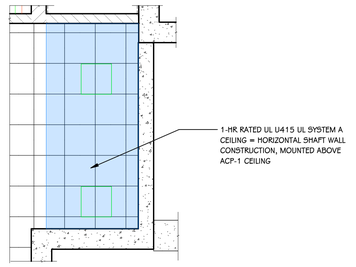
1. Integrate the high level alarm through BMS.

H. Controls shall be furnished by the TCC to enable system pumps with microprocessor controller equal to Tekmar 671 with remote slab sensor. Enable system pumps, snowmelt system pumps and modulate control valve in sequence.

END OF SECTION 23 0923



G 100 LOWER LEVEL CODE COMPLIANCE PLAN - UNIT A
1/8" = 1'-0"



2 / G 100A TRAINER 004 @ 1-HR RATED CEILING
1/4" = 1'-0"

CODE COMPLIANCE KEY

EGRESS SYMBOLS

Door # EGRESS 100 — EGRESS EXIT NUMBER FROM ROOM OR SPACE; MAXIMUM NUMBER OF OCCUPANTS PERMITTED BY EGRESS WIDTH; ROOM OR SPACE EGRESS IS FROM

EGRESS ROOM

EXISTING TRAVEL DISTANCE TO EGRESS DOOR

DIRECTION OF EGRESS

TRAVEL DISTANCE : 100'-0"

PERMITTED TRAVEL DISTANCE - 200'-0"

PERMITTED MAXIMUM TRAVEL DISTANCE PER CONDITION

FIRE SAFETY SYMBOLS

XFE	EXISTING FIRE EXTINGUISHER
XFEC	EXISTING FIRE EXTINGUISHER CABINET
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
AED	AUTOMATED EXTERNAL DEFIBRILLATOR (AED) RECESSED CABINET

FIRE-RATING KEY

COORDINATE ALL REQUIRED DAMPERS WITH MECHANICAL.

DESIGNATION	RATING	PRIORITY
	2 HOUR (NEW CONSTRUCTION)	1
	2 HOUR (EXISTING)	
	1 HOUR (NEW CONSTRUCTION)	2
	1 HOUR (EXISTING WALL, FORMERLY NOT FR)	
	SMOKE RESISTANT	3

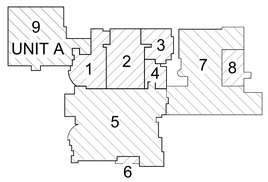
A1

1. ALL PENETRATIONS THROUGH A FIRE OR SMOKE RATED PARTITION SHOULD BE SEALED WITH AN APPROVED U.L. RATED PRODUCT.
2. THE TOPS OF ALL FIRE RATED PARTITIONS SHALL BE SEALED TO THE CONTINUOUS STRUCTURE ABOVE WITH A U.L. RATED SYSTEM OR ASSEMBLY.
3. WOOD BLOCKING IN FIRE-RATED PARTITIONS SHALL BE NON-COMBUSTIBLE TREATED WOOD.
4. REFER TO SPECIFICATION U.L. RATING INFORMATION.
5. FIRE-RATED WALLS ENDING INTO AN ACOUSTICAL DECK MUST HAVE THE FLUTES FILLED, REFER TO 'TOP OF WALL DETAIL AT ACOUSTIC DECK' SHOWN ON THIS SHEET.

- FOR MASONRY WALLS THE MASON SHALL FILL VOIDS AND FIRE SPRAY WITH UL LISTED MATERIAL.
- FOR STUD WALLS USE FIRE SAFING AND FIRE CAULK.

THIS DRAWING SHEET IS INTENDED TO BE PLOTTED IN COLOR. IF THIS TEXT APPEARS IN BLACK AND WHITE, IT IS PLOTTED INCORRECTLY. DISCARD AND OBTAIN AN ACCURATE DRAWING

MONTAGUE HIGH SCHOOL



FIRE KEY PLAN
SCALE: NO SCALE

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ISSUED FOR	DATE
ADDENDUM 1	6-20-23

PROJECT TITLE
PERFORMANCE GYMNASIUM ADDITION

OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

SHEET TITLE
LOWER LEVEL CODE COMPLIANCE PLAN - UNIT A

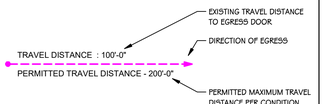
DATE
JUNE 9, 2023

SHEET NUMBER
G 100A
22-136.20

2 OVERALL MAIN LEVEL CODE COMPLIANCE PLAN
G101 1" = 20'-0"

CODE COMPLIANCE KEY

EGRESS SYMBOLS



FIRE SAFETY SYMBOLS

XFE	EXISTING FIRE EXTINGUISHER
XFEC	EXISTING FIRE EXTINGUISHER CABINET
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
AED	AUTOMATED EXTERNAL DEFIBRILLATOR (AED) RECESSED CABINET

FIRE-RATING KEY

COORDINATE ALL REQUIRED DAMPERS WITH MECHANICAL.

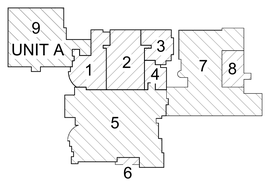
DESIGNATION	RATING	PRIORITY
	2 HOUR (NEW CONSTRUCTION)	1
	2 HOUR (EXISTING)	
	1 HOUR (NEW CONSTRUCTION)	2
	1 HOUR (EXISTING WALL, FORMERLY NOT FR)	
	SMOKE RESISTANT	3

1. ALL PENETRATIONS THROUGH A FIRE OR SMOKE RATED PARTITION SHOULD BE SEALED WITH AN APPROVED U.L. RATED PRODUCT.
2. THE TOPS OF ALL FIRE RATED PARTITIONS SHALL BE SEALED TO THE CONTINUOUS STRUCTURE ABOVE WITH A U.L. RATED SYSTEM OR ASSEMBLY.
3. WOOD BLOCKING IN FIRE-RATED PARTITIONS SHALL BE NON-COMBUSTIBLE TREATED WOOD.
4. REFER TO SPECIFICATION U.L. RATING INFORMATION.
5. FIRE-RATED WALLS ENDING INTO AN ACOUSTICAL DECK MUST HAVE THE FLUTES FILLED, REFER TO TOP OF WALL DETAIL AT ACOUSTIC DECK SHOWN ON THIS SHEET.

- FOR MASONRY WALLS THE MASON SHALL FILL VOIDS AND FIRE SPRAY WITH UL LISTED MATERIAL.
- FOR STUD WALLS USE FIRE SAFING AND FIRE CAULK.

AT MAXIMUM OCCUPANCY OF ASSEMBLY SPACE, OWNER WILL PROVIDE ACCESS TO EXISTING TOILET ROOMS AT THIS LOCATION IN ORDER TO COMPLETE THE REQUIRED MINIMUM PLUMBING COUNTS.

MONTAGUE HIGH SCHOOL



FIRE KEY PLAN
SCALE: NO SCALE

THIS DRAWING SHEET IS INTENDED TO BE PLOTTED IN COLOR. IF THIS TEXT APPEARS IN BLACK AND WHITE, IT IS PLOTTED INCORRECTLY. DISCARD AND OBTAIN AN ACCURATE DRAWING

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ADDENDUM 1 — 6-20-23
ISSUED FOR — DATE

PROJECT TITLE
PERFORMANCE GYMNASIUM ADDITION

OWNER
MONTAGUE AREA PUBLIC SCHOOLS

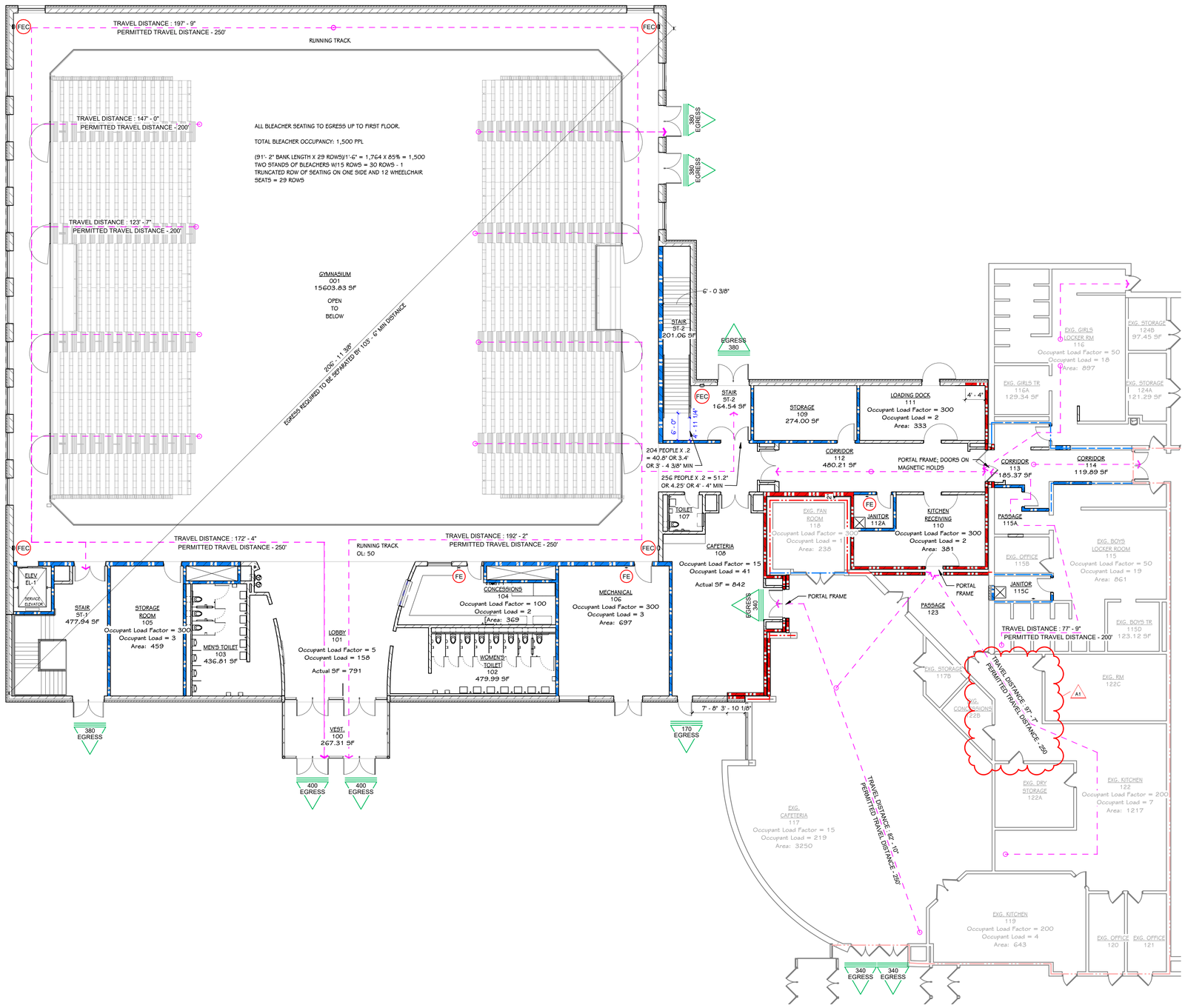
Montague, Michigan

SHEET TITLE
OVERALL MAIN LEVEL CODE COMPLIANCE PLAN

DATE
JUNE 9, 2023

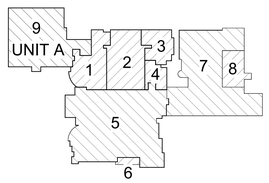
SHEET NUMBER
G 101

22-136.20



MAIN LEVEL CODE COMPLIANCE PLAN - UNITS A & B
1" = 10'-0"

MONTAGUE HIGH SCHOOL



FIRE KEY PLAN
SCALE: NO SCALE

2015 MICHIGAN BUILDING CODE (MBC)

1. BUILDING AREA, OCCUPANCIES, AND BUILDING TYPES

USE GROUP: E - EDUCATION (305.1)
A - ASSEMBLY (UNSEPARATED FROM GROUP E, 303.1.3)

CONSTRUCTION TYPE: EXISTING BUILDING - II BASED ON NFPA 220 1992 EDITION; NEW CONSTRUCTION - IIB (TABLE 601)

(TABLE 601 VALUES FOR IIB)
STRUCTURAL FRAME - 0 HR | EXTERIOR LOAD BEARING - 0 HR | STAIR (ENCLOSED) - 1 HR | EXTERIOR NON-LOAD BEARING - 0 HR | SHAFTS - 1 HR

2. BUILDING AREAS, HEIGHT, FRONTAGE, AND INCREASE (506.3)

BLDG AREA	GROUP	STORIES	AREA (ACTUAL)	PERIMETER	PERIM AT OPEN YARDS	% OPEN	% INC
ADDITION	E*	2	LL: 22,364 1 : 35,376	804'	626'	78	53

* CONTAINS GROUP A-3 ASSEMBLY. CODE ALLOWS GROUP A TO BE PART OF GROUP E WITHOUT SEPARATION

3. ALLOWABLE FLOOR AREA (506)

BLDG AREA	ALLOW. STORIES (TABLE 504.4)	ALLOW. HGT. (TABLE 504.3)	TABULAR ALLOW. AREA (TABLE 506.2)	INC. AREA (NS x % INC)	ALLOW. AREA (W/ INCREASE)
ADDITION TYPE IIB	3	75' ≥ ACTUAL	43,500 SF	11,433 SF	54,933 SF PER STORY

4. OCCUPANT LOAD

1004.1.1 MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

ACCESSORY STORAGE	300 GROSS
ASSEMBLY WITHOUT FIXED SEATS	7 NET
ASSEMBLY STANDING SPACE	5 NET
ASSEMBLY UNCONCENTRATED TABLES AND CHAIRS	15 NET
BUSINESS AREAS	100 GROSS
EDUCATIONAL LOCKER ROOMS	15 GROSS
EXERCISE ROOMS	50 GROSS
KITCHENS COMMERCIAL	200 GROSS

5. PROTECTION FROM HAZARDS

FIRE WALLS (SECTION 706.1) - EACH PORTION OF A BUILDING SEPARATED BY ONE OR MORE FIRE WALLS THAT COMPLY WITH THE PROVISIONS OF THIS SECTION SHALL BE CONSIDERED A SEPARATE BUILDING.

6. FIRE / SMOKE DAMPERS AND DUCT PENETRATIONS (N/A MEANS NOT APPLICABLE)

ITEM	FIRE DAMPER	SMOKE DAMPER	RATING	MBC
1 HR FIRE BARRIER WALLS	N/A*	N/A	-	717.5.2
2 HR FIREWALL	X	N/A	-	717.5.1
STAIR SHAFTS	NOTE 1	NOTE 1	-	1023.5
1 HR MECHANICAL SHAFTS	X	X	-	717.5.3
1 HR FLOOR ASSEMBLIES	X	N/A	-	717.6.1
THROUGH 1 NON-RATED FLOOR	N/A	N/A	**	717.6.3
SMOKE RESISTIVE ROOMS	N/A	N/A	***	

NOTE 1: DUCT PENETRATIONS AND DAMPERS NOT PERMITTED
* MUST MEET 717.5.3 EXCEPTION #3 TO VOID FIRE DAMPERS
** DUCT THROUGH FLOOR ASSEMBLIES SHALL SEAL GAPS W/ NONCOMP FIRE SAFING
*** SEAL PENETRATIONS WITH SMOKE RESISTIVE SEALANT (NO TRANSFER GRILLES)

7. FIRE STOPPING AND SMOKE STOPPING

FILL ALL HOLES AND JOINTS IN FIRE RATED PARTITIONS AND FLOOR ASSEMBLIES AROUND ALL MECHANICAL, PLUMBING, F.P. PIPING, ELECTRICAL PENETRATIONS WITH FIRE RATED FIRE STOP MATERIALS PER SPECIFICATION IN DIVISION 7 AND PER ASTM E814. FILL GAPS BETWEEN TOP OF FIRE RATED WALLS AND FLOOR / ROOF DECKS ABOVE WITH FIRESTOPPING. SUBMIT FIRE STOP TEST REPORTS AND PRODUCT LITERATURE AS REQUESTED BY AUTHORITIES HAVING JURISDICTION. ME PENETRATIONS THROUGH SMOKE RESISTIVE / PARTITIONS SHALL BE SEALED SMOKE TIGHT WITH SMOKE RESISTIVE SEALANT. GAPS AROUND PENETRATIONS THROUGH NONRATED FLOOR ASSEMBLIES SHALL BE SEALED WITH NONCOMBUSTIBLE FIRE SAFING SECURED IN PLACE (MBC 714.4.1.2)

8. FIRE ALARM & FIRE SPRINKLERED SYSTEMS

PROVIDE FIRE ALARM SYSTEM THROUGHOUT BUILDING (907.2.3) WITH VOICE ALARMS EXCEPT AT MANUAL PULL STATIONS. FIRE SPRINKLERED AND FIRE ALARM SYSTEMS CONTRACTOR SHALL BE MICHIGAN CERTIFIED UNDER MICHIGAN ACT 144 AND SHALL SUBMIT SHOP DRAWINGS TO AUTHORITIES HAVING JURISDICTION FOR APPROVAL. CONTRACTOR CANNOT BID UNLESS CERTIFIED.

FIRE AREA SHALL BE SUPRESSED WITH FIRE SPRINKLERED SYSTEM IN ACCORDANCE WITH 2013 NFPA 13

9. MEANS OF EGRESS

MINIMUM REQUIRED EGRESS WIDTH (SECTION 1005) THE MEANS OF EGRESS WIDTH SHALL NOT BE LESS THAN REQUIRED BY THIS SECTION. THE TOTAL WIDTH OF MEANS OF EGRESS IN INCHES SHALL NOT BE LESS THAN THE TOTAL OCCUPANT LOAD SERVED BY THE MEANS OF EGRESS.

EGRESS WIDTH PER OCCUPANT SERVED (1005.3): REFER TO LSC NOTES (MORE RESTRICTIVE).

EGRESS CAPACITY GUIDELINES BASED ON 0.2"/OCCUPANTS AT DOORS AND 0.3"/OCCUPANTS AT STAIRS:
36" (33" CLEAR) DOOR: 165 OCCUPANTS MAX
72" (67" CLEAR) PAIR DOORS, NO MULLION: 335 OCCUPANTS MAX
36" STAIR WIDTH: 120 OCCUPANTS MAX
48" STAIR WIDTH: 160 OCCUPANTS MAX

PANIC AND FIRE EXIT HARDWARE (1010.1.10) DOORS SERVING ROOMS OR SPACES WITH AN OCCUPANT LOAD OF 50 OR MORE IN A GROUP A OR E OCCUPANCY SHALL NOT BE PROVIDED WITH A LATCH OR LOCK OTHER THAN PANIC HARDWARE OR FIRE EXIT HARDWARE.

MEANS OF EGRESS LIGHTING: PROVIDE EMERGENCY EGRESS LIGHTING IN ALL MEANS OF EGRESS SPACES HAVING 2 OR MORE MEANS OF EGRESS, IN COMMON TOILET ROOMS AND AT EXTERIOR SIDE OF EXITS. PROVIDE PHOTOMETRIC PLAN CALCULATIONS OF LIGHTING LEVELS IN ACCORDANCE WITH 1008.3.5 TO AND REQUESTED BY AUTHORITIES HAVING JURISDICTION.

MAXIMUM COMMON PATH OF TRAVEL IS 75 FEET WITHIN ASSEMBLY AND GROUP E (TABLE 1006.2.1) EXCEPT 100 FEET PERMITTED WITHIN STAFF BUSINESS AREAS (TABLE 1006.2.1). COMMON PATH FOR GROUP E IS MORE RESTRICTIVE IN MBC THAN IN LSC.

MAXIMUM CORRIDOR DEAD END TRAVEL: 20 FEET (1020.4).

EGRESS THROUGH INTERVENING SPACES (1016.2) IS NOT ALLOWED EXCEPT WHERE ADJOINING ROOMS ARE ACCESSORY TO ONE OR THE OTHER AND PROVIDE DISCERNABLE PATH OF EGRESS TRAVEL TO AN EXIT, OR AS PERMITTED BY LSC (REFER TO LSC NOTES).

WHERE TWO EXITS EXIT ACCESS DOORWAYS, OR EXIT ACCESS STAIRWAYS ARE REQUIRED FROM ANY PORTION OF THE EXIT ACCESS (1007.1.1) - THE TWO ELEMENTS SHALL BE PLACED A DISTANCE APART NO LESS THAN ONE-THIRD OF THE LENGTH OF THE MAXIMUM OVERALL DIAGONAL DIMENSION OF THE AREA SERVED WHEN FULLY SPRINKLERED.

BOILER, INCINERATOR AND FURNACE ROOMS (1006.2.2.1): "TWO EXIT ACCESS DOORWAYS ARE REQUIRED IN BOILER, INCINERATOR AND FURNACE ROOMS WHERE THE AREA IS OVER 500 SQUARE FEET . . . AND ANY FUEL FIRED EQUIPMENT EXCEEDS 400,000 BTU/S INPUT CAPACITY." WHERE EXIT ACCESS DOORWAYS ARE REQUIRED, ONE IS PERMITTED TO BE A FIXED LADDER OR AN ALTERNATING TREAD DEVICE. EXIT ACCESS DOORWAYS SHALL BE SEPARATED BY A HORIZONTAL DISTANCE EQUAL TO ONE-HALF THE LENGTH OF THE MAXIMUM OVERALL DIAGONAL DIMENSION OF THE ROOM.

TRAVEL DISTANCE LIMITATIONS - EXITS SHALL BE LOCATED ON EACH STORY SUCH THAT THE MAXIMUM LENGTH OF EXIT ACCESS TRAVEL DOES NOT EXCEED THE DISTANCES GIVEN IN TABLE 1017.2 (SEE LSC NOTES).

COMMON PATH OF TRAVEL (TABLE 1006.2.1) SHALL NOT EXCEED 75' FOR OCCUPANCIES UNDER 50. COMMON PATH OF EGRESS TRAVEL - THAT PORTION OF EXIT ACCESS WHICH THE OCCUPANTS ARE REQUIRED TO TRAVERSE BEFORE TWO SEPARATE AND DISTINCT PATHS OF EGRESS TRAVEL TO TWO EXITS ARE AVAILABLE. PATHS THAT MERGE ARE COMMON PATHS OF TRAVEL. COMMON PATHS OF EGRESS TRAVEL SHALL BE INCLUDED WITHIN THE PERMITTED TRAVEL DISTANCE. EXIT ACCESS TRAVEL DISTANCE (1017.2) - OCCUPANCY E TRAVEL DISTANCE IS 250' WITH SPRINKLER SYSTEM.

CORRIDOR CONSTRUCTION (TABLE 1020.1) - E OCCUPANCY FULLY SPRINKLERED DOES NOT REQUIRE FIRE RESISTANCE RATING. CORRIDORS SHALL BE SMOKE RESISTANT (407.3 # 710).

CORRIDOR WIDTH IN GROUP E OCCUPANCIES HAVING AN OCCUPANT LOAD OF 100 OR MORE SHALL HAVE A MINIMUM WIDTH OF 72 INCHES (TABLE 1020.2).

MINIMUM NUMBER OF EXITS (TABLE 1006.3.1)
1 TO 500 OCCUPANTS = 2 EXITS REQUIRED
501 TO 1,000 OCCUPANTS = 3 EXITS REQUIRED
1,001 AND OVER OCCUPANTS = 4 EXITS REQUIRED

EVERY STUDENT OCCUPIED ROOM OVER 250 SQUIRE FEET MUST HAVE A DOOR OR WINDOW TO THE EXTERIOR (14.2.11) EXCEPTION: NOT REQUIRED IN FULLY SPRINKLERED BUILDINGS.

(1028.1) EXITS SHALL DISCHARGE DIRECTLY TO THE EXTERIOR OF THE BUILDING (1028.1). THE EXIT DISCHARGE SHALL BE AT GRADE OR SHALL PROVIDE A DIRECT PATH OF EGRESS TRAVEL TO GRADE. EXCEPTIONS PERMITTED PER 1028.1 TO ALLOW INTERIOR EXIT DISCHARGE.

10. INTERIOR FINISHES

ALL ROOMS / CORRIDORS / LOBBIES: CLASS C, EXCEPT WITHIN ENCLOSED STAIR EXITS TO HAVE CLASS B (TABLE 803.11)

11. TWO-WAY COMMUNICATION

TWO-WAY COMMUNICATION AT ELEVATOR (1009.8) - FOR LOCATION REFER TO CODE PLANGS WITH THE "2W" SYMBOL FOR TWO-WAY COMMUNICATION AT ELEVATOR AT ALL UPPER LEVELS (NOT REQUIRED AT ACCESSIBLE GRADE FLOOR LEVELS AT ACCESSIBLE EXITS).

PROVIDE TWO-WAY COMMUNICATION FOR EMERGENCY ASSISTANCE AT ELEVATORS THAT CONNECTS FROM THE UPPER FLOORS AT ELEVATOR TO A CONSTANTLY ATTENDED STATION APPROVED BY THE FIRE DEPARTMENT.

IF NO LOCATION IS AVAILABLE (OR NO ONE ANSWERS) SYSTEM SHALL AUTOMATICALLY ACCESS TELEPHONE #911 (1007.8.1).

COMMUNICATION SHALL HAVE ACCESSIBLE DIRECTIONS FOR USE AND TO GIVE THE USER INFORMATION OF WHERE THEY ARE LOCATED (E.G., BUILDING ADDRESS, FLOOR NUMBER, ELEVATOR NUMBER, ETC.).

SYSTEM SHALL HAVE BOTH AUDIBLE AND VISIBLE SIGNALS FOR THE HEARING IMPAIRED IN ORDER TO USE SYSTEM.

PROVIDE DIRECTIONAL INFORMATION TO FIND THIS COMMUNICATION SYSTEM ON ALL EVACUATION SIGNAGE REQUIRED WITHIN BUILDING IN ACCORDANCE WITH FIRE DEPARTMENT APPROVAL.

2015 MICHIGAN REHABILITATION CODE (MRC)

1. ALTERATION SCOPE

ALTERATION - LEVEL 2 (504)

LEVEL 2 ALTERATIONS INCLUDE THE RECONFIGURATION OF SPACE, THE ADDITION OR ELIMINATION OF ANY DOOR OR WINDOW, THE RECONFIGURATION OR EXTENSION OF ANY SYSTEM, OR THE INSTALLATION OF ANY ADDITIONAL EQUIPMENT (504.1).

2. ALTERATION APPLICATION

LEVEL 2 ALTERATIONS SHALL COMPLY WITH THE PROVISIONS OF CHAPTER 7 FOR LEVEL 1 ALTERATIONS AS WELL AS THE PROVISIONS OF CHAPTER 8 (504.2).

3. ADDITION SCOPE

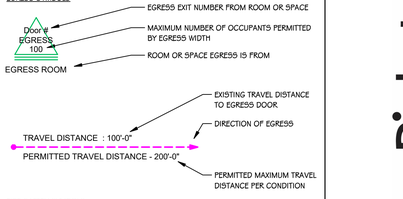
PROVISIONS FOR ADDITIONS SHALL APPLY WHERE WORK IS CLASSIFIED AS AN ADDITION AS DEFINED IN CHAPTER 2.

4. ADDITION APPLICATION

ADDITIONS TO EXISTING BUILDINGS SHALL COMPLY WITH THE PROVISIONS OF CHAPTER 11.

CODE COMPLIANCE KEY

EGRESS SYMBOLS



FIRE SAFETY SYMBOLS

XFE	EXISTING FIRE EXTINGUISHER
XFEC	EXISTING FIRE EXTINGUISHER CABINET
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
AED	AUTOMATED EXTERNAL DEFIBRILLATOR (AED) RECESSED CABINET

FIRE-RATING KEY

COORDINATE ALL REQUIRED DAMPERS WITH MECHANICAL.

DESIGNATION	RATING	PRIORITY
	2 HOUR (NEW CONSTRUCTION)	1
	2 HOUR (EXISTING)	
	1 HOUR (NEW CONSTRUCTION)	2
	1 HOUR (EXISTING WALL, FORMERLY NOT FR)	
	SMOKE RESISTANT	3

1. ALL PENETRATIONS THROUGH A FIRE OR SMOKE RATED PARTITION SHOULD BE SEALED WITH AN APPROVED U.L. RATED PRODUCT.
2. THE TOPS OF ALL FIRE RATED PARTITIONS SHALL BE SEALED TO THE CONTINUOUS STRUCTURE ABOVE WITH A U.L. RATED SYSTEM OR ASSEMBLY.
3. WOOD BLOCKING IN FIRE-RATED PARTITIONS SHALL BE NON-COMBUSTIBLE TREATED WOOD.
4. REFER TO SPECIFICATION U.L. RATING INFORMATION.
5. FIRE-RATED WALLS ENDING INTO AN ACOUSTICAL DECK MUST HAVE THE FLUTES FILLED, REFER TO TOP OF WALL DETAIL AT ACOUSTIC DECK SHOWN ON THIS SHEET.

- FOR MASONRY WALLS THE MASON SHALL FILL VOIDS AND FIRE SPRAY WITH UL LISTED MATERIAL.
- FOR STUD WALLS USE FIRE SAFING AND FIRE CAULK.

2012 NFPA LIFE SAFETY CODE (LSC)

1. OCCUPANCIES

OCCUPANCY USE GROUP: E - EDUCATION
A - ASSEMBLY (GYMNASIUM) (CHAPTER 12)

2. CONSTRUCTION TYPE

EXISTING: II (000) BASED ON NFPA 220 1992 EDITION
NEW CONSTRUCTION: IIB (000)

3. BUILDING AREA

MBC 506 ALLOWABLE FLOOR AREA AND HEIGHT - SEE MBC NOTES 3 AND 4

4. MEANS OF EGRESS

OCCUPANT LOAD FACTORS: 7.3.1.2: MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

STORAGE IN OTHER THAN STORAGE AND CERVANTILE OCCUPANCY	500 GROSS
ASSEMBLY WITHOUT FIXED SEATS	7 NET
LESS CONCENTRATED USE, WITHOUT FIXED SEATING	15 NET
EDUCATIONAL LOCKER ROOMS	15 GROSS
EXERCISE ROOMS WITH EQUIPMENT	50 GROSS
KITCHENS	100 NET
BUSINESS AREAS	100 GROSS

SEE CALCULATED OCCUPANCIES ON PLAN VIEWS

EGRESS WIDTH PER OCCUPANCY SERVED (7.3.3): MINIMUM WIDTH = 0.3 AT STAIRS # 0.2 AT DOORS PER OCCUPANT

MAXIMUM EXIT ACCESS TRAVEL: 250 FEET FOR ASSEMBLY OCCUPANCY (12.2.6.2(1) # 250 FEET FOR EDUCATIONAL OCCUPANCY (14.2.6.3 AS AMENDED). REFER TO MBC NOTES FOR COMMON PATH OF TRAVEL DISTANCES AS IT IS MORE RESTRICTIVE

MAXIMUM CORRIDOR DEAD END TRAVEL: 50 FEET (14.2.5.2) EXCEPT 20 FEET IN ASSEMBLY OCCUPANCIES (12.2.5.1.3)

EVERY STUDENT OCCUPIED ROOM SHALL HAVE AN EXIT ACCESS DOOR LEADING DIRECTLY TO AN EXIT ACCESS CORRIDOR DOOR OR EXIT DOOR EXCEPT EGRESS THROUGH AN INTERVENING ROOM WITH 75 FEET MAXIMUM TRAVEL FROM THE CLASSROOM DOOR TO CORRIDOR DOOR OR EXIT DOOR PERMITTED (14.2.5.5)

5. OCCUPANCY SEPARATIONS SHALL BE MIXED USE: ALL NONSEPARATED WITH EACH OTHER (6.1.14.1 # 6.1.14.3)

6. WHERE PERMANENTLY MOUNTED FOLDING OR MOVABLE PARTITIONS DIVIDE A ROOM INTO SMALLER SPACES, A SWINGING DOOR LEAF OR OPEN DOORWAY SHALL BE PROVIDED AS AN EXIT ACCESS FROM EACH SPACE (ADMINISTRATIVE RULES (7.2.1.12)

7. FIRE SPRINKLER SYSTEM THROUGHOUT BUILDING SHALL BE IN ACCORDANCE WITH 2013 NFPA 13

8. CORRIDORS, IF FULLY SPRINKLERED (14.3.4(2)), ARE NOT REQUIRED TO HAVE FIRE RESISTANCE RATING PROVIDED THE CORRIDOR WALLS FORM SMOKE PARTITIONS IN ACCORDANCE WITH 8-4. PROVIDE DOORS WITH CLOSERS EXCEPT DOORS TO NORMALLY OCCUPIED CLASSROOMS (14.3.4(2)(b))

9. WHERE FIRE BARRIERS SERVING HORIZONTAL EXITS, OTHER THAN EXISTING HORIZONTAL EXITS, TERMINATE AT OUTSIDE WALLS, AND THE OUTSIDE WALLS ARE AT AN ANGLE OF LESS THAN 180 DEGREES FOR A DISTANCE OF 10 FT ON EACH SIDE OF THE HORIZONTAL EXIT, THE OUTSIDE WALLS SHALL HAVE A MINIMUM 1-HOUR FIRE RESISTANCE RATING, WITH OPENING PROTECTIVES HAVING A MINIMUM 1¼-HOUR FIRE PROTECTION RATING, FOR A DISTANCE OF 10 FT ON EACH SIDE OF THE HORIZONTAL EXIT (7.2.4.3.4).

PLUMBING COUNTS (2018 MICHIGAN PLUMBING CODE)

OCCUPANCY COUNT
TOTAL OCCUPANCY = 1,921 MAXIMUM OCCUPANCY
A-3 - ASSEMBLY = 1,921 MAXIMUM, 161 TYPICAL
E - EDUCATION = 0

REQUIRED PLUMBING FIXTURES (PER ASSEMBLY CLASSIFICATION)

OCCUPANTS / 2	= PER SEX	
MALE WATER CLOSETS	= 1 PER 125	= 8 (UP TO 6 MAY BE SUBSTITUTED BY URINALS PER SECTION 419.2)
FEMALE WATER CLOSETS	= 1 PER 65	= 15
MALE LAVATORIES	= 1 PER 200	= 5
FEMALE LAVATORIES	= 1 PER 200	= 5
DRINKING FOUNTAINS	= 1 PER 500	= 4 (PER SECTION 410.3)
SERVICE SINKS	= 1	

ADDITIONAL PLUMBING FIXTURE REQUIREMENTS
6 OR MORE TOILET FIXTURES FOR EACH SEX = 1 "FAMILY" = 1 FAMILY/UNISEX (MBC 1109.2.1)

TOTAL REQUIRED FIXTURES
WATER CLOSETS = 23 (MAXIMUM OF 6 SUBSTITUTED BY URINALS)
LAVATORIES = 10
DRINKING FOUNTAINS = 4
SERVICE SINKS = 1

PROVIDED PLUMBING FIXTURES

MALE WATER CLOSETS	= 3 WATER CLOSETS (1 ADA + 1 AMBULATORY) 4 4 URINALS
FEMALE WATER CLOSETS	= 8 (1 ADA + 1 AMBULATORY)
ADDITIONAL UNISEX WATER CLOSETS PROVIDED	= 3
MALE LAVATORIES	= 6
FEMALE LAVATORIES	= 7
ADDITIONAL UNISEX LAVATORIES PROVIDED	= 3
DRINKING FOUNTAINS	= 4 + 1 BOTTLE FILLER
SERVICE SINKS	= 3 (MOVED LOCATION OF 2 EXISTING = 1 NEW + 2 REPLACEMENTS)

NOTE: AT MAXIMUM OCCUPANCY OF ASSEMBLY SPACE, OWNER WILL PROVIDE ACCESS TO EXISTING TOILET ROOM FACILITIES TO COMPLETE THE REQUIRED PLUMBING COUNT.

EXISTING MALE WATER CLOSETS	= 4 WC + 6 URINALS
EXISTING FEMALE WATER CLOSETS	= 11
EXISTING MALE LAVATORIES	= 8
EXISTING FEMALE LAVATORIES	= 8

THIS DRAWING SHEET IS INTENDED TO BE PLOTTED IN COLOR. IF THIS TEXT APPEARS IN BLACK AND WHITE, IT IS PLOTTED INCORRECTLY. DISCARD AND OBTAIN AN ACCURATE DRAWING

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ISSUED FOR	DATE
ADDENDUM 1	6-20-23

PROJECT TITLE
PERFORMANCE GYMNASIUM ADDITION

OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

SHEET TITLE
MAIN LEVEL CODE COMPLIANCE PLAN - UNITS A & B

DATE
JUNE 9, 2023

SHEET NUMBER
G 101A

22-136.20

EXTERIOR LOUVER SCHEDULE

NUMBER	ROOM #	ELEVATION	LENGTH	HEIGHT	AREA	FINISH
L1	106		6' - 6"	4' - 0"	26.00 SF	TO MATCH EXTERIOR STOREFRONT

EXTERIOR ELEVATION KEY

BR-1 - BRICK 1, MANUF: BELDEN BRICK (MIDLAND BLEND)
COLOR: BROWN
SIZE: MODULAR
TEXTURE: COURSE VELOUR
MORTAR COLOR:

BR-2 - BRICK 2, MANUF: BELDEN BRICK (CONCORD CLEAR)
COLOR: BUFF
SIZE: MODULAR
TEXTURE: SANDED VELOUR

BR-3 - BRICK 3, MANUF: BELDEN BRICK (CORAL BLEND VERTICAL)
COLOR: BUFF
SIZE: MODULAR
TEXTURE: VERTICAL

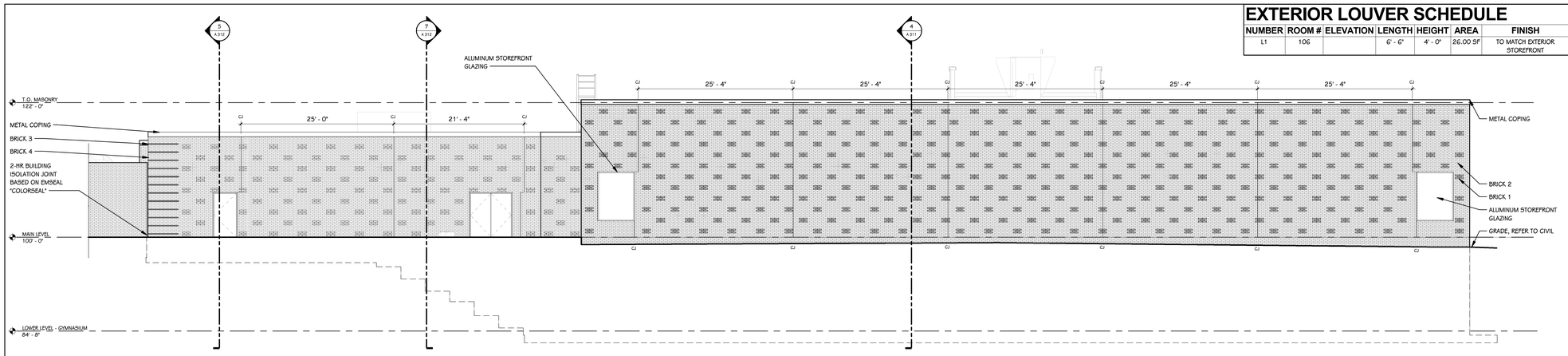
BR-4 - BRICK 4, MANUF: BELDEN BRICK (BEAVER BLEND)
COLOR: BROWN
SIZE: MODULAR
TEXTURE: DART-TEX

MP-1, METAL PANEL
MANUF: MBCI
STYLE: PW-120
COLOR: CUSTOM COLOR TO MATCH MONTAGUE BLUE (SCHOOL COLOR)

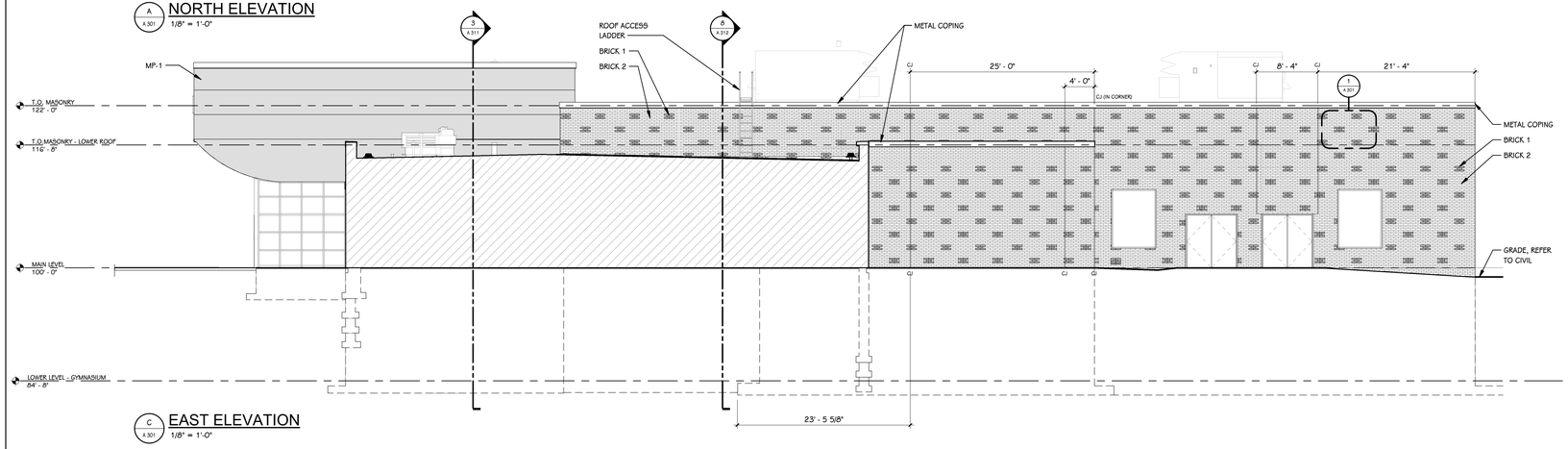
MSO, METAL SOFFIT
MANUF: MBCI
STYLE: FLEXLOC
COLOR: CUSTOM COLOR TO MATCH MONTAGUE BLUE (SCHOOL COLOR)

CJ = CONTROL JOINT, COLOR:

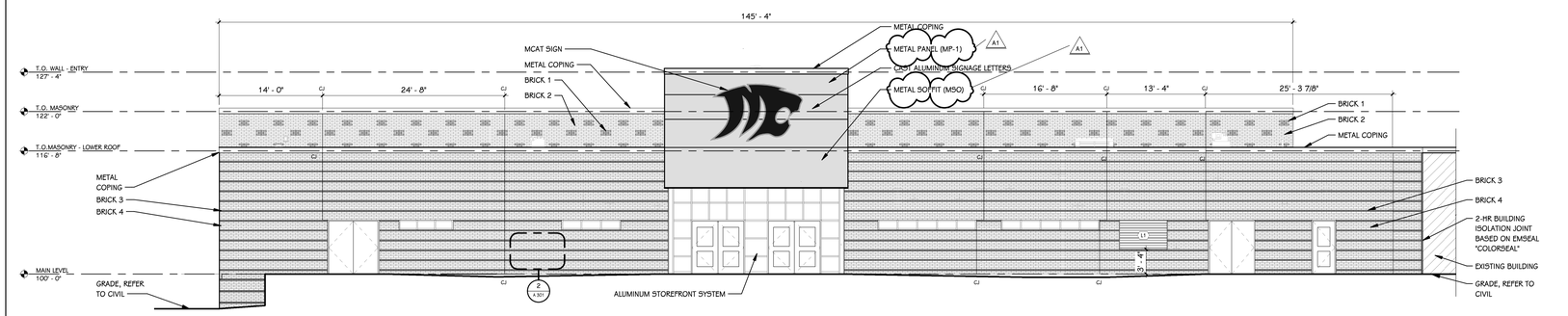
EJ - BUILDING EXPANSION JOINT, COLOR:



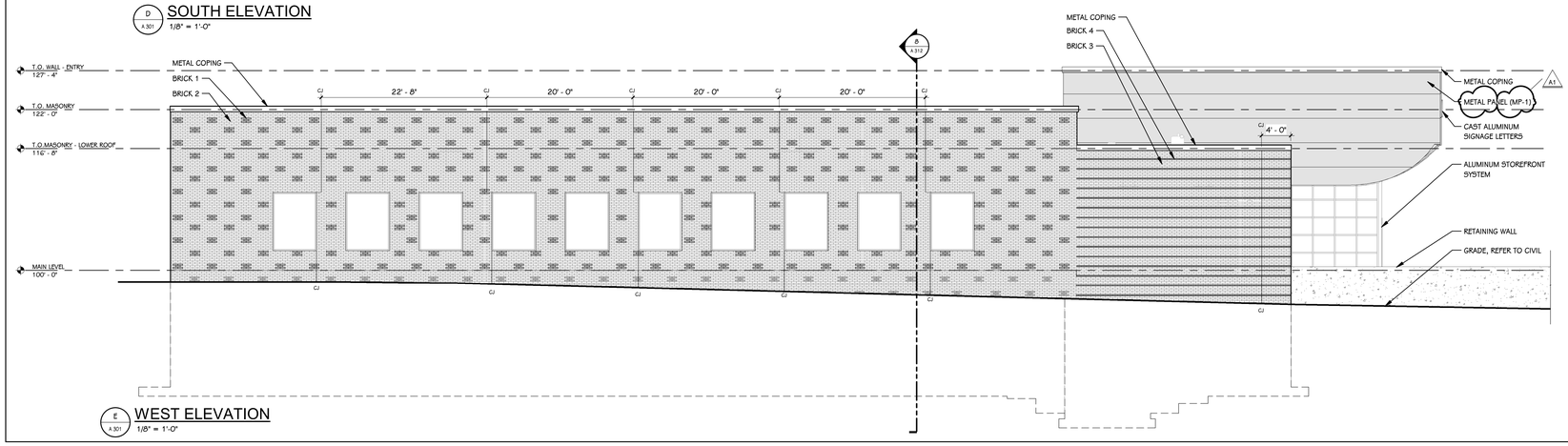
A 301 NORTH ELEVATION
1/8" = 1'-0"



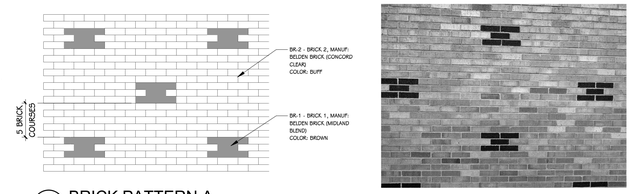
C A.301 EAST ELEVATION
1/8" = 1'-0"



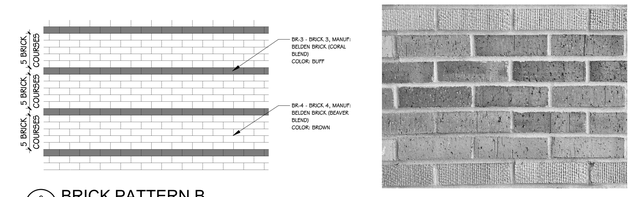
D A.301 SOUTH ELEVATION
1/8" = 1'-0"



E A.301 WEST ELEVATION
1/8" = 1'-0"

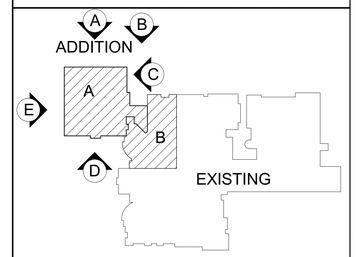


1 A.301 BRICK PATTERN A
1/2" = 1'-0"



2 A.301 BRICK PATTERN B
1/2" = 1'-0"

MONTAGUE HIGH SCHOOL



KEY PLAN
SCALE: NO SCALE

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ADDENDUM 1	6-20-23
ISSUED FOR	DATE

PROJECT TITLE
PERFORMANCE GYMNASIUM ADDITION

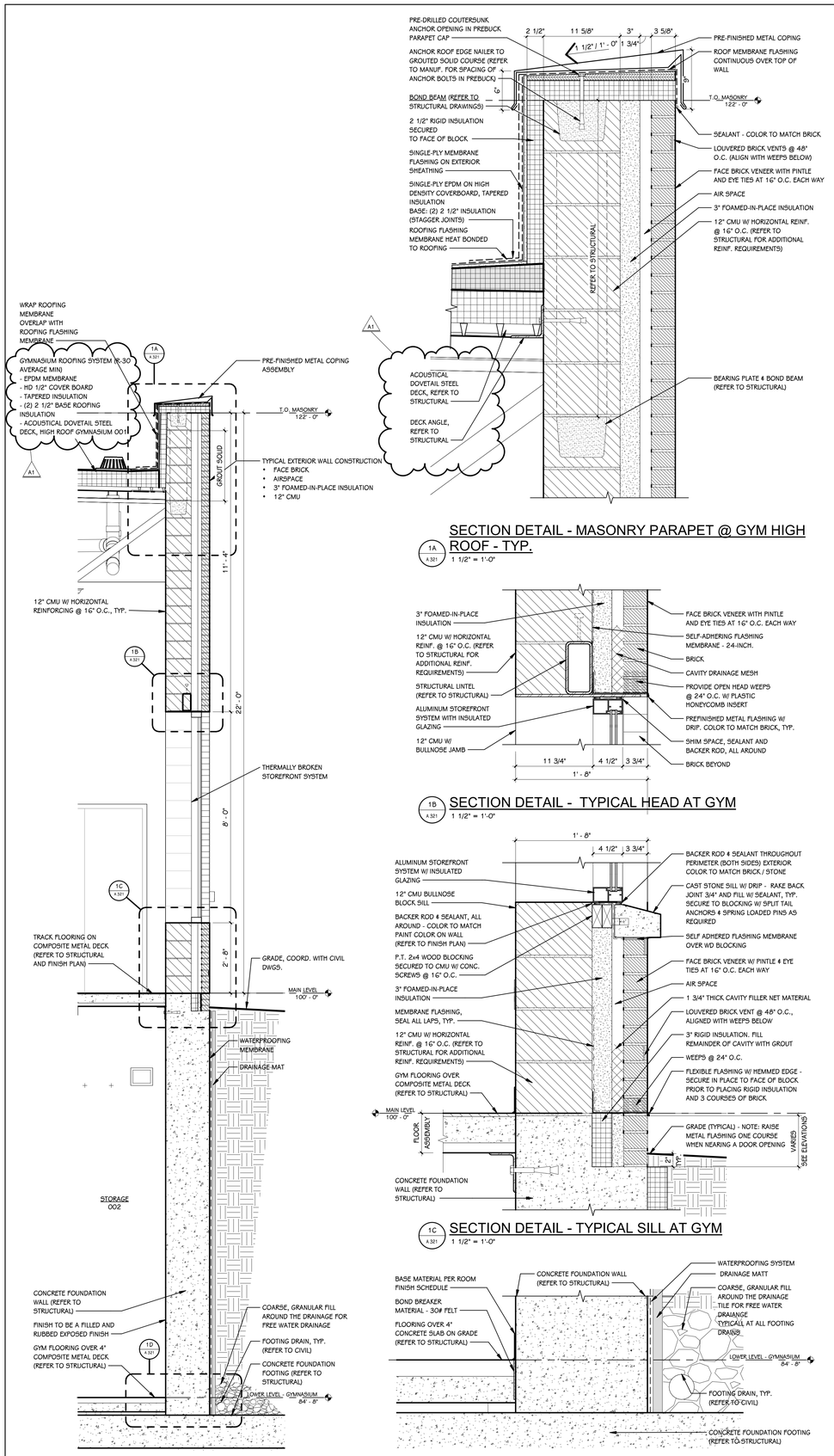
OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

SHEET TITLE
EXTERIOR ELEVATIONS

DATE
JUNE 9, 2023

SHEET NUMBER
A 301
22-136.20



SECTION DETAIL - MASONRY PARAPET @ GYM HIGH ROOF - TYP.

1A / A 321 — 1 1/2" = 1'-0"

SECTION DETAIL - TYPICAL HEAD AT GYM

1B / A 321 — 1 1/2" = 1'-0"

SECTION DETAIL - TYPICAL SILL AT GYM

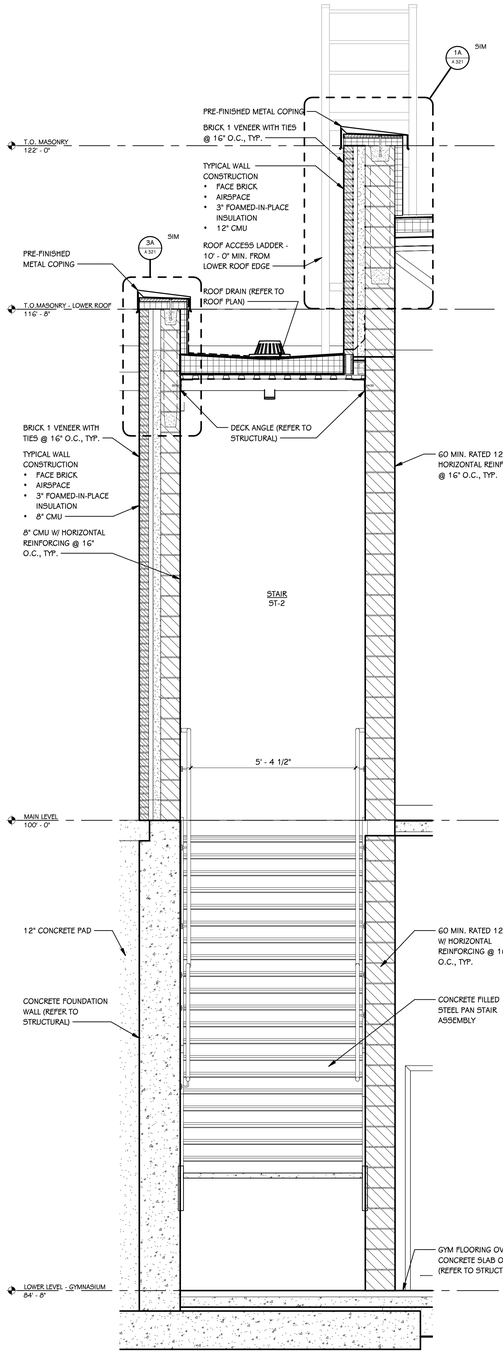
1C / A 321 — 1 1/2" = 1'-0"

SECTION DETAIL - TYPICAL EXT. WALL BELOW GRADE

1D / A 321 — 1 1/2" = 1'-0"

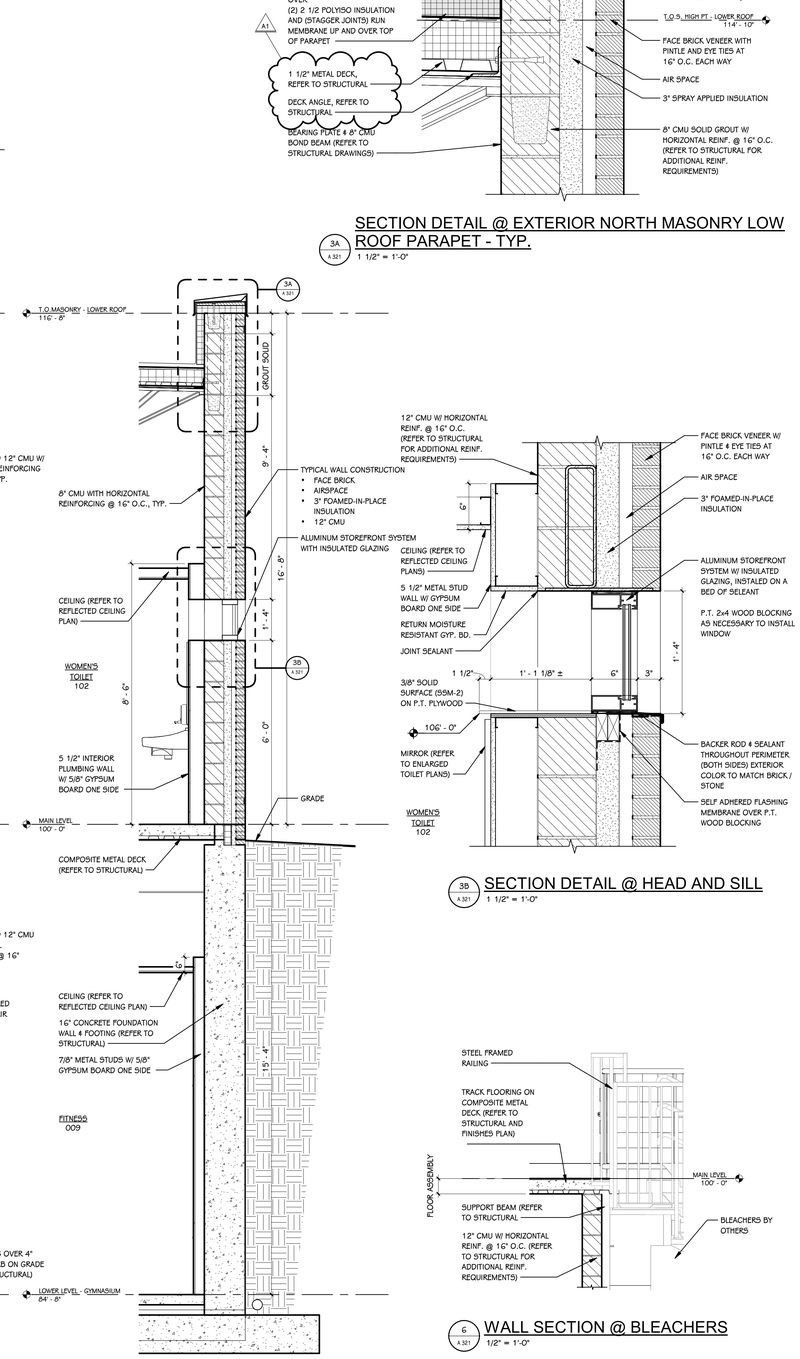
WALL SECTION - TYPICAL GYM EXT. WALL @ WINDOWS

1 / A 321 — 1/2" = 1'-0"



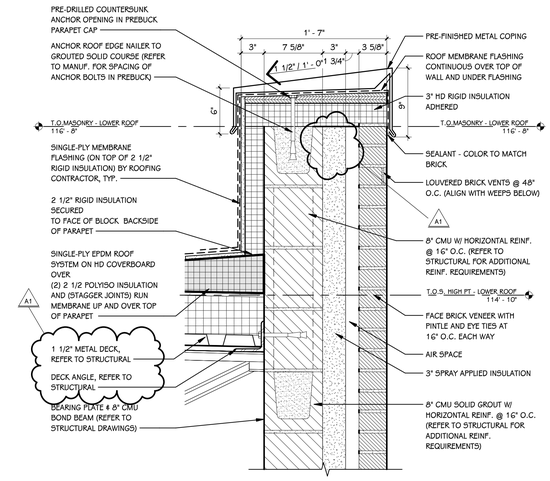
WALL SECTION @ GYM AND STAIR 2

2 / A 321 — 1/2" = 1'-0"



WALL SECTION @ EXTERIOR NORTH MASONRY WALL

3 / A 321 — 1/2" = 1'-0"



SECTION DETAIL @ EXTERIOR NORTH MASONRY LOW ROOF PARAPET - TYP.

3A / A 321 — 1 1/2" = 1'-0"

SECTION DETAIL @ HEAD AND SILL

3B / A 321 — 1 1/2" = 1'-0"

WALL SECTION @ BLEACHERS

6 / A 321 — 1/2" = 1'-0"

ADDENDUM 1	6-20-23
ISSUED FOR	DATE

PROJECT TITLE
PERFORMANCE GYMNASIUM ADDITION

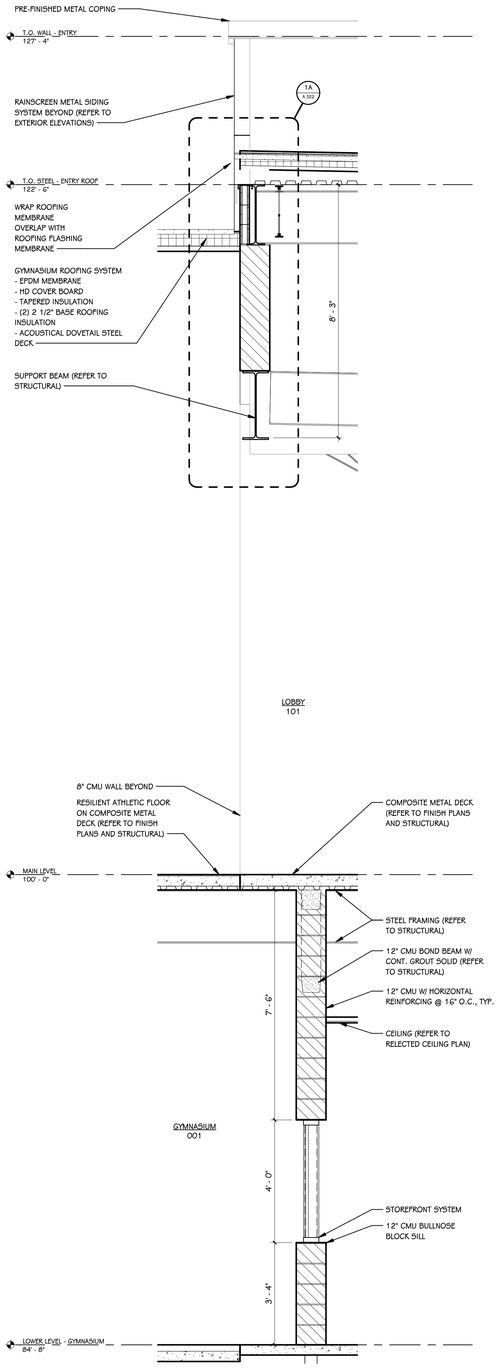
OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

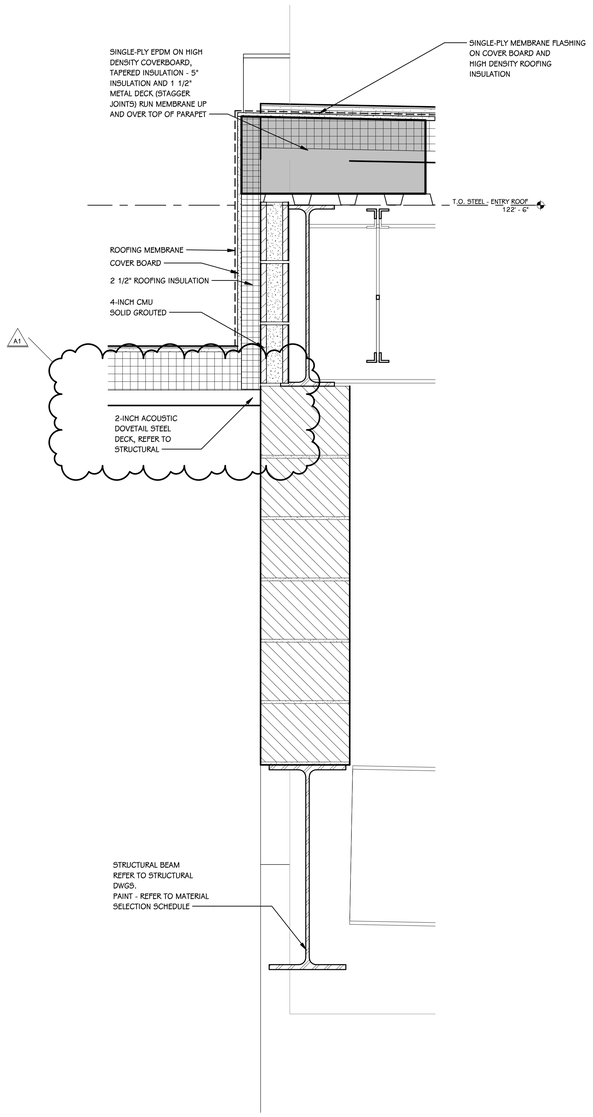
SHEET TITLE
WALL SECTIONS AND DETAILS

DATE
JUNE 9, 2023

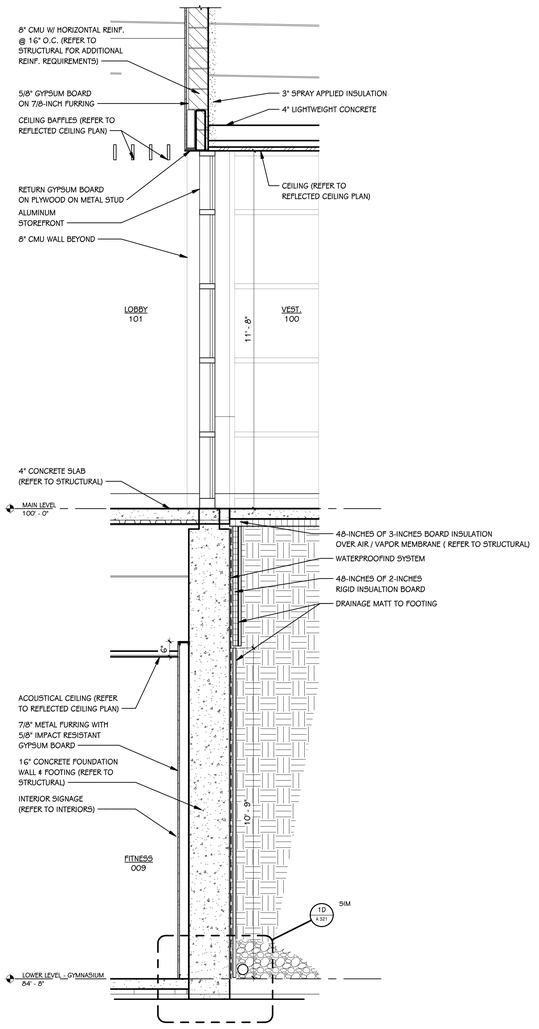
SHEET NUMBER
A 321
22-136.20



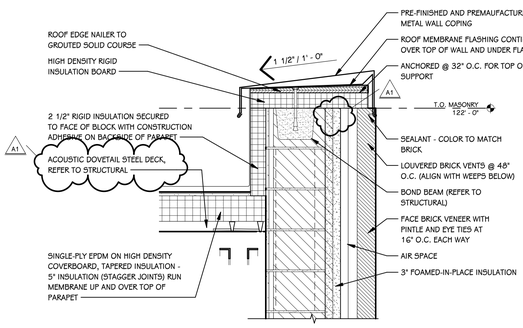
1 A 322 WALL SECTION @ LOBBY AND GYM
1/2" = 1'-0"



1A A 322 SECTION DETAIL PARAPET WALL @ LOBBY AND GYM
1 1/2" = 1'-0"

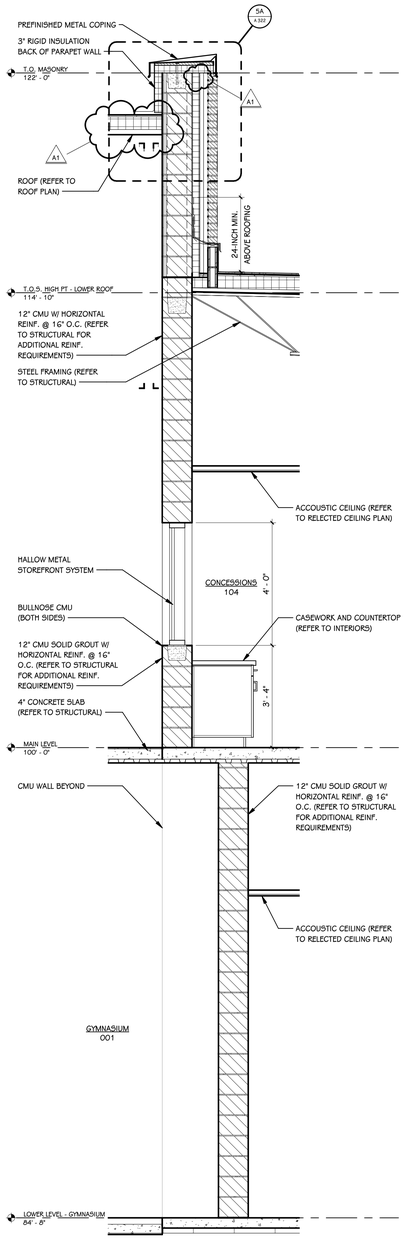


4 A 322 WALL SECTION @ LOBBY AND VESTIBULE
1/2" = 1'-0"



SECTION DETAIL @ GYM AND CONCESSIONS - HIGH ROOF

5A A 322 1" = 1'-0"



5 A 322 WALL SECTION @ GYM AND CONCESSIONS
1/2" = 1'-0"

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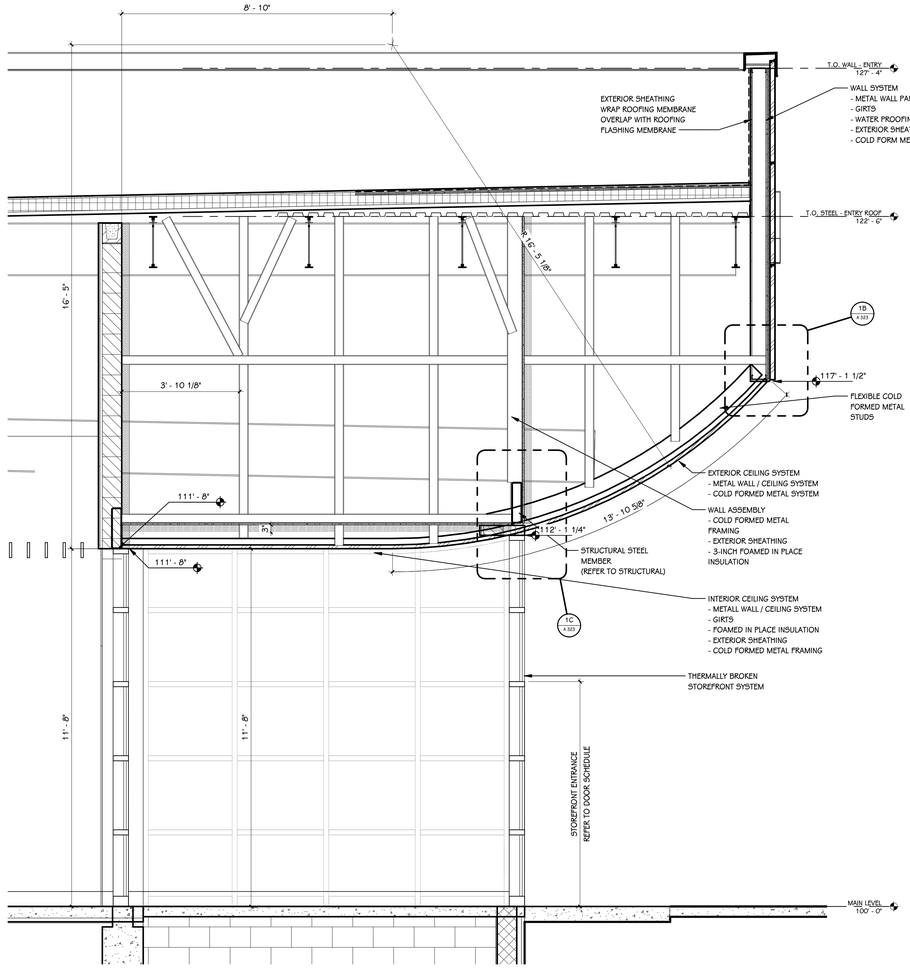
OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

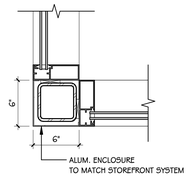
SHEET TITLE
WALL SECTIONS AND DETAILS

DATE
JUNE 9, 2023

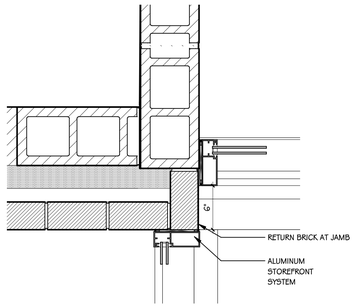
SHEET NUMBER
A 322
22-136.20



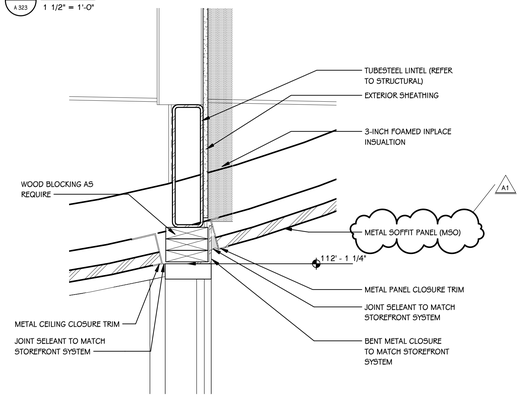
1 A 323 WALL SECTION @ VESTIBULE CANOPY
1/2" = 1'-0"



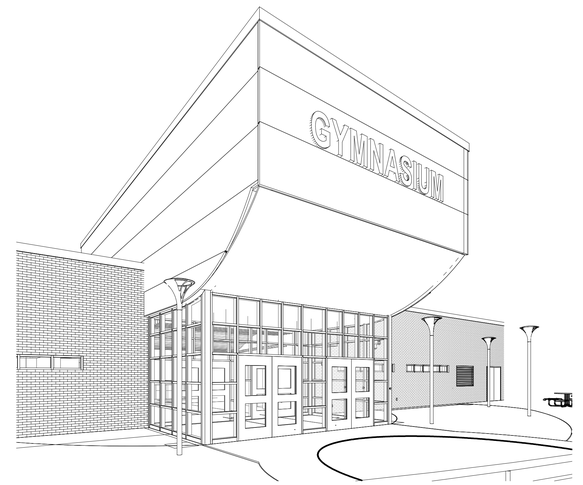
3 A 323 ENLARGED PLAN DTL AT CORNER COLUMN
1 1/2" = 1'-0"

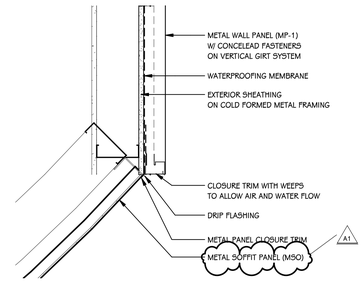


5 A 323 Detail 8
1 1/2" = 1'-0"

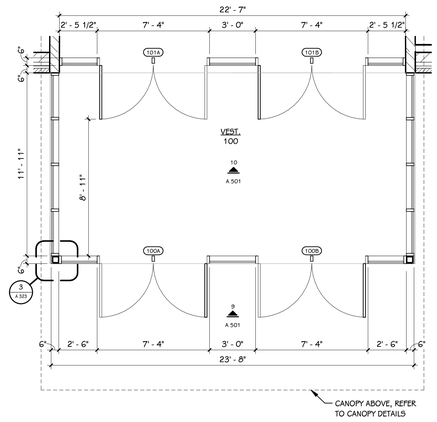


1C A 323 DETAIL SECTION @ VESTIBULE CANOPY - Callout 1
1 1/2" = 1'-0"

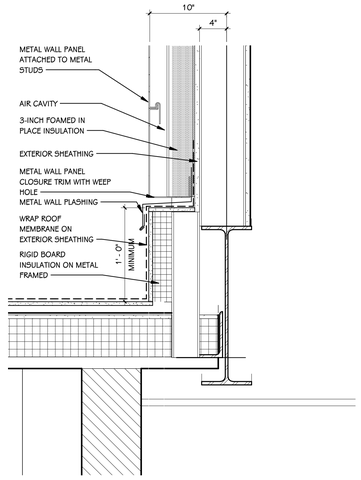




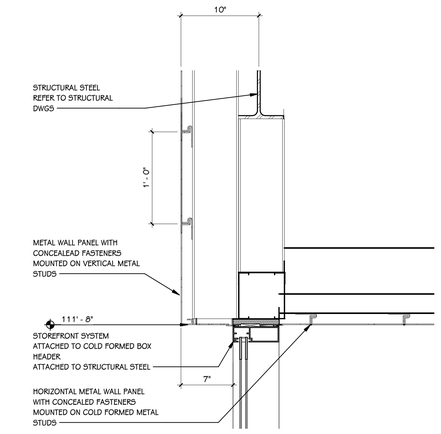
1B A 323 DETAIL SECTION @ VESTIBULE CANOPY CONNECTION
1 1/2" = 1'-0"



6 A 323 LOBBY ENLARGED FLOOR PLAN
1/4" = 1'-0"



7 A 323 Detail 9
1 1/2" = 1'-0"



2 A 323 Detail 7
1 1/2" = 1'-0"

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PROJECT TITLE
PERFORMANCE GYMNASIUM ADDITION

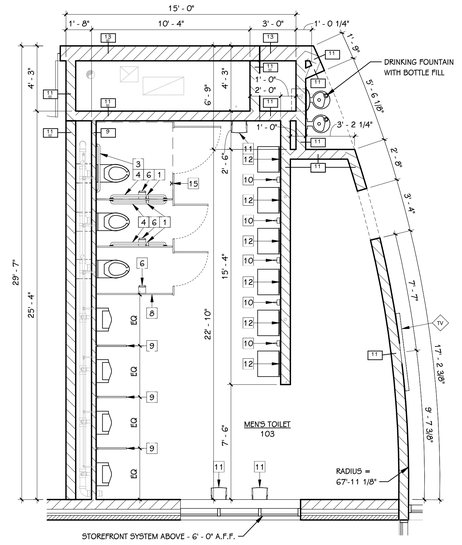
OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

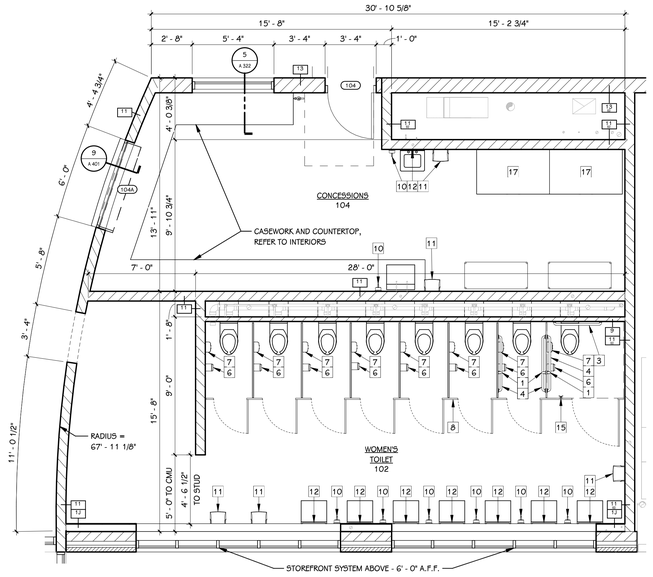
SHEET TITLE
CANOPY WALL SECTIONS AND DETAILS

DATE
JUNE 9, 2023

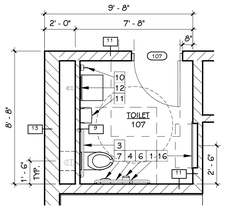
SHEET NUMBER
A 323
22-136.20



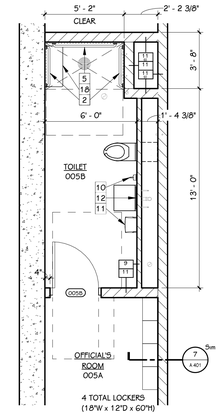
1 A.401 MENS TOILET 103
1/4" = 1'-0"



2 A.401 WOMENS TOILET 102 & CONCESSIONS 104
1/4" = 1'-0"



3 A.401 TOILET RM 107
1/4" = 1'-0"



4 A.401 TOILET RM 005B
1/4" = 1'-0"

ACCESSORY MATRIX

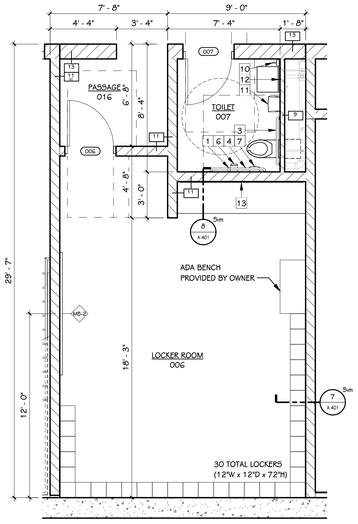
DESCRIPTION	OP	OI	CP	CI	NIC
BABY CHANGING STATIONS			X	X	
CODE REQUIRED INTERIOR SIGNAGE (ALL TOILET ROOMS, STAIRS, RAMPS, ELEVATORS, ELEVATOR SPRINKLER SHUT-OFF VALVE, AREAS OF REFUGE, TWO-WAY COMMUNICATION IN AREA OF REFUGE AND ASSEMBLY OCCUPANT LOADS)	X	X			
GRAB BARS			X	X	
MIRRORS			X	X	
SANITARY NAPKIN DISPENSER	X			X	
SANITARY NAPKIN DISPOSAL	X			X	
TOILET TISSUE DISPENSERS	X			X	
TOWEL DISPENSERS	X			X	
WASTE BASKETS	X	X			
APPLIANCES	X			X	
CLOCKS					X
COAT HOOKS			X	X	
COPY/PRINTER/FAX	X	X			
FURNITURE (AND ASSOCIATED FURNITURE COMPONENTS)	X	X			
LOOSE FURNITURE - SEATING, FILE CABINETS, TABLES, ETC.	X	X			
SCOREBOARDS	X	X			
SIGNAGE (INTERIOR/EXTERIOR)	X	X			
SOAP DISPENSER	X			X	
TV OR MONITOR BRACKETS FOR WALL OR CEILING MOUNTING	X			X	
TVS OR MONITORS (WALL OR CEILING HUNG)	X			X	
WINDOW TREATMENTS			X	X	
AED	X			X	
HAND SANITIZER DISPENSERS	X			X	

ACCESSORY MATRIX NOTES

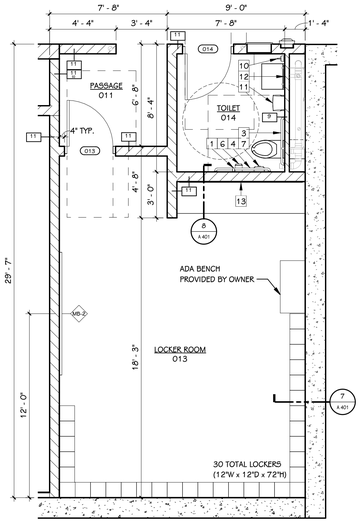
1. OP = OWNER PURCHASED, OI = OWNER INSTALLED, CP = CONTRACTOR PURCHASED, CI = CONTRACTOR INSTALLED.
2. DIMENSIONS INDICATED ARE TYPICAL UNLESS NOTED OTHERWISE ON PLANS.
3. GENERIC PLUMBING FIXTURES ARE SHOWN. REFER TO PLUMBING DRAWINGS AND SPECIFICATIONS FOR FIXTURE TYPES, MANUFACTURERS AND MOUNTING HEIGHTS.
4. CODE REQUIRED INTERIOR SIGNAGE - INCLUDES MINIMUM REQUIRED SIGN TYPES REQUIRED FOR OCCUPANCY AS DICTATED BY IBC, IFC, AND NFPA. COORDINATE WITH ANY OWNER-PROVIDED SIGNAGE.

KEYED NOTES - ENLARGED PLAN ☐

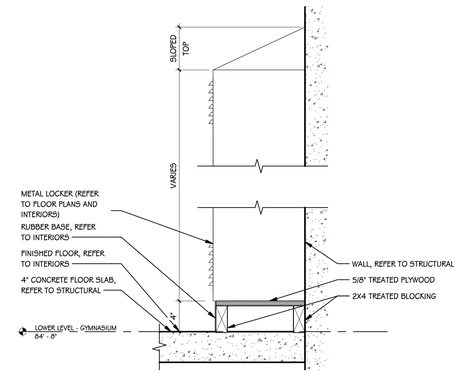
1 18" VERTICAL STAINLESS STEEL GRAB BAR
2 30" STAINLESS STEEL GRAB BAR
3 36" STAINLESS STEEL GRAB BAR
4 42" STAINLESS STEEL GRAB BAR
5 48" STAINLESS STEEL GRAB BAR
6 TOILET PAPER DISPENSER
7 SANITARY NAPKIN DISPOSAL
8 TOILET PARTITION - FLOOR TO CEILING BRACED
9 URINAL SCREEN - HEAVY DUTY CONTINUOUS BRACKET FULL SCREEN HEIGHT
10 SOAP DISPENSER
11 PAPER TOWEL DISPENSER
12 STAINLESS STEEL FRAMED MIRROR (18"Wx34"H)
13 STAINLESS STEEL FRAMELESS MIRROR (96"Wx36"H)
14 STAINLESS STEEL FRAMELESS MIRROR (48"Wx60"H)
15 DOUBLE ROBE HOOK
16 BABY CHANGING STATION
17 REFRIGERATOR - OWNER PROVIDED
18 FOLD DOWN SHOWER SEAT



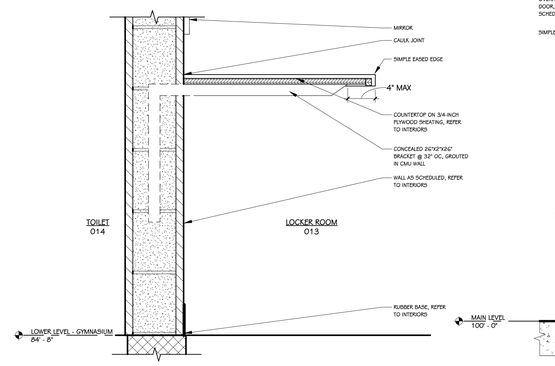
5 A.401 LOCKER ROOM 006 & TOILET 007
1/4" = 1'-0"



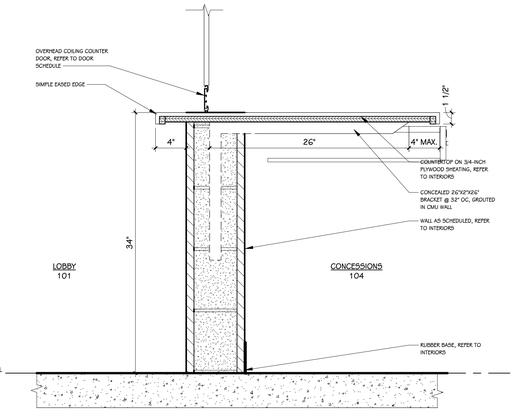
6 A.401 LOCKER ROOM 013 & TOILET 014
1/4" = 1'-0"



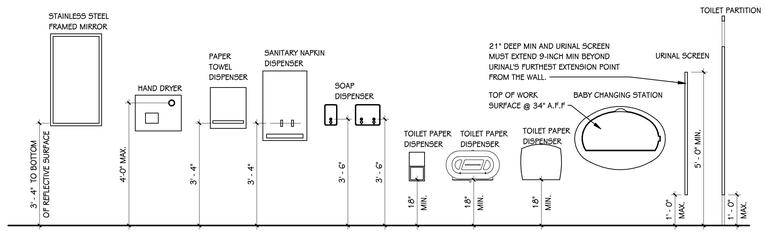
7 A.401 SECTION DETAIL @ LOCKER BASE - TYP.
1 1/2" = 1'-0"



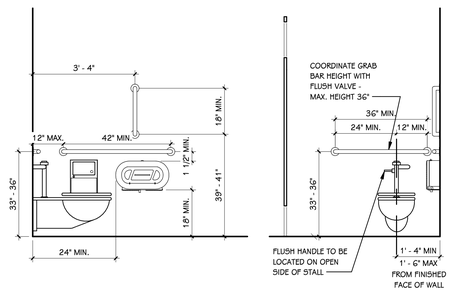
8 A.401 LOCKER ROOM COUNTER SECTION DETAIL - TYP.
1 1/2" = 1'-0"



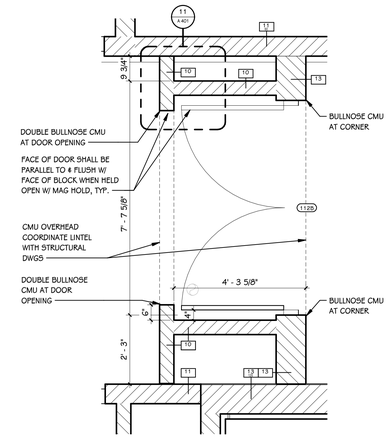
SECTION DETAIL @ ROLL-UP DOOR CONCESSIONS COUNTER - TYP.
9 A.401 1 1/2" = 1'-0"



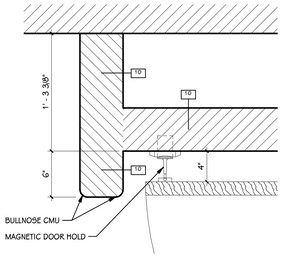
TYPICAL MOUNTING HEIGHTS
1/2" = 1'-0"



TYPICAL BARRIER-FREE MOUNTING HEIGHTS
1/2" = 1'-0"



10 A.401 ENLARGED PLAN @ POCKETED DOOR 112B
1/2" = 1'-0"



PLAN DETAIL
TYPICAL DOOR MAG. HOLD
11 A.401 1 1/2" = 1'-0"

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PROJECT TITLE
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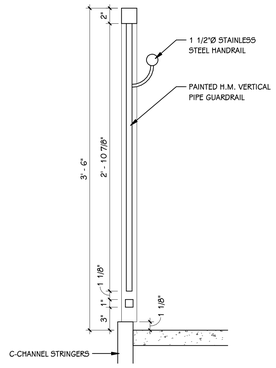
OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

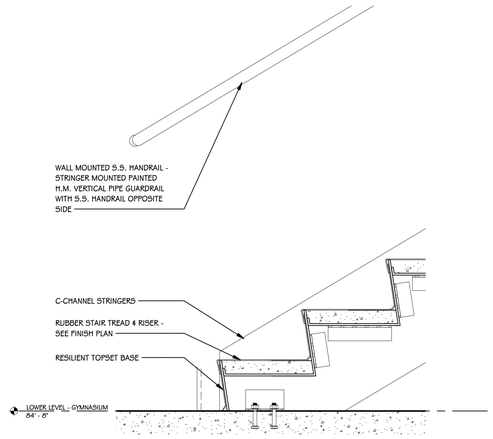
SHEET TITLE
ENLARGED TOILET PLANS, DETAILS, AND ACCESSORY MATRIX

DATE
JUNE 9, 2023

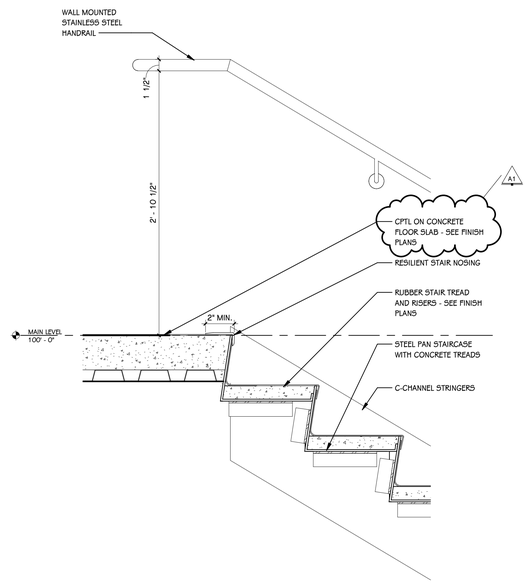
SHEET NUMBER
A 401
22-136.20



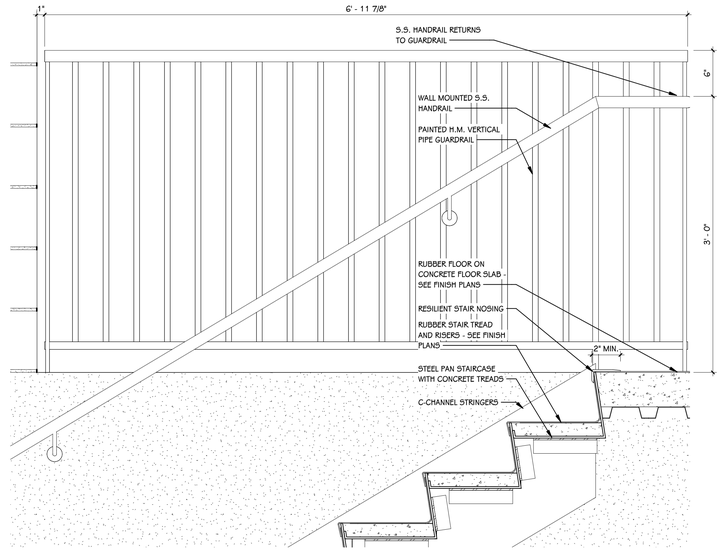
1 / A 423 TYPICAL GUARDRAIL SECTION
1 1/2" = 1'-0"



2 / A 423 STAIR SECTION ST-1 - Callout 1
1 1/2" = 1'-0"



3 / A 423 STAIR SECTION ST-2 - Callout 1
1 1/2" = 1'-0"



4 / A 423 STAIR SECTION ST-2 - Callout 2
1 1/2" = 1'-0"

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PROJECT TITLE
PERFORMANCE GYMNASIUM ADDITION

OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

SHEET TITLE
ENLARGED STAIR PLANS & SECTIONS

SHEET NUMBER
A 423
22-136.20

DATE
JUNE 9, 2023

DOOR SCHEDULE - LOWER LEVEL

NUMBER		ROOM NAME	FIRE RATING		DOOR			SIZE		FRAME			DETAILS			GLASS	ACCESS CONTROLS					Remarks	OVT Hardware Set
DOOR	ROOM		DOOR	FRAME	TYPE	MAT	FIN	WIDTH	HEIGHT	ELEV	MAT	FIN	HEAD	JAMB	SILL		A-PHONE	BARRIER-FREE	CARD READER	ELEC. LOCK HDWR.	MAG HOLD		
002	002	STORAGE	45 MIN	45 MIN	F	WD	PREFIN	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	-	12
003	003	PASSAGE	60 MIN	60 MIN	F	WD	PREFIN	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	Yes	PASSAGE.	20
004	004	TRAINER	-	-	F	WD	PREFIN	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	WALL STOP/HOLDER.	08
004A	004A	STORAGE	45 MIN	45 MIN	F	WD	PREFIN	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	STORE ROOM LOCK FUNCTION.	05
005	005	AREA OF REFUGE	60 MIN	60 MIN	F	WD	PREFIN	6' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	Yes	PASSAGE. PANIC HARDWARE WITH MAG HOLD.	21
005A	005A	OFFICIAL'S ROOM	60 MIN	60 MIN	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	-	11
005B	005B	TOILET	-	-	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	KEYED PRIVACY. NO INDICATOR, NO CLOSER.	01
006	006	LOCKER ROOM	-	-	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	LOCKSET. WALL STOP/HOLDER.	10
007	007	TOILET	-	-	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	KEYED PRIVACY. INDICATOR AND CLOSER.	02
009A	009	FITNESS	-	-	G	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	LG-1	No	No	No	No	No	PANIC HARDWARE. EXIT ONLY.	19
009B	009	FITNESS	-	-	G	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	LG-1	No	No	Yes	No	No	PANIC HARDWARE.	24
013	013	LOCKER ROOM	-	-	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	-	10
014	014	TOILET	-	-	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	KEYED PRIVACY. INDICATOR AND CLOSER.	02
ST-1C	001	GYMNASIUM	60 MIN	60 MIN	F	WD	PREFIN	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	Yes	PASSAGE.	20

DOOR SCHEDULE - FIRST FLOOR

NUMBER		ROOM NAME	FIRE RATING		DOOR			SIZE		FRAME			DETAILS			GLASS	ACCESS CONTROLS					Remarks	OVT Hardware Set
DOOR	ROOM		DOOR	FRAME	TYPE	MAT	FIN	WIDTH	HEIGHT	ELEV	MAT	FIN	HEAD	JAMB	SILL		A-PHONE	BARRIER-FREE	CARD READER	ELEC. LOCK HDWR.	MAG HOLD		
100A	100	VEST.	-	-	FG2	AL	ANOD	7' - 0"	7' - 2"	4	AL	ANOD	-	-	-	IG-1	No	No	No	Yes	No	ELECTRIFIED SCHEDULED.	28
100B	100	VEST.	-	-	FG2	AL	ANOD	7' - 0"	7' - 2"	4	AL	ANOD	-	-	-	IG-1	No	No	Yes	Yes	No	CARD READER AND A/O SEQUENCED. ELECTRIFIED SCHEDULED.	29
101A	101	LOBBY	-	-	FG2	AL	ANOD	7' - 0"	7' - 2"	4	AL	ANOD	-	-	-	IG-1	No	No	No	Yes	No	ELECTRIFIED SCHEDULED.	17
101B	101	LOBBY	-	-	FG2	AL	ANOD	7' - 0"	7' - 2"	4	AL	ANOD	-	-	-	IG-1	No	Yes	No	Yes	No	CARD READER AND A/O SEQUENCED. ELECTRIFIED SCHEDULED.	18
101C	TR-1	TRACK	-	-	F	AL	ANOD	6' - 8"	7' - 2"	4	AL	ANOD	H3	J2	-	-	No	No	No	No	No	KRM. KEYED. PULL, HOLD-OPEN IN CLOSER Q.	31
101D	TR-1	TRACK	-	-	F	AL	ANOD	6' - 8"	7' - 2"	4	AL	ANOD	H3	J2	-	-	No	No	No	No	No	-	32
104	104	CONCESSIONS	-	-	G	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	GL-1	No	No	Yes	No	No	WALL STOP/HOLDER.	07
104A	104	CONCESSIONS	-	-	OHC	STL	PREFIN	6' - 0"	6' - 0"	5	STL	PREFIN	H1 (RADIUSED)	-	11 / A 401	-	No	No	No	No	No	-	33
105	105	STORAGE ROOM	60 MIN	60 MIN	F	HM	P-6	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	STORE ROOM LOCK FUNCTION	05
106	106	MECHANICAL	60 MIN	60 MIN	F	HM	P-6	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	STORE ROOM LOCK FUNCTION	06
106A	106	MECHANICAL		-	F	AL	ANOD	6' - 0"	7' - 2"	4	AL	ANOD	H3	J2	-	-	No	No	No	No	No	KEYED. STORE ROOM LOCK FUNCTION.	16
107	107	TOILET		-	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	KEYED PRIVACY. INDICATOR AND CLOSER.	02
108	108	CAFETERIA	-	-	F	WD	PREFIN	6' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	WALL STOP/HOLDER.	03
108A	108	CAFETERIA	90 MIN	120 MIN	F	WD	PREFIN	6' - 0"	7' - 2"	1	HM	P-6	3 / A 503	6 / A 503	-	-	No	No	Yes	No	Yes	-	26
108B	108	CAFETERIA		-	FG2	AL	ANOD	3' - 0"	7' - 2"	1	AL	ANOD	H3	J2	-	GL-1	No	No	Yes	No	No	ELECTRIFIED SCHEDULED.	27
109	109	STORAGE	60 MIN	60 MIN	F	HM	P-6	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	STORE ROOM LOCK FUNCTION.	12
110	110	KITCHEN RECEIVING	-	-	F	HM	P-6	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	HOLD OPEN.	09
110A	110	KITCHEN RECEIVING	120 MIN	120 MIN	F	HM	P-6	3' - 8"	7' - 2"	1	HM	P-6	10 / A 504	13 / A 504	-	-	No	No	Yes	No	Yes	-	13
111	111	LOADING DOCK		-	F	HM	P-6	3' - 8"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	HOLD OPEN.	09
111A	111	LOADING DOCK		-	F	AL	ANOD	3' - 8"	7' - 2"	1	AL	ANOD	H3	J2	-	-	No	No	Yes	No	No	KEYED LOCK. HOLD OPEN.	15
112	112	CORRIDOR	90 MIN	120 MIN	F	WD	PREFIN	6' - 8"	7' - 2"	1	HM	P-6	17 / A 505	18 / A 505	-	-	No	No	No	No	Yes	DUAL EGRESS.	23
112A	112A	JANITOR	20 MIN	45 MIN	F	HM	P-6	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	STORE ROOM LOCK FUNCTION.	04
112B	112	CORRIDOR	-	-	F	WD	PREFIN	6' - 8"	7' - 2"	1	HM	P-6	H2	J1	-	-	No	No	Yes	No	Yes	ALWAYS LOCKED. LOCKED DOWN.	25
113	113	CORRIDOR	20 MIN	45 MIN	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	LOCKSET.	14
114	114	CORRIDOR	90 MIN	120 MIN	F	WD	PREFIN	6' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	Yes	ALWAYS LOCKED. LOCKED DOWN.	26
115A	113	CORRIDOR	20 MIN	45 MIN	F	WD	PREFIN	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	Yes	No	No	LOCKSET.	14
115B	115C	JANITOR	20 MIN	45 MIN	F	HM	P-6	3' - 0"	7' - 2"	1	HM	P-6	H1	J1	-	-	No	No	No	No	No	STORE ROOM LOCK FUNCTION.	04
ST-1	ST-1	STAIR	60 MIN	60 MIN	F	WD	PREFIN	6' - 8"	7' - 2"	1	HM	P-6	H2	J1	-	-	No	No	No	No	Yes	PASSAGE.	22
ST-1A	ST-1	STAIR	-	-	F	AL	ANOD	6' - 8"	7' - 2"	4	AL	ANOD	H3	J2	-	-	No	No	Yes	Yes	No	ALWAYS LOCKED BUT CAN BE SCHEDULED. ONE DOOR QEL, KRM, DPS, RX IN EACH DEVICE. SECOND LEAF HAS BLANK CYLINDER.	30
ST-2	ST-2	STAIR	60 MIN	60 MIN	F	WD	PREFIN	6' - 0"	7' - 2"	1	HM	P-6	H2	J1	-	-	No	No	No	No	Yes	PASSAGE.	21
ST-2A	ST-2	STAIR	-	-	F	AL	ANOD	6' - 8"	7' - 2"	4	AL	ANOD	H3	J2	-	-	No	No	Yes	No	No	ALWAYS LOCKED BUT CAN BE SCHEDULED. ONE DOOR QEL, KRM, DPS, RX IN EACH DEVICE. SECOND LEAF HAS BLANK CYLINDER.	30

GENERAL NOTES - DOORS

1 REFER TO A 500's SHEETS FOR ADDITIONAL ACCESS CONTROL INFORMATION NOT NOTED ON THIS SHEET.

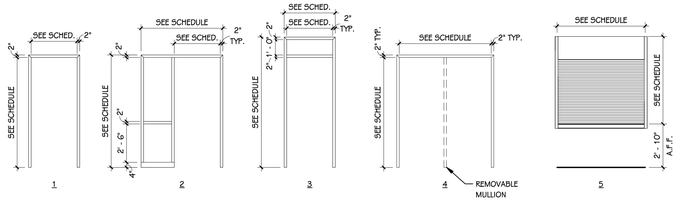
DOOR SCHEDULE GLAZING TYPES

GL-1 CLEAR SAFETY GLASS
LG-1 CLEAR LAMINATED SAFETY GLASS
IG-1 LOW-E-COATED CLEAR INSULATED SAFETY GLASS
IG-2 ACID ETCHED
NOTE: SEE SPECIFICATION SECTION 08 8000 FOR ADDITIONAL INFORMATION

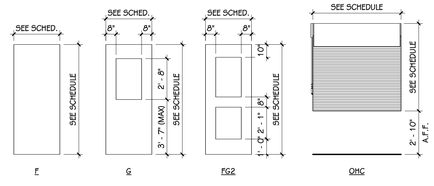
ACCESS PANEL SCHEDULE

CA-# = CEILING PANEL WA-# = WALL PANEL

MARK	RATING	SIZE		FINISH
		WIDTH	HEIGHT	
CA-1	45 MIN.	2' - 0"	2' - 0"	P-5
CA-2	-	2' - 0"	2' - 0"	P-5
CA-3	-	2' - 0"	2' - 0"	P-5
CA-4	-	2' - 0"	2' - 0"	P-5
CA-5	-	2' - 0"	2' - 0"	P-5
CA-6	-	2' - 0"	2' - 0"	P-5
CA-7	-	2' - 0"	2' - 0"	P-5
CA-8	-	2' - 0"	2' - 0"	P-5

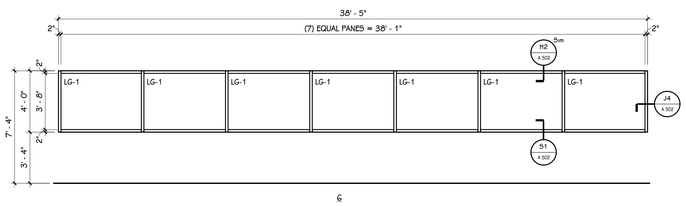


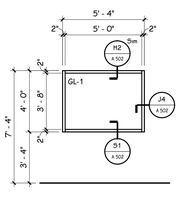
FRAME ELEVATION LEGEND
1/4" = 1'-0"



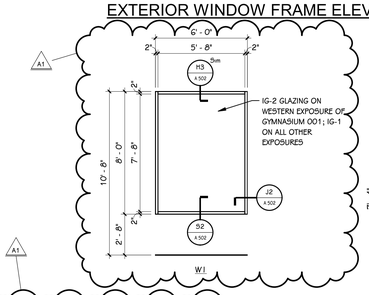
DOOR PANEL ELEVATION LEGEND
1/4" = 1'-0"

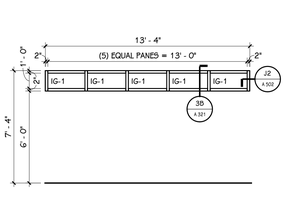
INTERIOR FRAME ELEVATIONS

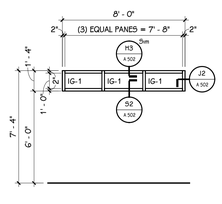


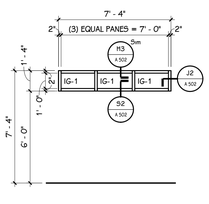


EXTERIOR WINDOW FRAME ELEVATIONS

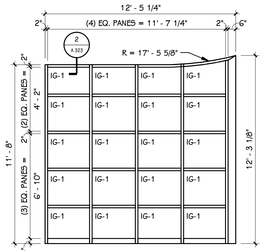


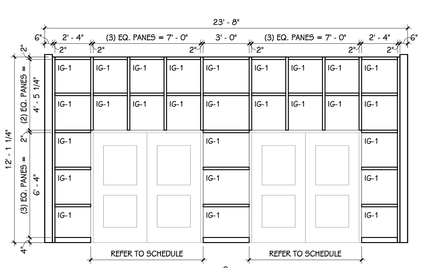


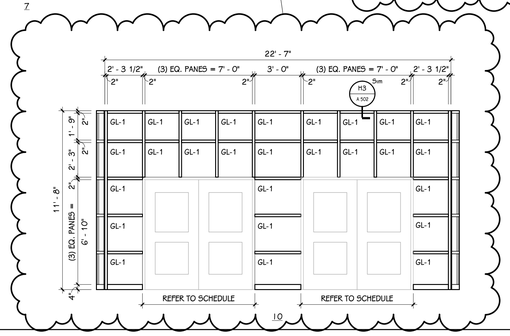


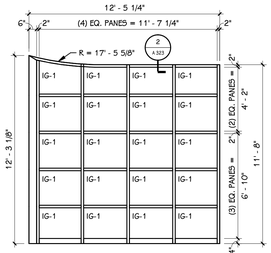


EXTERIOR FRAME ELEVATIONS









ADDENDUM 1 6-20-23
ISSUED FOR DATE

PROJECT TITLE
PERFORMANCE GYMNASIUM ADDITION

OWNER
MONTAGUE AREA PUBLIC SCHOOLS

Montague, Michigan

SHEET TITLE
DOOR SCHEDULES, FRAME ELEVATIONS, WINDOWS & ACCESS PANEL INFORMATION

DATE
JUNE 9, 2023

SHEET NUMBER
A 501
22-136.20

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SOILS & STRUCTURES

REPORT OF GEOTECHNICAL INVESTIGATION FOR MONTAGUE AREA PUBLIC SCHOOLS ADDITIONS

MONTAGUE
MUSKEGON COUNTY
MICHIGAN

DECEMBER 14, 2022

Montague Area Public Schools
4882 Stanton Boulevard
Montague, Michigan 49437

Project No. 2022.2109

SOILS & STRUCTURES

December 14, 2022

Montague Area Public Schools
4882 Stanton Boulevard
Montague, Michigan 49437

Attention: Mr. Jeffrey Johnson

Regarding: Montague Area Public Schools Additions
Montague, Muskegon County, Michigan
Project No. 2022.2109

Dear Mr. Johnson:

Soils & Structures is pleased to present this geotechnical investigation report for the Montague Area Public Schools Additions project in Montague, Muskegon County, Michigan.

The investigation included eight (8) test borings drilled to depths of 15.0 and 25.0 feet in accordance with ASTM D 1586 procedures.

The report, test boring location plan and test boring logs are enclosed. The report provides recommendations for site preperation, foundations, fill, floors and pavement.

We appreciate the opportunity to provide engineering services to Montague Area Public Schools. If you have any questions regarding this report, please contact our office.

Sincerely,
Soils & Structures, Inc.

Malcolm Thompson

Malcolm P. Thompson, P.E.
MPT/mt

Reviewed by:

David W. Hohmeyer

David W. Hohmeyer, P.E.

SOILS & STRUCTURES

Table of Contents

Appendix

SOILS & STRUCTURES

Location of Soil Investigation

The soil investigation was located at the existing Montague Area Public School at 4882 Stanton Boulevard in Montague, Muskegon County, Michigan. The parcel number is 61-21-020-200-0007-00.

Purpose of Investigation

The purpose of this investigation is to provide geotechnical engineering recommendations for the proposed building addition, agriculture barn, and pavement.

Design Information

The project consists of a building addition, agriculture building and pavement. The building addition will extend northwest from the existing building. The building addition will be a one and two story steel frame structure with masonry walls and a slab on grade floor. A portion of the addition will include a poured concrete basement. The agriculture barn will be a one-story structure with a slab on grade floor. Pavement for this project will include parking areas and concrete hardscapes.

The maximum column load is anticipated to be less than 200,000 pounds. The maximum wall loads are anticipated to be less than 6,000 pounds per foot. Allowable settlements of 0.6 inches for total settlement and 0.4 inches for differential settlement are assumed. If the actual loads are significantly greater than the anticipated loads listed in this report, then Soils & Structures should be contacted so that the recommendations included in this report may be reviewed and revised if necessary.

The first-floor elevation of the building addition will be approximately 658.5 feet. The basement floor elevation of the building addition will be approximately 642.5 feet. The floor elevation of the agriculture barn has not been determined at the time of this report. Fill and excavation will probably be required to achieve the required grade in the construction area. The thickness of fill required to raise the grade is anticipated to be less than 8.0 feet. Fill for this project will also include backfill over foundations and utilities. The thickness of backfill over foundations and utilities is anticipated to be less than 18.0 feet.

The greatest depth of excavation is anticipated to be less than 18.0 feet which will be required for the for the construction of foundations and utilities. Dewatering with well points will probably not be necessary to construct foundations and utilities.

The standard-duty parking areas are assumed to be subjected to passenger vehicle traffic only, with no commercial truck traffic. An estimate of 250,000 lifetime Equivalent Single-Axle Loads (ESALs) over a service life of twenty years was assumed for the standard-duty pavement recommendations. The subgrade is assumed to be prepared as recommended in this report.

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Tests Performed

The investigation included eight (8) test borings drilled to depths of 15.0 and 25.0 feet. The test borings are designated as Test Boring One through Test Boring Eight. The locations were determined by Montague Area Public Schools. The locations were adjusted for accessibility by Soils & Structures as necessary. The test borings were conducted in accordance with ASTM D 1586 procedures. The ASTM D 1586 standard describes the procedure for sampling and testing soil using the Standard Penetration Test. An automatic hammer was used to obtain the soil samples.

The surface elevations at the test boring locations and additional points of reference were obtained with a Global Navigation Satellite System (GNSS) Receiver. The receiver was connected to the local MDOT CORS base station. Through this system, vertical measurements are obtained and referenced to the North American Vertical Datum (NAVD88). Horizontal measurements are also obtained at the test boring locations which are referenced to the Michigan State Plane Coordinate System. Both the vertical and horizontal measurements typically have an accuracy of approximately 0.5 inches. The measured test boring locations and surface elevations are represented in Table 1.

Table 1: Measured Test Boring and Points of Reference Locations and Surface Elevations

Test Boring / Location	Elevation Measured (feet)	Northing (feet)	Easting (feet)	Surface Cover
Test Boring One*	655.0	707369.0	12592631.2	Topsoil
Test Boring Two	656.7	707316.6	12592937.2	Asphalt
Test Boring Three	653.9	707341.2	12592708.9	Topsoil
Test Boring Four	655.3	707334.4	12592829.9	Sand
Test Boring Five	653.9	707262.7	12592761.0	Asphalt
Test Boring Six	652.3	707211.8	12592700.1	Asphalt
Test Boring Seven	658.2	707226.4	12592886.0	Concrete
Test Boring Eight*	663.9	706985.9	12593506.9	Topsoil
Base Setup VRS1	649.2	626295.6	12621445.8	-

*Potential Error: GPS Signal Interrupted

Soil samples were classified according to the Unified Soil Classification System. This method is a standardized system for classifying soil according to its engineering properties. Please refer to the appendix of this report for the Unified Classification System Chart. The classification is shown in the "Material Description" column of the test boring logs.

SOILS & STRUCTURES

The soil strength and the allowable soil bearing value were evaluated using the "N" value. The "N" value is the number of blows required to drive a soil sampler one foot with a standard 140 pound drop hammer. The sampler is driven a distance of 18.0 inches. The number of blows for each 6.0 inch increment is recorded. The sum of the second and third intervals is the "N" value. The number of blows for each 6.0 inch interval is shown on the test boring logs under the column labeled "Penetration." The "N" value for each sample is shown in the adjacent column.

Laboratory testing consisted of natural moisture content (ASTM D 2216), sieve analysis (ASTM D 6913) and unconfined compressive strength testing (ASTM D 2166). The tests were performed on representative soil samples. The tests were performed in accordance with the ASTM standards listed above. The water content documents the presence of groundwater in the soil. The sieve test determines the particle distribution which is used to classify the soil and estimate its properties. Unconfined compression testing determines the strength properties of cohesive soil.

The U.S. Geological Survey Topographic map and the Quaternary Geology map of Southern Michigan were reviewed. These maps provide general geological information about the region. Publicly available well logs were reviewed to determine the depth to bedrock.

Description of Soil

The general soil profile consists of a layer of sand which extends to depths of 12.5 to at least 25.0 feet over a layer of clay which extends to depths of 22.0 to at least 25.0 feet. Portions of the upper sand layer may be fill placed during construction of the existing building and pavement. The natural sand is a lacustrine, or lake deposit from a former high-water stage of Lake Michigan. Lake sediments typically form layered strata and are characterized by relatively uniform gradation. The natural clay is part of a glacial end moraine. The end moraine is a geological formation consisting of glacial till in which clay is the primary soil type. Bedrock appears to be present at a depth greater than 160.0 feet.

Topsoil is present at the surface in the areas of Test Boring One, Test Boring Three and Test Boring Eight. The topsoil thickness ranges from 11.0 to 16.0 inches.

Pavement is present at the surface in the areas of Test Boring Two, Test Boring Five and Test Boring Six. The pavement consists of 2.5 to 4.0 inches of asphalt over 8.5 to 18.0 inches of what appears to be an aggregate base. Concrete is present at the surface in the area of Test Boring Seven. The concrete thickness is approximately 6.25 inches.

SOILS & STRUCTURES

The sand layer consists primarily of brown fine to medium sand with varying amounts of gravel. The fines content is low and is less than 7.0 percent, indicating the sand is porous and free draining. The "N" values of the sand layer range from 4 to 22, indicating the sand is in a loose to very compact state. The sand should have an internal friction angle of 30 degrees or greater and a California Bearing Ratio of 10 or greater when it is compacted to 95.0 percent of its maximum density. The sand layer will support foundations, floors and pavement following site preparations including the compaction of loose sand.

The clay layer consists of brown to gray low plasticity clay. The "N" values of the clay layer range from 11 to 22, indicating the clay is in a stiff to verry stiff state. The undrained shear strength is in the range of 2100 to 5600 pounds per square foot, also indicating the clay is in a stiff to very stiff state. The clay layer will support foundations following site preparations.

Description of Groundwater Conditions

The water table is present at depths between 23.0 and 24.0 feet in the areas of Test Boring Four through Test Boring Six. These depths correspond to elevations between 629.3 and 631.3 feet. Perched groundwater is present at depths between 18.0 and 19.0 feet in the areas of Test Boring Three and Test Boring Six. Groundwater was not encountered in the remaining test borings. Seasonal precipitation will influence the perched groundwater elevation. Long-term groundwater monitoring was not performed as part of this evaluation.

Description of Site

The site is located at 4882 Stanton Boulevard in Montague, Muskegon County, Michigan. The site is an existing school complex. The north side of the site is bordered by a field and residential buildings. The east side of the site is bordered by the existing school building and pavement. The south side of the site is bordered by Stanton Boulevard. The west side of the site is bordered by the school's parking lot and Cook Street. The surface elevation of the site ranges from 652.3 to 658.2 feet. Photographs #1 and #2 show the site at the time the test borings were performed.

Photograph #1: View of the north portion of the site. The view is to the east. (Project No. 2022.2109 Montague Area Public Schools Additions, Montague, Muskegon County, Michigan, October, 2022)

Photograph #2: View of the center of the site. The view is to the southeast. (Project No. 2022.2109, Montague Area Public Schools Additions, Montague, Muskegon County, Michigan, October, 2022)

Settlement

The maximum settlement of the buildings is anticipated to be less than 0.5 inches provided the recommendations in this report are observed including subgrade preparation. Differential settlement will be approximately one half of the maximum value. These levels of settlement are within the recommended acceptable limits of 0.6 inches of total settlement and 0.4 inches of differential settlement.

Recommendations

Site & Subgrade Preparation

Existing pavement, trees, and vegetation in the construction area should be cleared and removed as part of subgrade preparation. The topsoil should be removed to the extent that all soil with an organic content of 3.0 percent or greater is removed. Soil containing roots should be removed to the extent that the root content by volume is 5.0 percent or less. All roots over 0.5 inches in diameter should be removed. The anticipated thickness of topsoil to be removed is 16.0 inches or less.

The construction area should initially be excavated to the required subgrade level. In situ sand below foundations, floors and fill should be compacted to 95.0 percent of its maximum capacity to a minimum depth of 3.0 feet. Sand not meeting this requirement should be recompacted or removed and replaced with MDOT Class II fill. The subgrade should be inspected and tested to determine if soft or wet clay is present below foundations, floors, and fill. Soft clay should be removed and replaced with sand meeting MDOT Class II specifications. For this project soft clay is defined as clay with a shear strength of less than 1500 pounds per square foot as measured with a hand penetrometer.

Soil brought to the site for fill should be clean sand meeting MDOT Class II specifications. Fill should be placed in accordance with the "Fill" section of this report. The fill should be compacted to 95.0 percent of its maximum density, as determined by the modified proctor method per the ASTM D 1557 standard. The soil which will be used for fill should be kept free of topsoil and other organic materials. Compaction tests are recommended to check the compaction of the new fill.

Additional exposure to moisture as a result of precipitation events or accumulated surficial runoff will weaken the clay's support capacity. The contractor should be prepared to perform temporary dewatering in all excavations which extend into the clay layer to accommodate accumulated precipitation. The exposed subgrade should be graded to accommodate proposed site grades and establish positive drainage. In wet conditions improvements consisting of undercutting of the clay subgrade may be required.

Pavement subgrade, subbase, and aggregate base should be proof rolled using a fully-loaded tri-axle dump truck. The proof roll should consist of single, overlapping passes. Areas that experience yielding during the proof roll should be recompacted.

Foundations

Spread foundations are recommended to support the buildings provided the subgrade is prepared as discussed in this section as well as the "Site & Subgrade Preparation" and "Fill" sections of this report. The foundations are anticipated to be supported on compacted fill or the in situ soil following site preparation.

In situ sand below foundations should be compacted to 95.0 percent of its maximum capacity to a minimum depth of 3.0 feet. Sand not meeting this requirement should be recompacted or removed and replaced with MDOT Class II fill. If foundations are constructed on clay, the clay should be dry and level to ensure proper contact between the subgrade and concrete. Prior to pouring the foundations, the clay should be tested with a pocket penetrometer or torvane to ensure adequate strength to support the foundations. The natural clay under foundations should possess a shear strength of 1500 pounds per square foot or greater. Clay with a lower shear strength should be removed to its full extent under foundations.

Fill below foundations should be compacted to a density of 95.0 percent of the soil's maximum density to its full depth. Compaction tests should be performed in the foundation subgrade to verify these levels of compaction. Soils not meeting or exceeding the minimum density should be recompacted.

The recommended minimum cover over exterior foundations is 42.0 inches for protection against frost heave.

Foundations should not be constructed on frozen soil. During cold weather construction, the foundation subgrade and foundations should be protected from freezing with insulated blankets until backfill is placed over both sides of the foundation. Foundations that are damaged by frost heave should be replaced.

The site classification for seismic design is "D" based on the Michigan Building Code provided the recommendations in this report are observed. The site has a peak ground acceleration of 0.069g with a 2.0 percent probability of exceedance in 50 years. The mapped spectral accelerations are 0.063 for the short-term response (S_s) and 0.040 for the one second response (S_1). The corresponding numeric seismic design values for the spectral response acceleration parameters above are 0.067g (S_{DS}) and 0.065g (S_{D1}) respectively.

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Foundations may be designed using an allowable soil bearing value of 3,000 pounds per square foot for isolated column foundations and 2,500 pounds per square foot for wall foundations provided the recommendations in this report are observed. A minimum width of 16.0 inches is recommended for new foundations. The allowable bearing values may be increased 25.0 percent when considering transient loads such as earthquakes and wind.

Floors

A slab on grade is recommended for the floors. The subgrade should be prepared as described in the "Site & Subgrade Preparation" section of this report.

A base of 6.0 inches of clean sand is recommended under the floors. The sand should meet MDOT Class II specifications. Fill under floors should be compacted as described in the "Fill" section of this report. The clean sand layer present near the surface may be used for the sand base. Soil that contains organic materials or has a high clay content should be replaced.

A vapor barrier is recommended under the floor. The vapor barrier should consist of a 10 mil polyethylene sheet and should be located immediately below the floor slab.

A modulus of subgrade reaction of 150 pounds per cubic inch is recommended for the design of slabs on grade.

Lateral Earth Pressure

Foundation walls with different soil levels on either side should be designed as retaining walls. Sand should be used as backfill behind retaining and foundation walls. The sand should meet MDOT Class II specifications. The cantilevered walls should be designed using a soil density of 120 pounds per cubic foot and a coefficient of active earth pressure of 0.30 for level sand backfill. Braced excavations and foundation walls that will be braced against lateral movement at the top of the wall should be designed using a soil density of 120 pounds per cubic foot and a coefficient of at rest earth pressure of 0.45 for level sand backfill. The effects of any surcharge or sloping backfill should also be included in the design.

Excavations

The in situ sand and fill are OSHA type "C" soils. Excavations that will be entered by personnel should be based on OSHA requirements for a type "C" soil. Based on OSHA requirements, a maximum allowable side slope of 34 degrees (1.5H:1V) is recommended for excavations 4.0 to 20.0 feet deep. Excavations less than 4.0 feet deep may have vertical side slopes. Temporary or permanent earth retention may be required for excavations adjacent to structures such as the existing building which limit the available space for appropriate sloping or benching.

SOILS & STRUCTURES

Fill

Fill, including the aggregate layers under pavement, should be compacted to a density of 95.0 percent of its maximum density to its full depth. The maximum density should be determined in accordance with the ASTM D 1557 standard. A maximum thickness per layer of 6.0 inches is recommended. In sand the lift thickness may be increased to 12.0 inches if a vibratory roller or loader is used for compaction.

Where free draining porous fill is required, the fill should be sand meeting MDOT Class II requirements or ASTM requirements for a SP or SW which are the designations for clean sand.

Compaction tests are recommended to confirm that the fill is compacted to the required density. Fill should not be placed over frozen ground, snow or ice. Soil which contains frozen material should not be used as fill. During winter construction, removal of frozen ground may be necessary prior to placing fill.

Groundwater Management

Dewatering with well points to control groundwater will probably not be necessary to construct foundations and utilities. Temporary ditches, sumps and ditch pumps may be necessary to control perched water and surface water. The exposed subgrade should be graded to accommodate proposed site grades and establish positive drainage. If excavations encounter groundwater, the excavation bottom may be stabilized by placing a 6.0 to 8.0 inch layer of porous stone over the bottom of the excavation. The stone will stabilize the bottom of the excavation.

Infiltration rates for the upper layer of in situ sand should be suitable for internal drainage of the site. Sand meeting MDOT Class II specifications is recommended in areas where increased drainage is required.

The clay layer does not meet the exception for drains in Section 1805.4 of the Michigan Building Code. Drains around the exterior basement foundations are recommended. The drains should consist of a 4.0-inch diameter slotted plastic pipe wrapped in filter fabric. Pea gravel should be used for backfill within a 6.0-inch circumference of the drain.

Pavement areas should be properly drained to minimize the effects of frost heaving and the loss of subgrade due to water infiltration.

Hot Mix Asphalt (HMA) Pavement

The recommended pavement section materials listed in Table 2 refer to and should comply with the standard material designations included in applicable MDOT specifications and guidelines, including the 2012 MDOT "Standard Specifications for Construction." These recommendations were developed based on the discussions and assumptions included in this report and the design procedures outlined in the "AASHTO Guide for Design of Pavement Structures - 1993." The subgrade should be prepared as described in the "Site and Subgrade Preparation" section of this report. The final pavement section should be designed based on actual traffic volumes and the owner-specific performance requirements.

The design life assumes that maintenance repairs such as joint sealing, patching, and overlays are regularly performed throughout the life of the pavement. The design life also assumes that proper drainage has been established throughout the site. Proper drainage includes the installation of a storm system and structures and establishing positive drainage in the subgrade and the pavement cross-section layers.

Table 2: Recommended Pavement Section

Pavement Cross Section Materials	Standard Duty		Heavy Duty	
	Material	Thickness (in)	Material	Thickness (in)
HMA Wearing Coarse[1]	5E1	2.0	4E1	2.5
HMA Base Coarse[2]	4E1	2.0	4E1	2.5
Aggregate Base	21AA Crushed Limestone	8.0	21AA Crushed Limestone	10.0
Sand Subbase	Class II	12.0	Class II	12.0

Note 1: If necessary, geogrid used to mechanically stabilize subgrade should be placed between the subbase and the proposed aggregate base. It should consist of a tri-axial configuration (such as Tensar TX-140 or similar). Segments must be overlapped by a minimum of 12.0 inches.

The recommended asphaltic binders are PG64-28 for the wearing and leveling course. A softer binder may be necessary to achieve desired performance characteristics when utilizing Tier II RAP contents, per the MDOT Special Provision for Recycled Asphalt Pavement.

Target void content should be 3.0 percent. The paving contractor should submit the proposed mix design to the owner for review and approval prior to placement. The asphalt pavement should be compacted to 94 to 97 percent of the theoretical maximum density, determined via the Superpave "Rice" Method. Additionally, a tack coat of SS-1h emulsion should be applied between each asphalt layer at a rate of 0.1 gallon/square yard.

SOILS & STRUCTURES

The paving contractor should submit the proposed mix design to the owner for review and approval prior to placement. The HMA pavement should be placed in at least two lifts. The pavement section should be constructed in accordance with MDOT guidelines and specifications as well as applicable state and local requirements.

Paved areas that display poor workmanship, which may include segregation, "cold screed scrapes", wearing courses not flush with curbs or rims, roller marks, shoving, smearing or tearing of the mat, flushing, or excessive cold joints should be repaired or replaced by the contractor immediately.

The pavement section should be constructed in accordance with MDOT guidelines and specifications as well as applicable state and local requirements. Support conditions and compaction should be assessed during construction in accordance with the "Quality Control and Testing" section of this report. This assessment should occur prior to installation of individual pavement layers.

Portland Cement Concrete (PCC) Pavement

The subgrade should be prepared in accordance with the "Site & Subgrade Preparation" and "Fill" sections of this report and applicable MDOT guidelines and specifications.

A base of 12.0 inches of clean sand is recommended under concrete pavement. The sand should meet MDOT Class II specifications. A minimum slab on grade concrete pavement thickness of 4.0 to 6.0 inches is recommended for standard and heavy duty concrete pavement. The recommended minimum concrete thickness in the area of dumpster pads is 8.0 inches. A structural engineer should design any reinforcing steel used to promote load transfer between slabs.

A base of at least 6.0 inches of MDOT Class II sand or 21AA crushed limestone aggregate is recommended for underneath sidewalk slabs. Soil that contains organic materials or has a high clay or silt content should be replaced. The recommended minimum concrete pavement thickness is 4.0 inches for sidewalks hemmed in by greenbelt, or 6.0 inches for revealed-face.

A modulus of subgrade reaction of 150 pounds per cubic inch is recommended for the design of concrete pavement provided the recommendations in this report are observed. The paving contractor should submit the proposed mix design to the owner for review and approval prior to concrete placement.

Quality Control Testing

The subgrade should be examined and tested after the topsoil is removed and before fill is placed. A density gauge and probe rod should be used to verify that the subgrade possesses the required compaction.

Compaction tests in accordance with ASTM D 6938 procedures are recommended to confirm that fill in the construction area is compacted to the specified density. While fill is being placed, compaction tests should be performed at the rate of one test per 400 cubic yards of fill and throughout the depth of the fill with a minimum of five tests at each 1.0 foot elevation interval. Compaction tests should be performed under foundations at the rate of one test per 50 linear feet for wall foundations and one test per column foundation. The recommended testing frequency in the floor and pavement subgrade is one test per 2500 square feet. Tests should also be performed in the backfill over foundations and utilities. The maximum density should be determined in accordance with ASTM D 1557 or ASTM D 4253 procedures.

The shear strength of clay should be checked with a hand penetrometer or torvane. The tests should be performed at the same frequency as compaction tests.

A smooth 0.5 to 0.75 inch diameter rod should be used in conjunction with compaction tests to probe for loose areas under foundations, in fill and under floors.

A dynamic cone should not be substituted for compaction tests for evaluating backfill.

Pavement subgrade, subbase, and aggregate base should be proof rolled using a fully-loaded tri-axle dump truck prior to aggregate base and pavement placement.

Asphalt quality control testing should adhere to the 2012 MDOT Standards for Construction. Asphalt temperatures during placement should be at least 275 degrees Fahrenheit; material that arrives at temperatures below 250 degrees Fahrenheit shall be rejected. Asphalt density testing should be performed with a nuclear density gauge at a minimum rate of one test per 500 square feet of pavement. At least five total verification cores in each course should be taken to assess relative compaction, calibrate the nuclear density gauge, and evaluate thickness. A minimum of two loose mix samples per mix per day should be taken at the plant and delivered to the quality-assurance firm's laboratory for vacuum extraction-gradations. The asphalt contractor should provide a minimum of two (2) theoretical maximum density verifications per day.

Compaction Testing should be performed by technicians supervised by a registered geotechnical engineer. Proof rolling and stabilization should be performed by a senior technician or field engineer under the supervision of a registered geotechnical engineer.

SOILS & STRUCTURES

General Conditions & Reliance

The report was prepared in accordance with generally accepted practices of the geotechnical engineering profession. The scope of work consisted of performing eight test borings and providing soil related recommendations for the design and construction of the proposed building addition, building and pavement. The scope of work did not include an environmental study or wetland determination.

The report and the associated test borings were prepared specifically for the previously described project and site. Soils & Structures should be consulted if a significant change in the scope of the project is made.

The test borings represent point information and may not have encountered all of the soil types and materials present on this site. This report does not constitute a guarantee of the soil or groundwater conditions or that the test boring is an exact representation of the soil or groundwater conditions at all points on this site.

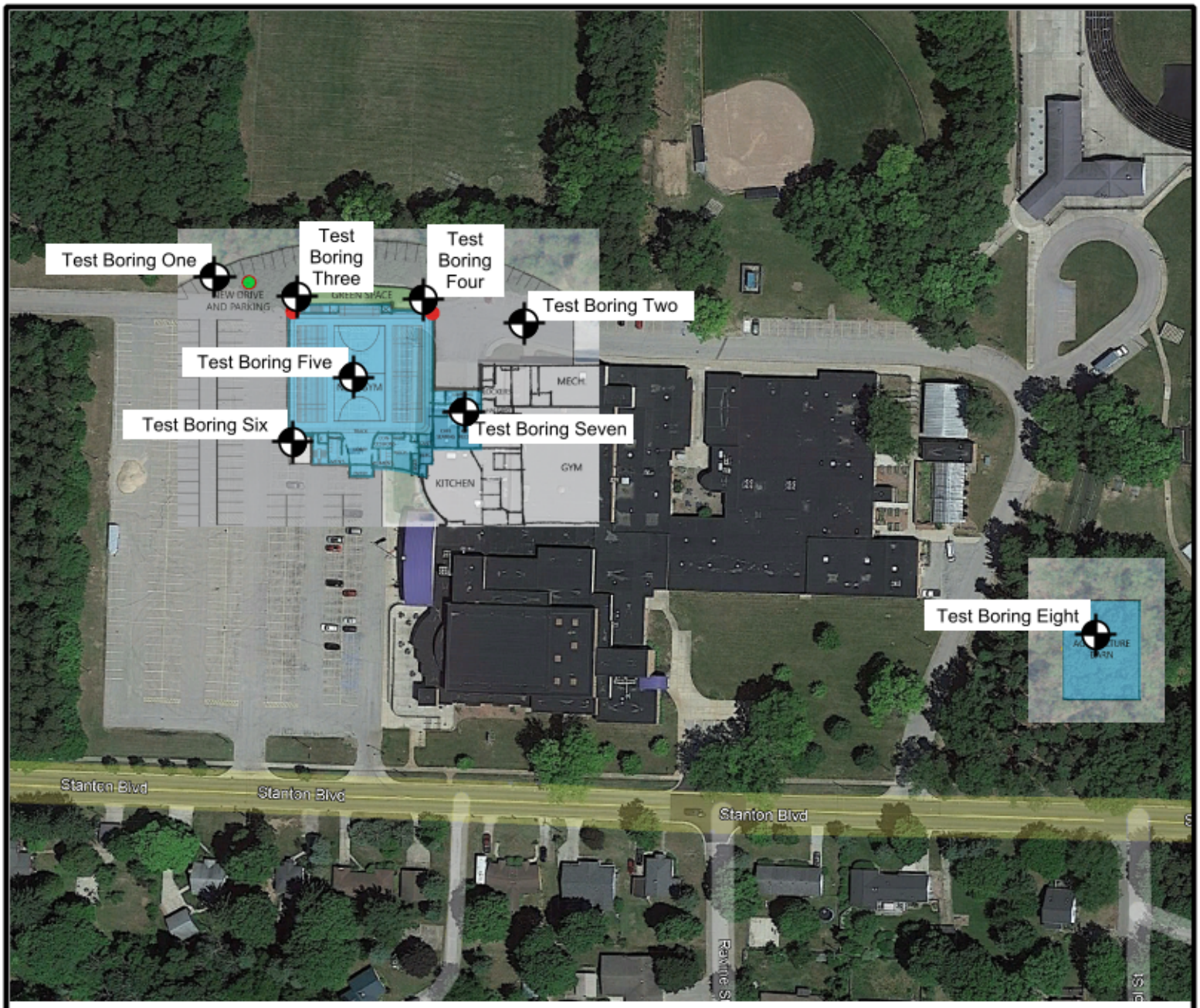
The descriptions and recommendations contained in this report are based on an interpretation of the test borings and laboratory tests. The test borings should not be used independently of the report. If soil conditions are encountered which are significantly different from the test borings, Soils & Structures should be consulted for additional recommendations.

The report and test borings may be relied upon by Montague Area Public Schools for the design, construction, permitting and financing associated with the construction of the Montague Area Public Schools Additions project in Montague, Muskegon County, Michigan. The use of the report and test borings by third parties not associated with this project or for other sites has not been agreed upon by Soils & Structures. Soils & Structures does not recommend or consent to third party use or reliance of the report or test borings unless allowed to review the proposed use of these materials. Unless obtained in writing, consent to third party use should not be assumed. Third parties using the report or test boring logs do so at their own risk and are offered no guarantee or promise of indemnity.

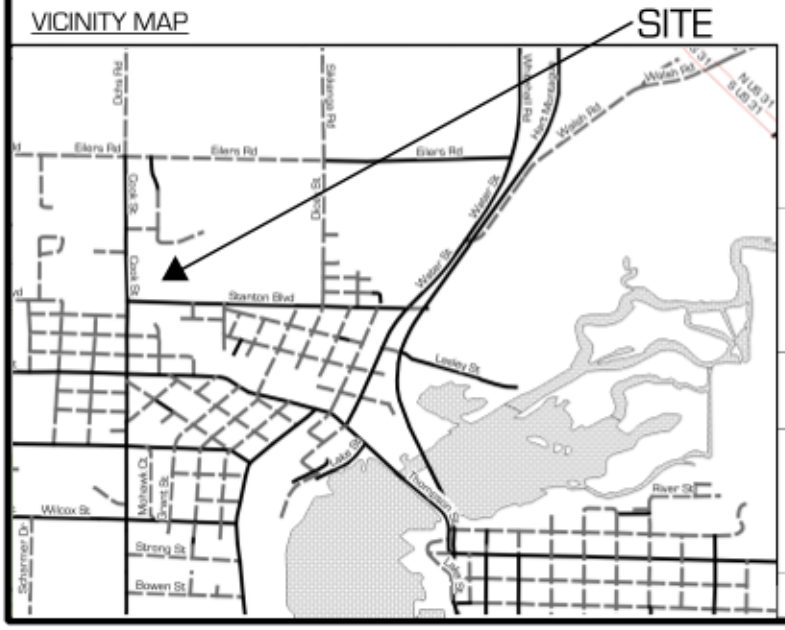
SOILS & STRUCTURES

Appendix

Test Boring Location Plan
General Soil Profile
Test Boring Logs
Laboratory Tests
General Soil Infromation



VICINITY MAP



TEST BORING LOCATION PLAN
NTS

Note: The background of the test boring plan is a portion of a site plan over a portion of an aerial photograph from Google Earth dated 6/21/2022

Montague Area Public Schools Addition

Montague, Muskegon County, Michigan

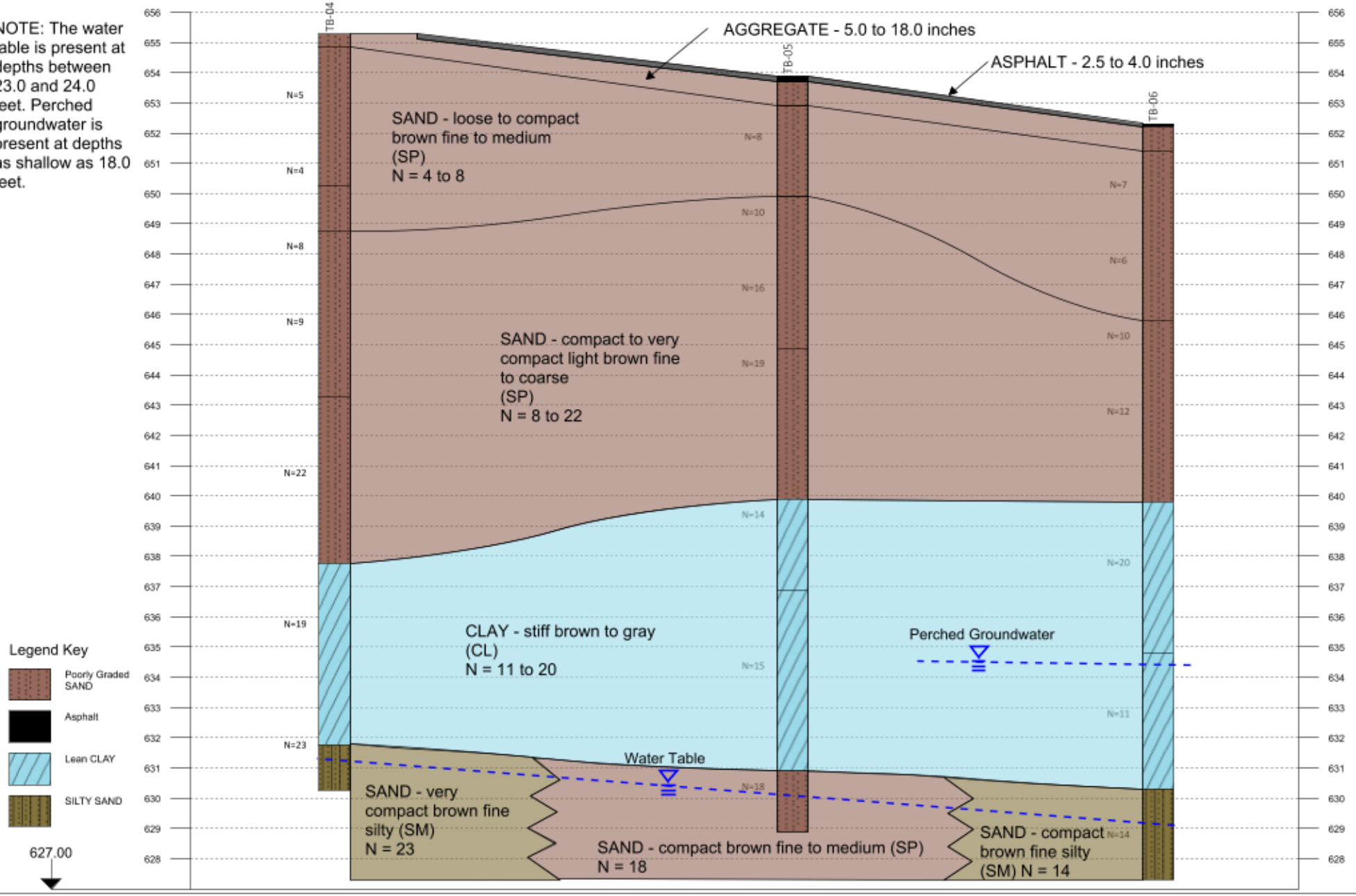
Soils & Structures, Inc.
6480 Grand Haven Road
Muskegon, Michigan 49441

JOB NO.: 2022.2109 DATE: 12-13-2022

Project Id:	2022.2109	Title:	Section line 1
Project Title:	Montague Area Public Schools Additions	Vertical Scale:	1:53
Location:	Montague, Michigan	Horizontal Scale:	1:347
Client:	Montague Area Public Schools	Engineer:	Malcolm Thompson, P.E.

GENERAL SOIL PROFILE

NOTE: The water table is present at depths between 23.0 and 24.0 feet. Perched groundwater is present at depths as shallow as 18.0 feet.



Legend Key

- Poorly Graded SAND
- Asphalt
- Lean CLAY
- SILTY SAND

627.00

SOILS & STRUCTURES

Borehole ID: TB-01

Sheet 1 of 1

Project Name:	Montague Area Public Schools Additions	**Project Number:**	2022.2109		
Project Location:	Montague, Michigan	**Logged By:**	H Scharphorn	**Reviewed By:**	K Martella
Client:	Montague Area Public Schools	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	15.00
Date Started:	Nov 07 2022 **Completed:** Nov 07 2022	**Northing:**	707369.0 **Easting:** 12592631.2	**Elevation:**	655.04
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50				
Hammer Type:	Automatic Hammer	End of Drilling	Nov 07 2022 - Water Not Encountered		
Notes:					

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1		TOPSOIL - dark brown sandy (16.0")												
2		SAND - slightly compact brown fine to medium												
3				SPT-A	67	2-2-3	5			5.0				SP
4		SAND - slightly compact brown fine to medium with a trace of clay and gravel												
5				SPT-B	73	2-2-3	5			5.3				SP
6														
7		SAND - very compact light brown fine to coarse with a trace of gravel												
8				SPT-C	73	7-9-12	21							SP
9		SAND - compact light brown fine to medium												
10				SPT-D	67	5-7-12	19			1.9				SP
11														
12														
13		CLAY - stiff brown with a trace of silt												
14				SPT-E	80	5-8-11	19			21.9				CL
15														
16														
17														
18														
19														
20														
21														
22														
23														
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29														
30														

SOILS & STRUCTURES

Borehole ID: TB-02

Sheet 1 of 1

Project Name:	Montague Area Public Schools Additions	**Project Number:**	2022.2109		
Project Location:	Montague, Michigan	**Logged By:**	H Scharphorn	**Reviewed By:**	K Martella
Client:	Montague Area Public Schools	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	15.00
Date Started:	Nov 08 2022 **Completed:** Nov 08 2022	**Northing:**	707316.6 **Easting:** 12592937.2	**Elevation:**	656.74
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50				
Hammer Type:	Automatic Hammer	End of Drilling	Nov 08 2022 - Water Not Encountered		
Notes:					

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
0		ASPHALT - (4.0")												
1		SAND - brown fine to medium gravelly (fill)												
2		SAND - compact brown fine to medium with gravel with a trace of clay												
3				SPT-A	80	5-5-6	11			4.5				SP
4														
5				SPT-B	73	4-4-4	8			4.8				SP
6														
7		GRAVEL - compact brown sandy												
8				SPT-C	20	4-4-7	11			3.6				GP
9														
10				SPT-D	20	4-5-6	11							GP
11														
12		SAND - compact light brown fine to medium												
13														
14				SPT-E	40	6-6-10	16							SP
15														
16														
17														
18														
19														
20														
21														
22														
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SOILS & STRUCTURES

Borehole ID: TB-03

Sheet 1 of 1

Project Name:	Montague Area Public Schools Additions	**Project Number:**	2022.2109		
Project Location:	Montague, Michigan	**Logged By:**	H Scharphorn	**Reviewed By:**	K Martella
Client:	Montague Area Public Schools	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	25.00
Date Started:	Nov 07 2022 **Completed:** Nov 07 2022	**Northing:**	707341.2 **Easting:** 12592708.9	**Elevation:**	653.87
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50	At Time of Drilling	19.00 on Nov 07 2022 - Perched Water Encountered		
Hammer Type:	Automatic Hammer				
Notes:					

Depth	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
0	TOPSOIL - dark brown sandy gravelly (12.0")												
1	SAND - slightly compact brown fine to medium with a trace of clay and gravel												
2													
3		SPT	SPT-A	67	3-3-4	7			4.2				SP
4	SAND - compact brown fine to coarse with a trace of gravel												
5		SPT	SPT-B	47	7-8-10	18							SP
6													
7	SAND - compact light brown fine to medium												
8		SPT	SPT-C	73	5-8-11	19			2.8				SP
9	SAND - compact light brown fine to coarse												
10		SPT	SPT-D	73	5-7-7	14			2.7				SP
11													
12													
13	CLAY - stiff brown with a trace of silt												
14													
15		SPT	SPT-E	80	4-6-10	16		1.06	23.4				CL
16													
17													
18	CLAY - very stiff brown with a trace of silt												
19	▽												
20		SPT	SPT-F	0	7-8-14	22							CL
21													
22	CLAY - stiff gray with a trace of silt												
23													
24		SPT	SPT-G	80	4-6-9	15			22.0				CL
25													
26													
27													
28													
29													
30													

SOILS & STRUCTURES

Borehole ID: TB-04

Sheet 1 of 1

Project Name:	Montague Area Public Schools Additions	**Project Number:**	2022.2109		
Project Location:	Montague, Michigan	**Logged By:**	H Scharphorn	**Reviewed By:**	K Martella
Client:	Montague Area Public Schools	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	25.00
Date Started:	Nov 07 2022 **Completed:** Nov 07 2022	**Northing:**	707334.4 **Easting:** 12592829.9	**Elevation:**	655.27
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50				
Hammer Type:	Automatic Hammer	End of Drilling	24.00 on Nov 07 2022		
Notes:					

Depth	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
1	SAND - dark brown fine to medium with a trace of gravel (5.0")												
2	SAND - slightly compact brown fine to medium												
3			SPT-A	67	3-2-3	5							SP
4													
5	SAND - loose brown fine to coarse gravelly		SPT-B	47	2-2-2	4			6.0				SP
6													
7	SAND - compact light brown fine to coarse												
8			SPT-C	60	3-4-4	8							SP
9													
10			SPT-D	47	1-4-5	9							SP
11													
12	SAND - very compact light brown fine to medium												
13													
14													
15			SPT-E	73	5-9-13	22			3.6				SP
16													
17													
18	CLAY - stiff brown with a trace of silt												
19													
20			SPT-F	87	5-8-11	19		2.40	23.9				CL
21													
22													
23													
24	SAND - very compact brown fine silty		SPT-G	80	5-10-13	23			21.3				SM
25													
26													
27													
28													
29													
30													

SOILS & STRUCTURES

Borehole ID: TB-05

Sheet 1 of 1

Project Name:	Montague Area Public Schools Additions			**Project Number:**	2022.2109		
Project Location:	Montague, Michigan			**Logged By:**	H Scharphorn	**Reviewed By:**	K Martella
Client:	Montague Area Public Schools			**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	25.00
Date Started:	Nov 07 2022	**Completed:**	Nov 07 2022	**Northing:**	707262.7	**Easting:**	12592761.0	**Elevation:**	653.89
Drilling Method:	3-1/4" Hollow Stem Auger			**Ground Water Levels**			
Equipment:	Diedrich D-50						
Hammer Type:	Automatic Hammer			End of Drilling	24.00 on Nov 07 2022		
Notes:							

Depth	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
0	ASPHALT - (3.0")												
1	SAND - brown fine to medium gravelly (9.0") (fill)												
2	SAND - compact brown fine to medium												
3			SPT-A	73	3-4-4	8			4.0				SP
4	SAND - compact brown fine to coarse with gravel												
5			SPT-B	73	2-3-7	10							SP
6													
7			SPT-C	80	5-6-10	16							SP
8													
9	SAND - compact light brown fine to medium with a trace of gravel												
10			SPT-D	73	5-9-10	19			2.4				SP
11													
12													
13													
14	CLAY - stiff brown with a trace of silt												
15			SPT-E	60	3-5-9	14							CL
16													
17	CLAY - stiff gray silty with lenses of sand												
18													
19													
20			SPT-F	87	5-6-9	15			19.6				CL
21													
22													
23	SAND - compact brown fine to medium												
24			SPT-G	73	3-5-13	18			21.1				SP
25													
26													
27													
28													
29													
30													

SOILS & STRUCTURES

Borehole ID: TB-06

Sheet 1 of 1

Project Name:	Montague Area Public Schools Additions	**Project Number:**	2022.2109		
Project Location:	Montague, Michigan	**Logged By:**	H Scharphorn	**Reviewed By:**	K Martella
Client:	Montague Area Public Schools	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	25.00
Date Started:	Nov 07 2022 **Completed:** Nov 07 2022	**Northing:**	707211.8 **Easting:** 12592700.1	**Elevation:**	652.30
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50	At Time of Drilling	18.00 on Nov 07 2022 - Perched Water Encountered		
Hammer Type:	Automatic Hammer	End of Drilling	23.00 on Nov 07 2022		
Notes:					

Depth	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
0	ASPHALT - (2.5")												
1	SAND - brown fine to medium gravelly (8.5") (fill)												
2	SAND - slightly compact brown fine to medium												
3			SPT-A	80	4-3-4	7			3.8				SP
4													
5			SPT-B	73	3-3-3	6			4.0				SP
6													
7	SAND - compact light brown fine to medium												
8			SPT-C	80	3-4-6	10							SP
9													
10			SPT-D	67	2-5-7	12			2.7				SP
11													
12													
13	CLAY - stiff brown with a trace of silt												
14													
15			SPT-E	80	5-8-12	20		2.79	19.7				CL
16													
17													
18	CLAY - stiff brown with silt with lenses of silt												
19													
20			SPT-F	80	3-4-7	11			22.3				CL
21													
22	SAND - compact brown fine silty												
23													
24			SPT-G	80	5-6-8	14			27.4				SM
25													
26													
27													
28													
29													
30													

SOILS & STRUCTURES

Borehole ID: TB-07

Sheet 1 of 1

Project Name:	Montague Area Public Schools Additions	**Project Number:**	2022.2109
Project Location:	Montague, Michigan	**Logged By:**	H Scharphorn
Reviewed By:	K Martella		
Client:	Montague Area Public Schools	**Survey Datum:**	NAD 1983 StatePlane Michigan South
Hole Depth:	25.00		
Date Started:	Nov 08 2022	**Completed:**	Nov 08 2022
Northing:	707226.4	**Easting:**	12592886.0
Elevation:	658.16		
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**	
Equipment:	Diedrich D-50		
Hammer Type:	Automatic Hammer	End of Drilling	Nov 08 2022 - Water Not Encountered
Notes:			

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
0		CONCRETE - (6.25")												
1		SAND - compact brown fine to medium (possible fill)												
2														
3				SPT-A	73	6-6-6	12							SP
4		SAND - loose brown fine to medium with silt with a trace of gravel												
5				SPT-B	80	3-2-2	4							SP
6														
7		SAND - slightly compact brown fine to medium with a trace of clay and gravel												
8				SPT-C	80	2-2-3	5							SP
9		SAND - compact brown fine to coarse with a trace of clay and gravel												
10				SPT-D	60	2-3-5	8							SP
11														
12														
13		SAND - slightly compact light brown fine to medium												
14														
15				SPT-E	73	2-2-3	5							SP
16														
17		SAND - slightly compact light brown fine to medium with a trace of gravel												
18														
19														
20				SPT-F	60	4-3-2	5							SP
21														
22														
23		SAND - compact light brown fine to medium												
24				SPT-G	73	5-7-10	17							SP
25														
26														
27														
28														
29														
30														

SOILS & STRUCTURES

Borehole ID: TB-08

Sheet 1 of 1

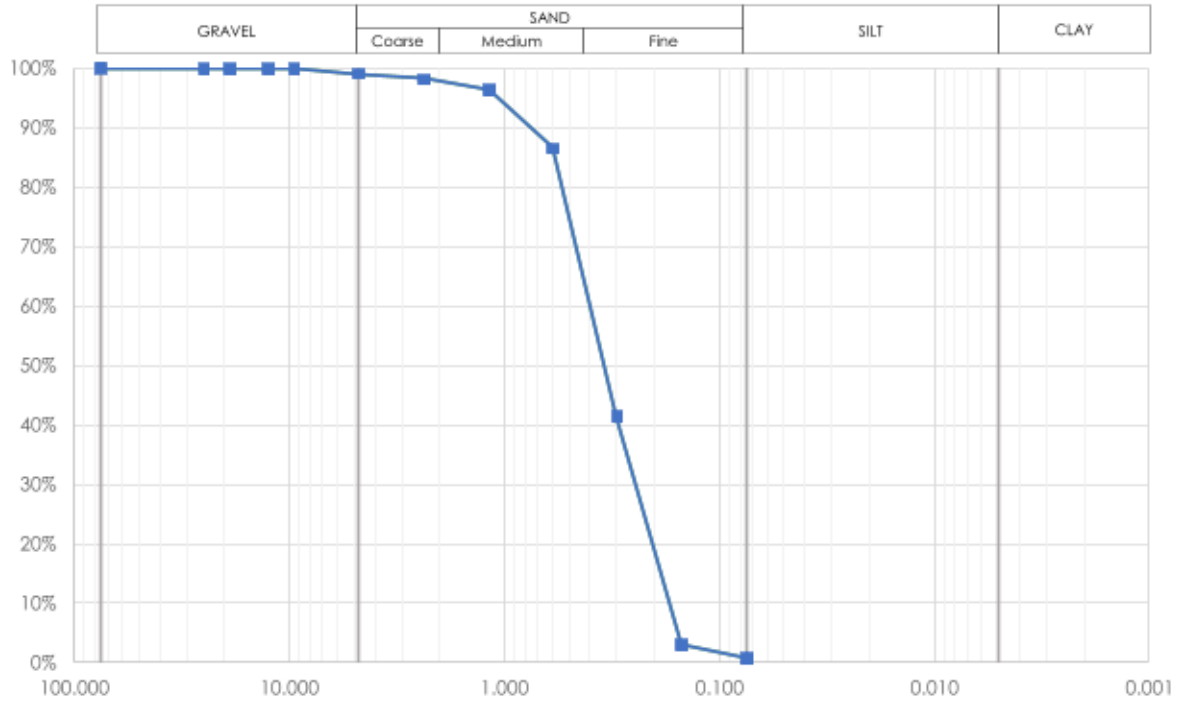
Project Name:	Montague Area Public Schools Additions	**Project Number:**	2022.2109		
Project Location:	Montague, Michigan	**Logged By:**	H Scharphorn	**Reviewed By:**	K Martella
Client:	Montague Area Public Schools	**Survey Datum:**	NAD 1983 StatePlane Michigan South	**Hole Depth:**	25.00
Date Started:	Nov 08 2022 **Completed:** Nov 08 2022	**Northing:**	706985.9 **Easting:** 12593506.9	**Elevation:**	663.85
Drilling Method:	3-1/4" Hollow Stem Auger	**Ground Water Levels**			
Equipment:	Diedrich D-50				
Hammer Type:	Automatic Hammer	End of Drilling	Nov 08 2022 - Water Not Encountered		
Notes:					

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits: Liquid Limit	Atterberg Limits: Plastic Limit	Atterberg Limits: Plasticity Index	USCS
		TOPSOIL - dark brown sandy (11.0")												
1		SAND - loose brown fine to medium												
2														
3				SPT-A	80	2-2-2	4							SP
4		SAND - slightly compact brown fine to medium												
5				SPT-B	73	2-3-4	7							SP
6														
7		SAND - compact light brown fine to coarse gravelly												
8				SPT-C	73	3-4-6	10							SP
9		SAND - compact light brown fine to coarse with gravel												
10				SPT-D	67	5-7-8	15							SP
11														
12														
13		SAND - compact light brown fine to medium												
14														
15				SPT-E	73	5-7-9	16							SP
16														
17														
18														
19														
20				SPT-F	73	6-8-11	19							SP
21														
22														
23														
24				SPT-G	73	8-9-11	20							SP
25														
26														
27														
28														
29														
30														

SOILS & STRUCTURES

Particle Size Distribution Report

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Client	Montague Area Public Schools				
Date	11/17/2022				
Sample Location	TB-01	Sample ID	A	Depth (ft)	2.0



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	0.0%	0.9%	1.4%	37.4%	59.4%	0.0%	0.0%
D85	**D60**	**D50**	**D30**	**D15**	**D10**	**Loss By Wash**	
0.5893	0.4230	0.3564	0.2550	0.1964	0.1769	0.9%	

Particle Size	
Sieve	**% Passing**
3 in.	100%
1 in.	100%
3/4 in.	100%
1/2 in.	100%
3/8 in.	100%
No. 4	99%
No. 8	98%
No. 16	96%
No. 30	87%
No. 50	42%
No. 100	3%
No. 200	0.9%

Hydrometer	
Particle Size (mm)	**% Passing**

Material Description
Fine to Medium SAND (SP)

Remarks

Technician

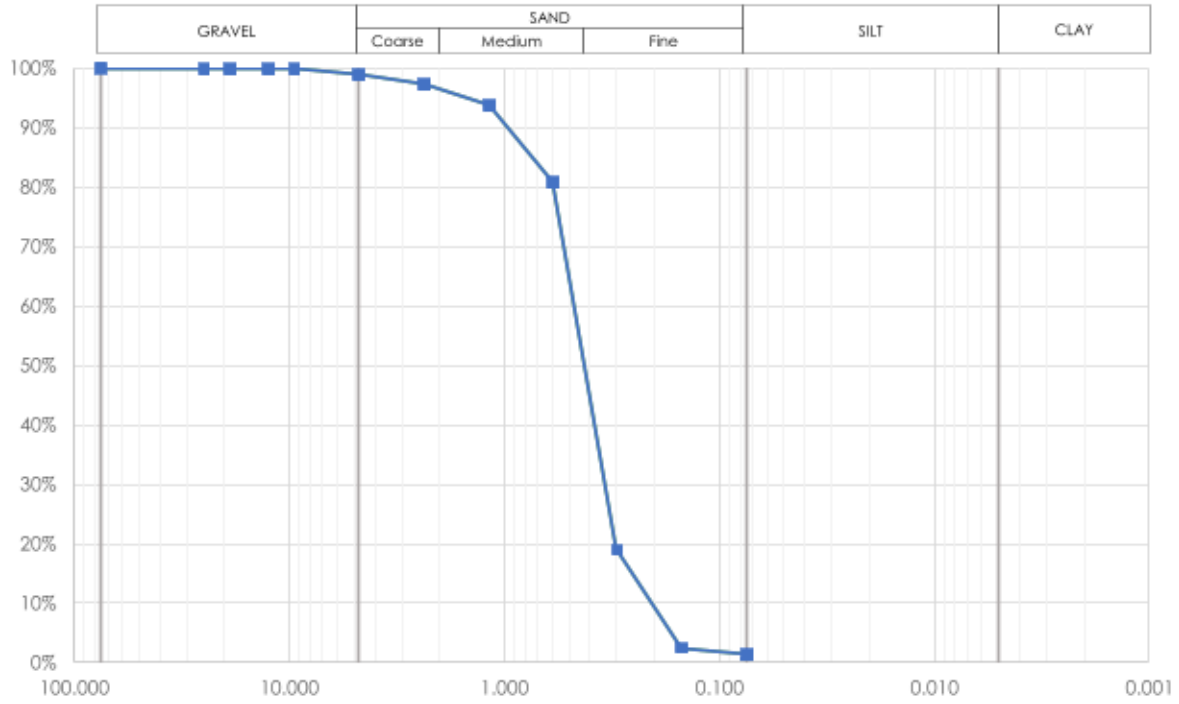
Checked
mvanweelden

Approved
mvanweelden

SOILS & STRUCTURES

Particle Size Distribution Report

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Client	Montague Area Public Schools				
Date	11/17/2022				
Sample Location	TB-05	Sample ID	A	Depth (ft)	2.0



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	0.0%	1.1%	2.6%	51.5%	43.4%	0.0%	0.0%
D85	**D60**	**D50**	**D30**	**D15**	**D10**	**Loss By Wash**	
0.7831	0.4985	0.4500	0.3531	0.2632	0.2177	1.5%	

Particle Size	
Sieve	% Passing
3 in.	100%
1 in.	100%
3/4 in.	100%
1/2 in.	100%
3/8 in.	100%
No. 4	99%
No. 8	97%
No. 16	94%
No. 30	81%
No. 50	19%
No. 100	3%
No. 200	1.5%

Hydrometer	
Particle Size (mm)	% Passing

Material Description

Fine to Medium SAND (SP)

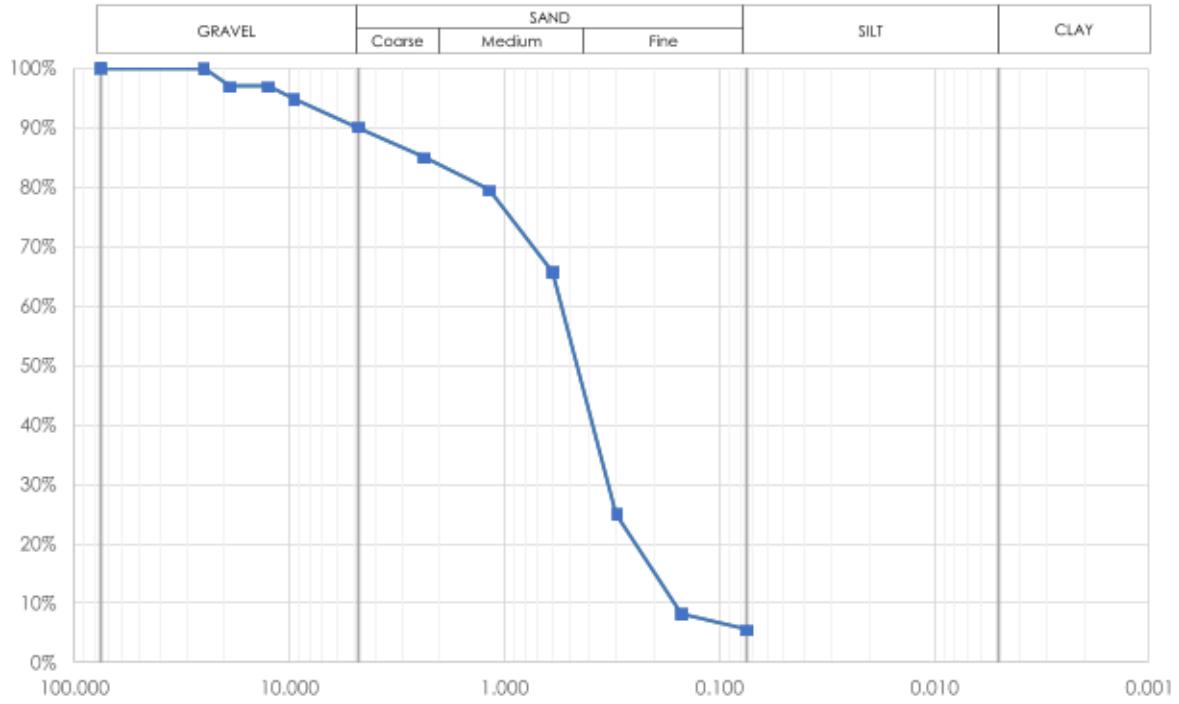
Remarks

Technician	Checked	Approved
	mvanweelden	mvanweelden

SOILS & STRUCTURES

Particle Size Distribution Report

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Client	Montague Area Public Schools				
Date	11/17/2022				
Sample Location	TB-02	Sample ID	B	Depth (ft)	4.5



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	3.1%	6.8%	6.8%	41.3%	36.5%	0.0%	0.0%
D85	**D60**	**D50**	**D30**	**D15**	**D10**	**Loss By Wash**	
2.3919	0.5576	0.4840	0.3368	0.2106	0.1659	5.1%	

Particle Size	
Sieve	% Passing
3 in.	100%
1 in.	100%
3/4 in.	97%
1/2 in.	97%
3/8 in.	95%
No. 4	90%
No. 8	85%
No. 16	79%
No. 30	66%
No. 50	25%
No. 100	8%
No. 200	5.5%

Hydrometer	
Particle Size (mm)	% Passing

Material Description

Fine to Medium SAND with Gravel and a Trace of Clay (SP)

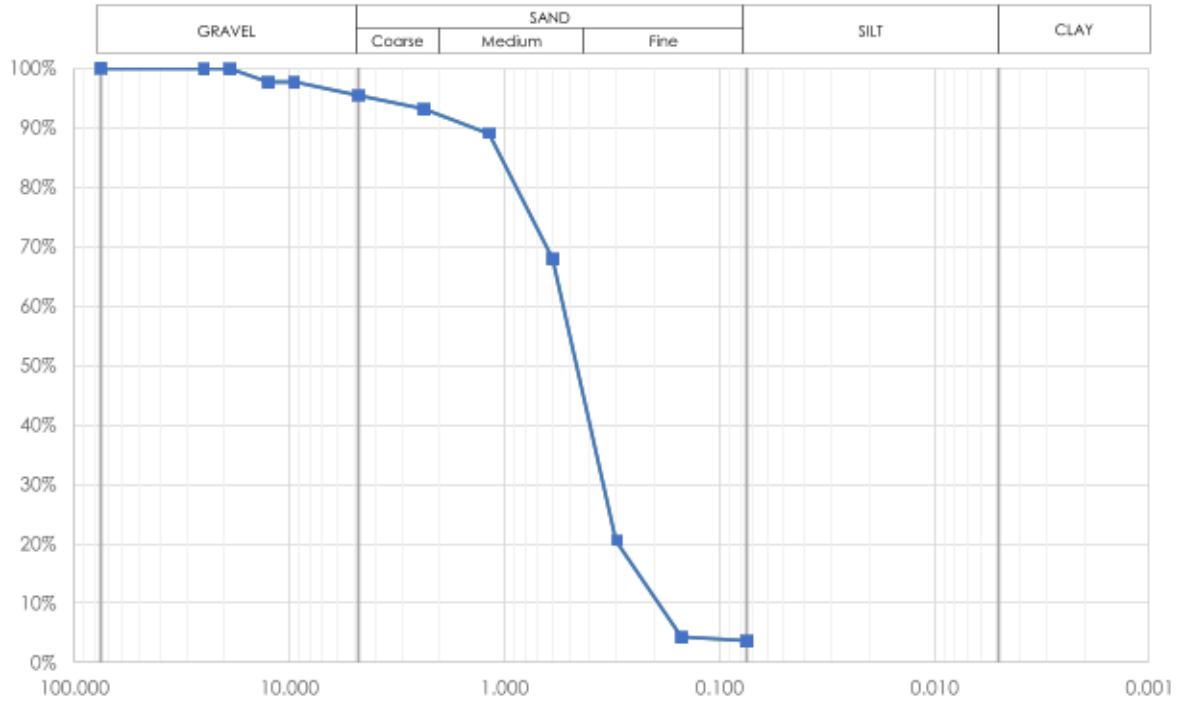
Remarks

Technician	Checked	Approved
	mvanweelden	mvanweelden

SOILS & STRUCTURES

Particle Size Distribution Report

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Client	Montague Area Public Schools				
Date	11/17/2022				
Sample Location	TB-06	Sample ID	B	Depth (ft)	4.5



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	0.0%	4.5%	3.7%	51.5%	36.7%	0.0%	0.0%
D85	**D60**	**D50**	**D30**	**D15**	**D10**	**Loss By Wash**	
1.0679	0.5492	0.4859	0.3592	0.2477	0.2014	3.6%	

Particle Size	
Sieve	**% Passing**
3 in.	100%
1 in.	100%
3/4 in.	100%
1/2 in.	98%
3/8 in.	98%
No. 4	96%
No. 8	93%
No. 16	89%
No. 30	68%
No. 50	21%
No. 100	4%
No. 200	3.6%

Hydrometer	
Particle Size (mm)	**% Passing**

Material Description
Fine to Medium SAND (SP)

Remarks

Technician

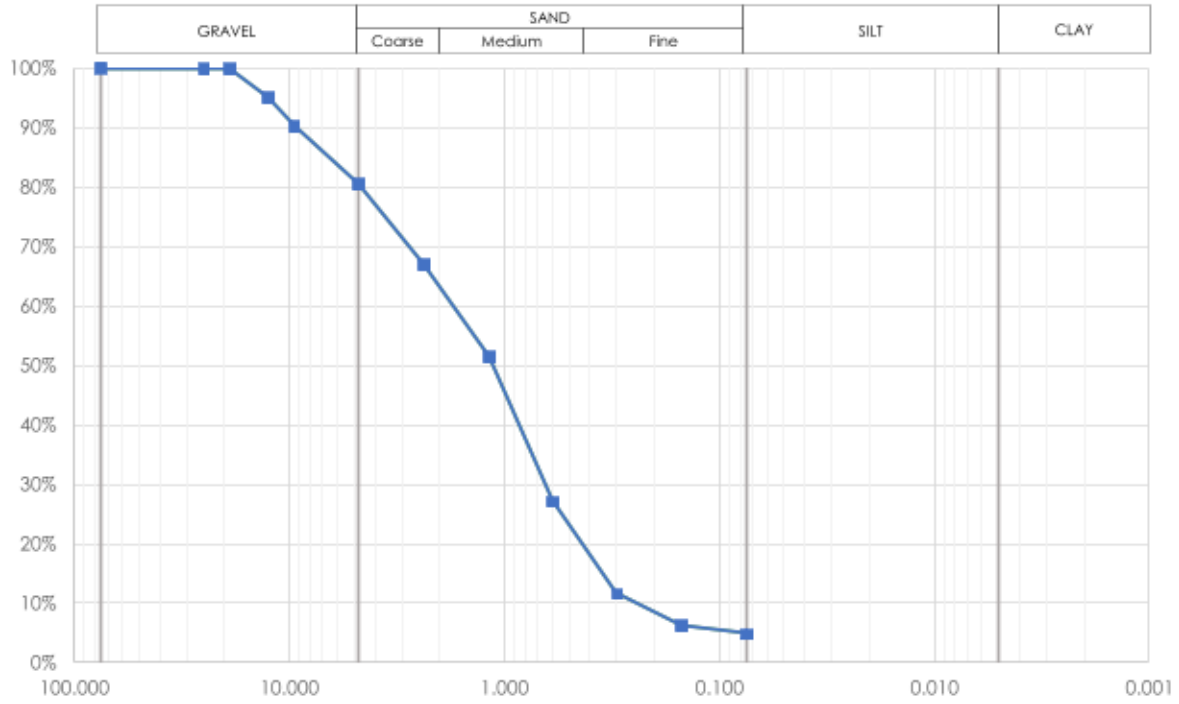
Checked
mvanweelden

Approved
mvanweelden

SOILS & STRUCTURES

Particle Size Distribution Report

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Client	Montague Area Public Schools				
Date	11/17/2022				
Sample Location	TB-04	Sample ID	B	Depth (ft)	4.5



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	0.0%	19.4%	18.3%	44.1%	13.3%	0.0%	0.0%
D85	**D60**	**D50**	**D30**	**D15**	**D10**	**Loss By Wash**	
6.9113	1.8290	1.1452	0.6673	0.3647	0.2536	4.9%	

Particle Size	
Sieve	**% Passing**
3 in.	100%
1 in.	100%
3/4 in.	100%
1/2 in.	95%
3/8 in.	90%
No. 4	81%
No. 8	67%
No. 16	51%
No. 30	27%
No. 50	12%
No. 100	6%
No. 200	4.9%

Hydrometer	
Particle Size (mm)	**% Passing**

Material Description
Fine to Coarse Gravelly SAND (SP)

Remarks

Technician

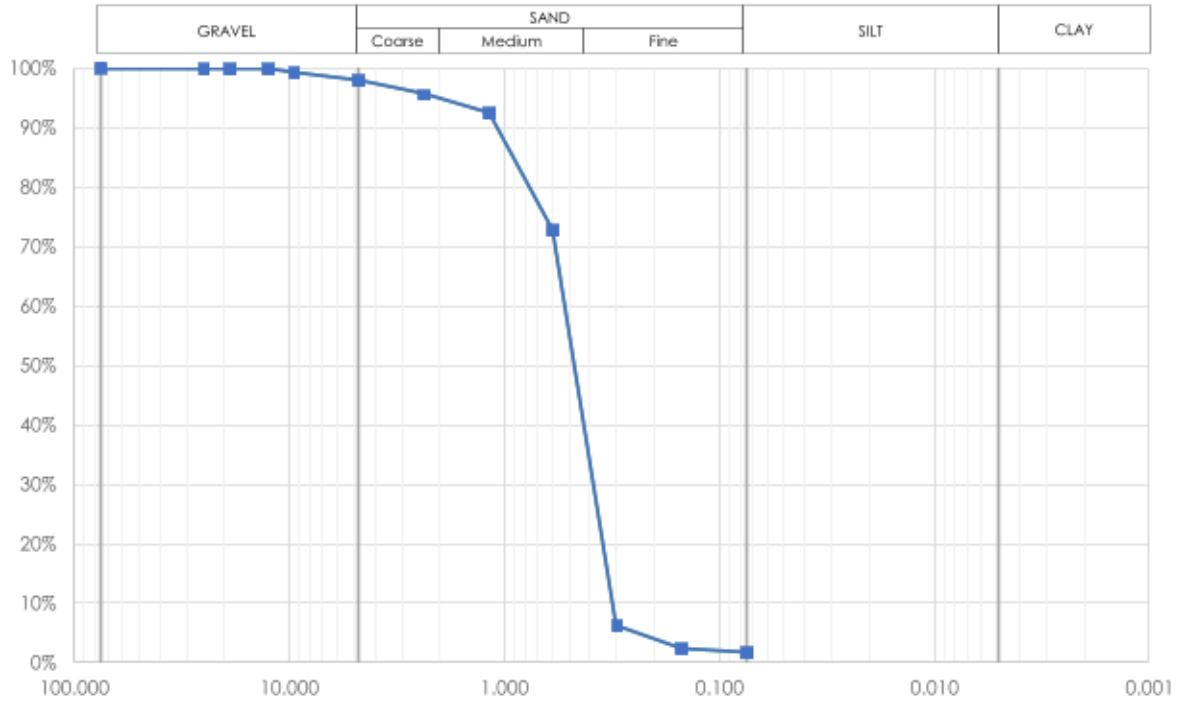
Checked
mvanweelden

Approved
mvanweelden

SOILS & STRUCTURES

Particle Size Distribution Report

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Client	Montague Area Public Schools				
Date	11/17/2022				
Sample Location	TB-03	Sample ID	C	Depth (ft)	7.0



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	0.0%	2.0%	3.3%	60.7%	32.4%	0.0%	0.0%
D85	**D60**	**D50**	**D30**	**D15**	**D10**	**Loss By Wash**	
0.9583	0.5424	0.4972	0.4068	0.3389	0.3163	1.7%	

Particle Size	
Sieve	**% Passing**
3 in.	100%
1 in.	100%
3/4 in.	100%
1/2 in.	100%
3/8 in.	99%
No. 4	98%
No. 8	96%
No. 16	93%
No. 30	73%
No. 50	6%
No. 100	2%
No. 200	1.7%

Hydrometer	
Particle Size (mm)	**% Passing**

Material Description
Fine to Medium SAND (SP)

Remarks

Technician

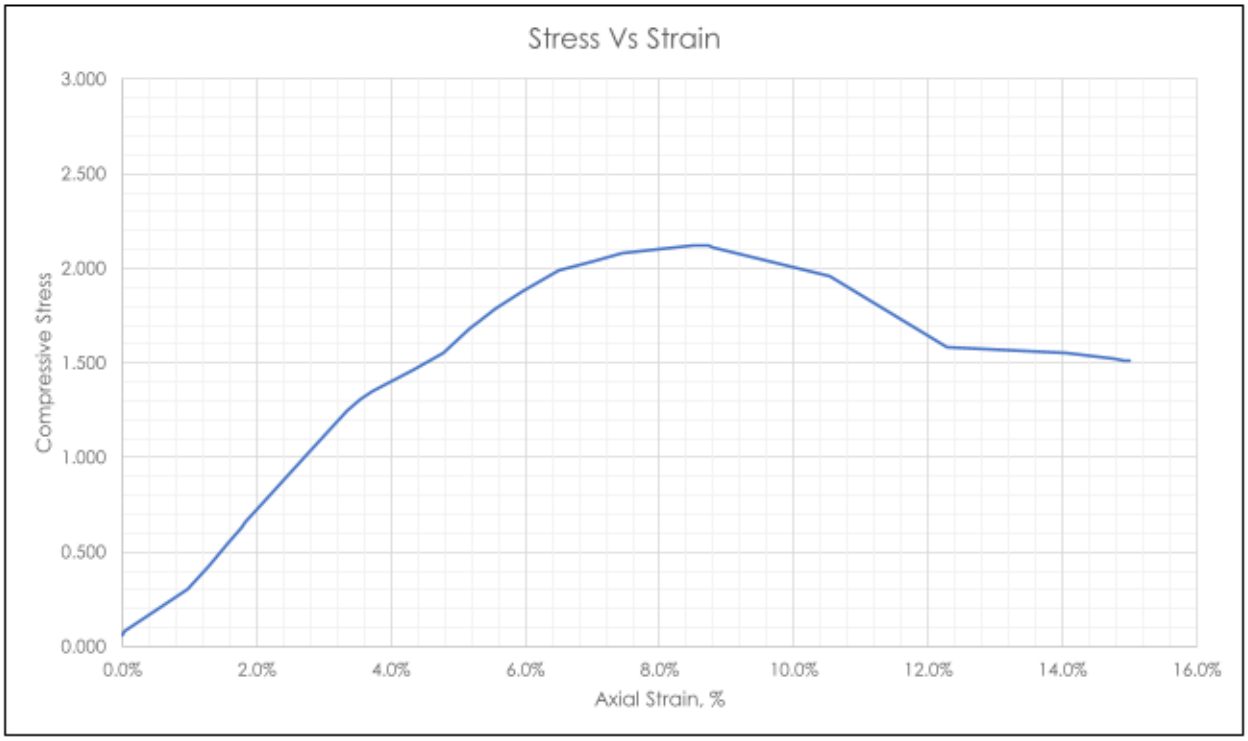
Checked
mvanweelden

Approved
mvanweelden

SOILS & STRUCTURES

Unconfined Compressive Strength

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Date	11/17/2022				
Client	Montague Area Public Schools				
Sample Location	TB-03	Sample ID	E	Depth (ft)	14.5



Sample ID	E
Unconfined Strength (tsf)	2.122
Undrained Shear Strength (tsf)	1.061
Failure Strain (%)	8.5%
Strain Rate, (in/min)	0.055
Moisture Content	23.1%
Wet Density (pcf)	121.5
Dry Density (pcf)	98.7
Void Ratio	0.6946
Saturation (%)	89.1%
Specimen Diameter (in)	1.47
Specimen Height (in)	2.89
Height/Diameter Ratio	1.97

Liquid Limit

Plastic Limit

Plasticity Index

Assumed GS
2.68

Remarks

Technician

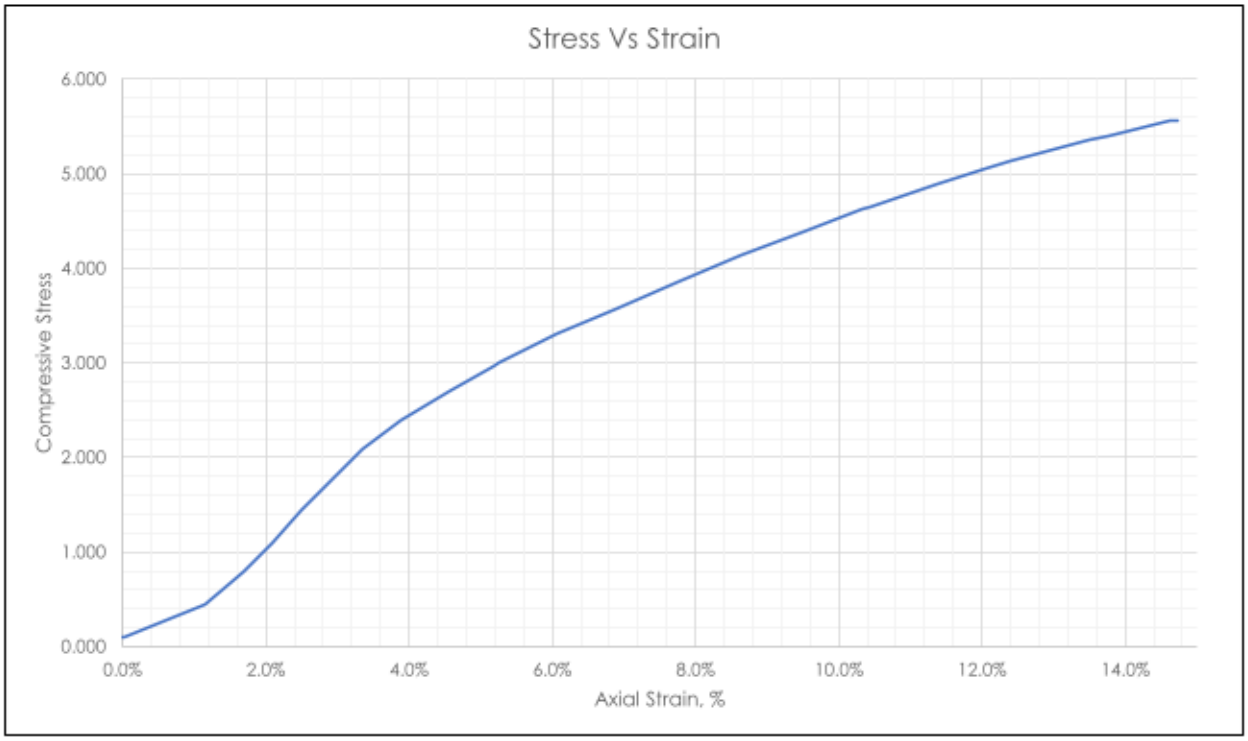
Checked
mvanweelden

Approved
mvanweelden

SOILS & STRUCTURES

Unconfined Compressive Strength

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Date	11/17/2022				
Client	Montague Area Public Schools				
Sample Location	TB-06	Sample ID	E	Depth (ft)	14.5



Sample ID	E
Unconfined Strength (tsf)	5.571
Undrained Shear Strength (tsf)	2.786
Failure Strain (%)	14.7%
Strain Rate, (in/min)	0.055
Moisture Content	19.7%
Wet Density (pcf)	130.2
Dry Density (pcf)	108.7
Void Ratio	0.5379
Saturation (%)	98.3%
Specimen Diameter (in)	1.37
Specimen Height (in)	2.95
Height/Diameter Ratio	2.15

Liquid Limit

Plastic Limit

Plasticity Index

Assumed GS
2.68

Remarks

Technician

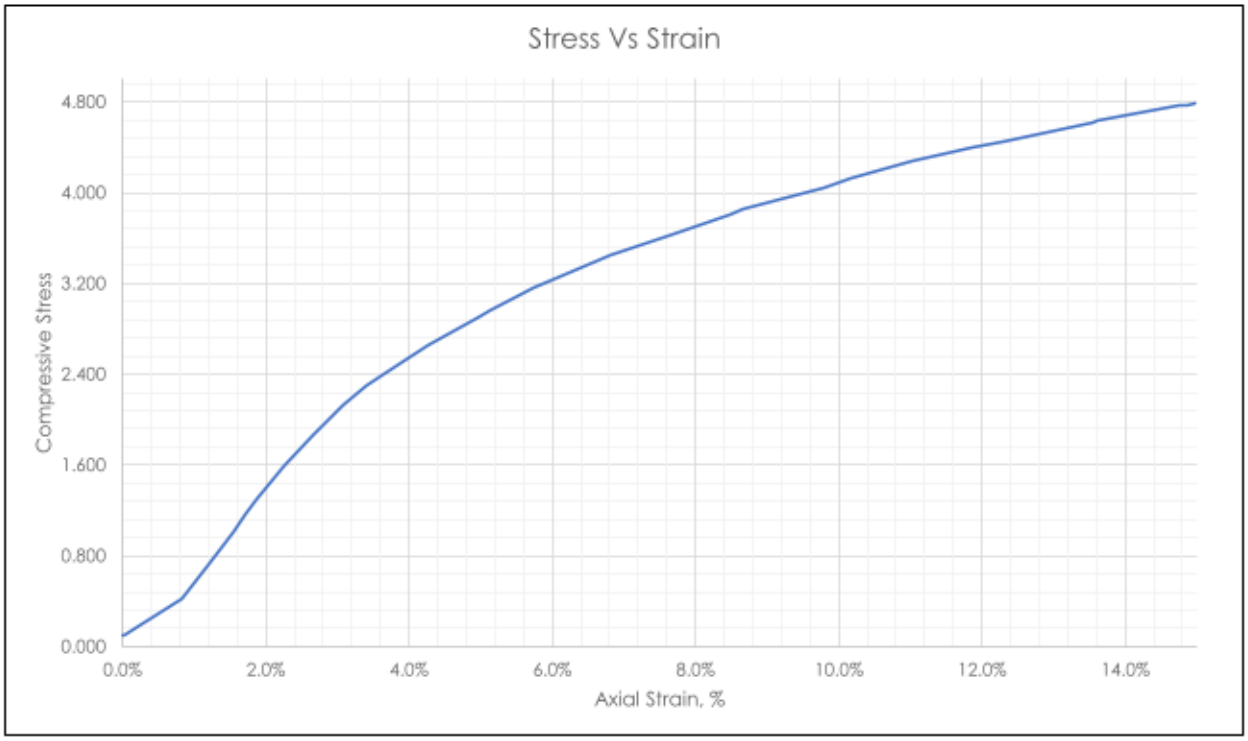
Checked
mvanweelden

Approved
mvanweelden

SOILS & STRUCTURES

Unconfined Compressive Strength

Project Name	Montague Area Public Schools Additions				
Project Number	2022.2109				
Date	11/17/2022				
Client	Montague Area Public Schools				
Sample Location	TB-04	Sample ID	F	Depth (ft)	19.5



Sample ID	F
Unconfined Strength (tsf)	4.795
Undrained Shear Strength (tsf)	2.397
Failure Strain (%)	15.0%
Strain Rate, (in/min)	0.055
Moisture Content	23.9%
Wet Density (pcf)	125.4
Dry Density (pcf)	101.3
Void Ratio	0.6516
Saturation (%)	98.3%
Specimen Diameter (in)	1.38
Specimen Height (in)	3.01
Height/Diameter Ratio	2.18

Liquid Limit

Plastic Limit

Plasticity Index

Assumed GS
2.68

Remarks

Technician

Checked
mvanweelden

Approved
mvanweelden

SOILS & STRUCTURES

General Information for Method of Field Investigation

The soil investigation was performed in accordance with the American Society of Testing and Materials method ASTM D 1586, which is the "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils". Samples of compressible clays or organic soils are obtained in accordance with ASTM D 1587, which is the "Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes." Rock may be cored in conjunction with the above methods as specified in ASTM D 2113 which is the "Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigation."

Field Testing

Standard Penetration Tests (SPT) in accordance with ASTM D 1586 were generally performed at depths of 2.0', 4.5', 7.0', 9.5' and 5.0' intervals thereafter.

Laboratory Testing

Samples obtained from the Standard Penetration Test, ASTM D 1586 or thin walled tube method, ASTM D 1587, were tested in the laboratory for the moisture content and density and/or particle size, where applicable. When soils sampled possessed sufficient cohesive properties, it was tested for its compressive strength in the unconfined state.

Natural Percent Moisture content (N.P.M.) of the soil is the percentage by weight of water contained in the soil sample compared to the dry weight of the solids of which the soil is composed. The NPM of select samples is determined in accordance with ASTM D 2216.

Natural Density (N.D.) of soil as reported on the appended boring logs is the natural wet density of the soils expressed in pounds per cubic foot.

The unconfined compressive strength of cohesive soils is determined in the laboratory on "undisturbed" select samples in accordance with ASTM D 2166. This test determines the maximum load required at a specified rate to deform the cohesive soil specimen length twenty (20%) percent. The primary purpose of the unconfined compression test is to obtain approximate quantitative values of the compressive strength of soils possessing sufficient coherence to permit testing in the unconfined state. The shear strength of the cohesive soil can be calculated from the results of the unconfined compressive strength test.

Color

When the color of the soils is uniform throughout, the color recorded will be such as brown, gray, and black and may be modified by adjectives such as light and dark. If the soils predominant color is shaded by secondary color, the secondary color precedes the primary color, such as gray-brown, or yellow-brown. If two major and distinct colors are swirled throughout the soil, the colors will be modified by the term mottled; such as mottled brown and gray.

Water Observations

Depth of water recorded in the test boring is measured from the ground surface to the water surface. Initial depth indicates water level during boring, completing depth indicates water level immediately after boring, and depth after "X" number of hours indicates water level after allowing the groundwater rise or fall over a period of time. Water observations in pervious soils are considered reliable groundwater levels for accurate groundwater measurements at the time the test borings were performed unless records are made over several days' time. Factors such as weather, soils porosity, etc., will cause the groundwater level to fluctuate for both pervious and impervious soils.

Sample Type

If not otherwise indicated, the sample is a split-barrel liner sample ASTM D 1586.

"S.T.' – Shelby tube sample, ASTM D 1587
"A" – disturbed augered sample
"C" – rock core sampled ASTM D 2113
N.P.M. – Natural Percent Moisture of in-situ soils sample
N.D. – Natural Density of in-situ soils sample in pcf.
S.S. – Shear Strength of cohesive soils samples as determined by the Unconfined Compression tests in ksf.

Classification Data – Laboratory data to assist in classification of soils and classification of soils characteristics; i.e., plastic limit or liquid limit

Test Boring Logs

Particle Size	**Visual**
Boulders	Larger than 12" (300 mm)
Cobbles	12" to 3" (300 to 75 mm)
Gravel - Coarse	3" to ¾ " (75 to 19 mm)
Gravel – Fine	19.0 to 4.75 mm
Sand- Coarse	4.75 to 2.0 mm
Sand - Medium	2.0 to 0.425 mm
Sand - Fine	0.425 to 0.075 mm
Silt	0.075 to 0.002 mm
Clay	0.002 mm and smaller

Soils Components

Major Component	**Minor Component**
Gravel	Trace (1 - 10%)
Sand	Some (11 - 35%)
Silt/Clay	And (36 - 50%)

Condition of Soil Relative to Compactness

Granular Material	**"N" Value**
Loose	0 - 4
Slightly Compact	5 - 7
Compact	8 - 20
Very Compact	21 - 50
Extremely Compact	51 and above

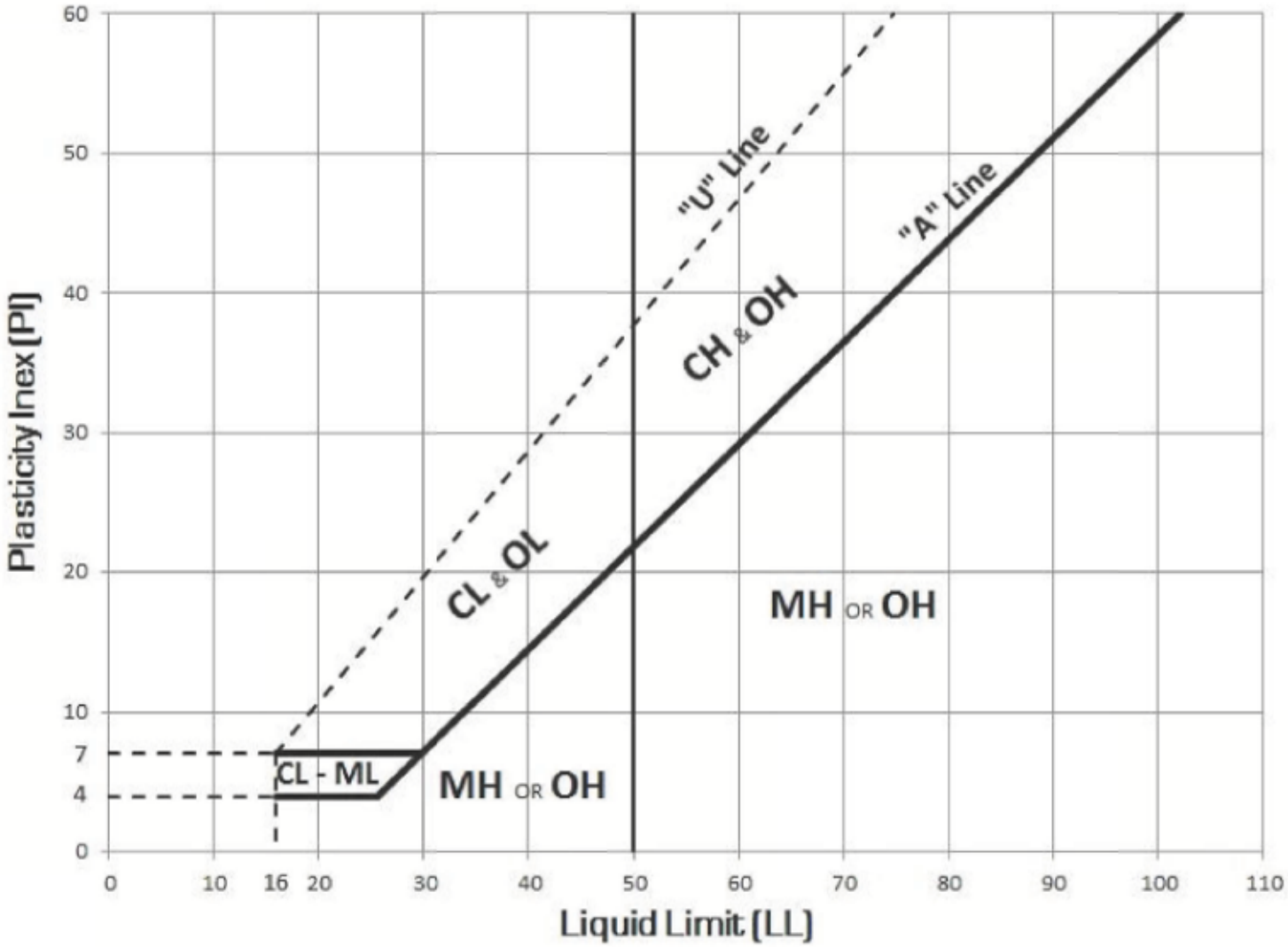
Cohesive Material	**"N" Value**
Soft	0 - 4
Firm	5 - 7
Stiff	8 - 20
Very Stiff	21 - 50
Extremely Stiff	51 and above

"N" values in clay soils are not to be used as a measure of shear strength. However, they may be used as a general indication of strength.

Unified Soil Classification System Chart

Major Divisions			Letter Symbol	Typical Descriptions
Coarse Grained Soils More than 50% of material is larger than No. 200 sieve size	Gravel – Gravelly Soils more than 50% of coarse fraction retained on No. 4 sieve	Clean gravels (little or no fines)	GW	Well-Graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly-Graded gravels, gravel-sand mixtures, little or no fines
		Gravel with Fines (appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sand and Sandy Soils More than 50% of coarse fraction passing No. 4 sieve	Clean Sand (little or no fines)	SW	Well-Graded sands, gravelly sands, little or no fines
			SP	Poorly-Graded sands, gravelly sands, little or no fines
		Sand with Fines (appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine Grained Soils More than 50% of material is smaller than No. 200 sieve size	Silts and Clays Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays or low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays or low plasticity
	Silts and Clays Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays or medium to high plasticity, organic silts
	Highly organic soils		PT	Peat, humus, swamp soils with high organic contents

For Laboratory Classification of Fine Grained Soil
Plasticity Chart



WINBERG CONSTRUCTION INC

PRE-BID MEETING MINUTES

June 14, 2023 at 2:30 PM

PROJECT: Montague Area Public Schools – MHS Performance Gymnasium Addition

PROJECT #: 22-136.20

SIGN-IN SHEETS

1. See Attached

INTRODUCTIONS

1. OWNER: Montague Area Public Schools
    a. Jeffrey Johnson, *Superintendent*
    b. Tom Cederquist, *Director of Operations*
    c. Stacey Brown, *Director of Business Affairs*

2. ARCHITECT / ENGINEERS: TowerPinkster / Teton Designs / Hurley & Stewart / Rhoades Engineering
    a. Bret Kronlein - TowerPinkster, *AIA – Senior Project Manager*
    b. Lori Pawlias - TowerPinkster, *Architectual Project Coordinator*
    c. Chad Trnka - Rhoades Engineering, *Principal-Senior Electrical Engineer*
    d. Curtis Pawlowski - Rhoades Engineering, *Mechanical Engineer*

3. CONSTRUCTION MANAGER: WinBerg Construction, Inc.
    a. Brad VanBergen, *President*
    b. Jared Mott, *Project Manager*
    c. Dan Vincent, *Site Superintendent*

BIDDING PROCEDURES

1. BID CATEGORIES
    a. All Bidders are required to familiarize themselves with all Bid Categories, not just their own

2. BID FORM
    a. Bids must be submitted in duplicate on the Bid Form provided, sealed, and plainly labeled per the Instructions to Bidders
    b. Familial Disclosure Statement and Iran Economic Sanctions Act must be filled out and notarized and is included on the Bid Form

3. ALTERNATES
    a. Refer to the Plans and Specification Section 01 2300 – Alternates
        - Alternate No. 1 – Mill and fill "L" shaped parking lot area
        - Alternate No. 2 – Eliminate the gym divider curtain
        - Alternate No. 3 – Eliminate two (2) rows of North student section bleachers
        - Alternate No. 4 – Heated sidewalks – operational
        - Alternate No. 5 – Synthetic turf in lieu of grass

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Montague, MI 49437
www.winbergconstruction.com
(231) 894.8409 (231) 730.3674 jared@winbergconstruction.com

b. Voluntary Alternates are encouraged and will be considered in the selection process – these will not be read aloud at the bid opening – please attach a separate sheet if needed to better explain the Voluntary Alternates

4. RFI's
    a. Please submit all RFI's as soon as possible
    b. All RFI's must be submitted by the end of the day on Monday, June 19, 2023 for them to be processed and included as part of Addendum No. 1
        i. (anticipated release date: Tuesday, June 20, 2023
    c. Please direct all RFI's to Jared Mott at *jared@winbergconstruction.com* (email preferred)
    d. Use the RFI form provided in the specifications

5. ADDENDUMS
    a. The Pre-Bid Meeting Minutes will be issued as part of Addendum No. 1

6. BONDING REQUIREMENTS
    a. Bid security in the amount of five percent (5%) of the bid, in the form of a Bid Bond, Certified or Cashier's Check is required and to be made payable to Montague Area Public Schools. Proposals not accompanied with the proper bid security will not be accepted
    b. Performance, labor and material bonds will be required for all contracts exceeding $50,000.00 in the amount of 100% of the contract

7. INSURANCE REQUIREMENTS
    a. Montague Area Public Schools, WinBerg Construction, Inc., and TowerPinkster must be named as additional insured
    b. Please see SAMPLE Insurance Certificate in the Instruction to Bidders for requirements

8. TESTING, INSPECTIONS, and PERMIT REQUIREMENTS
    a. All special testing and inspections will be paid for by the Owner and coordinated through the Construction Manager
    b. All contractors are required to pay for and obtain all necessary permits, inspections, etc.

9. SCHEDULE
    a. Contractor's endorsement and/or amendment of the Schedule is required and will help aid the Team in delivering the Project on time
    b. Rerouting of water piping needs to take place immediately upon Award and prior to school start

10. BID DATE
    a. Bids are due no later than **2:00 PM (local time) on Friday, June 23, 2023** at the Montague Area Public Schools District Office located at 4882 Stanton Blvd., Montague, MI 49437

OTHER INFORMATION

1. Prevailing wages DO NOT apply to this project
2. All applicable Michigan sales and use taxes apply to this project
3. All site visits must be coordinated through the Project Manager, Jared Mott, he can be reached by cell at (231) 730-3674, in the office at (231) 894-8409 or by email at *jared@winbergconstruction.com*
4. All correspondence is to flow through the Construction Manager, WinBerg Construction, Inc.

QUESTIONS / COMMENTS

1. Who is providing and installing the rigid insulation for the heated sidewalks? ***Bid Category No. 20 – Mechanical is to furnish and install the rigid insulation as it pertains to all heated sidewalks, stairs, and ramp.***

2. Dumpsters will be provided by the Construction Manager for **general refuse only**. Any special dumpsters for recycling, concrete, etc. will be the responsibility of the contractor requiring such.

3. Geotechnical report was requested as it is not in the Bid Documents. ***This will be issued with Addendum No. 1.***

4. Owner is providing and installing the volleyball equipment directly. ***Please remove volleyball equipment from the scope of work for Bid Category No. 7 – General Trades completely. Bid Category No. 4 – Concrete to provide thickened slab (36" x 36" x 18" deep) around all six (6) sleeve locations. Bid Category No. 13 – Wood Athletic Flooring to install six (6) floorplates (provided by Owner). Core drilling of holes through wood floor and concrete will be performed by the Owner's installer and/or Construction Manager.***

5. Clarification that the Owner is providing scoreboards through a future bid package.

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