Schematic Design Report

New Parkrose Middle School

Submitted to Parkrose School District

by Dull Olson Weekes - IBI Group Architects, Inc.

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Introduction

Introduction

This report culminates the portion of the project planning and design phase known as Schematic Design (SD). Schematic Design is the first of three distinct phases of architectural services relating to the development of the project which focus on the drawings and related specifications.

Information gathered during the Visioning and Programming phases was primarily written in nature. During the Schematic Design phase this information (with ongoing collaboration with the Middle School Design Team) was analyzed and evaluated against the context of the project site, and then applied to the creation of physical rooms and spaces which comprise the project. This process results in a building plan that addresses the needs and goals of the project while remaining within stated area and budgetary parameters as defined by the Area Program.

Schematic Design reflects the project scope, and establishes the overall conceptual design, scale, and functional relationships among the individual components of the project. The primary objectives are to arrive at clearly defined and feasible site and building concepts, and to present them in a concise format that achieves understanding and acceptance by the Parkrose School District and the community.

Because the design process is a continuum, it is somewhat difficult to identify the “final” point at which any of the initial phases can be said to be totally complete. In this regard, the significance of Schematic Design lies in the fact that at this stage of development the project remains in a state of discovery and development. Thus the opportunity exists to respond to necessary changes to functional uses, program, and building systems which are still under discussion with the Middle School Design Team. This dialogue is a logical outcome of the transition from Visioning and Programming into the graphic images of Schematic Design.

The next major phase is known as Design Development. One of the primary design tasks to be completed during Design Development is a series of Focus Group meetings intended to follow up in greater detail previous discussions with staff. These sessions consist of interviews between Dull Olson Weekes – IBI Group Architects (DOWA-IBI) and individual staff members representing the various departments and user groups in the school who are knowledgeable of the unique requirements of each functional area of the building. Highly detailed information gathered during these interviews will be incorporated into the evolving project drawings and specifications. The goal is to complete Design Development with a project that is clearly defined at a level of detail so that final construction drawings can begin.

History and Process

In the Fall of 2008, the Parkrose School District, with the assistance of DOWA – IBI, began an analysis of all District facilities. The analysis was presented in a report to the School Board in June of 2009. This report noted deficiencies of a significant nature for Parkrose Middle School, including code and ADA problems, failing building systems, and a school that was not functioning in a way that promoted progressive 21st century learning concepts.

The School Board with the assistance of the Bond Coordinating Council began a process of evaluating the possibility of proposing a capital projects bond to the voters of Parkrose School District. Replacement of the Middle School was deemed a priority in this process, and was a centerpiece of the bond proposal. In May of 2011 the voters of Parkrose approved the bond measure and planning for the bond projects began.

In the Fall of 2011 DOWA – IBI began planning for the New Middle School. The process included conceptual discussions about the nature of middle school education, the goals and expectations of the community, sustainable design concepts, and the specific needs of a new middle school. Specifically, the steps included tours of existing buildings, Visioning Sessions, development of the Building Area Program, and specific conceptual development of a design for the new middle school.

This report is intended to describe the details of this process, and to provide narratives of both the process and the final Schematic Design documents. Included in this report are technical discussions of various engineering and design consultants who are part of the DOWA – IBI team.

YES for PARKROSE

Visioning Process

Visioning

A series of visioning sessions kicked off the design process. Participants had an opportunity to share what they like best about Parkrose Middle School and what needs improvement. Following this discussion, the group was shown an external scan of projects around the world, mainly in Finland where there are good examples of student centered environments. This external scan promoted conversation amongst the team about the future of education in the world and in Parkrose. The sessions concluded with a focus on the current Parkrose Middle School's curriculum and the changes seen for the future

Tours

rock creek middle school

The Design Team visited several facilities for ideas on how school design can enhance the learning and curriculum intent. The schools visited were:

- Rock Creek Middle School, North Clackamas School District
- Laurel Ridge Middle School, Sherwood School District
- Rosemont Ridge Middle School, West Linn Wilsonville School District

laurel ridge middle school

The Design Team was provided a survey to complete after each school tour, these were then analyzed and evaluated. The following are the common themes that emerged from the tours and surveys.

Sense of Arrival

Upon arriving at the facility via any transportation, an inviting and clear entry that provides a sense of arrival to the school was a clear important element.

Inviting Places

It is important that throughout the facility there are places (exterior and interior) that provide a personal and inviting connection to the facility.

rosemont ridge middle school

Flexible Learning Environments

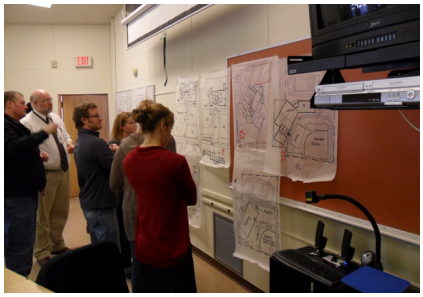
Providing a variety of learning spaces along with mobile furniture and storage allows for the flexibility needed in a changing world of education.

Safety and Security

As safety and security concerns continue to rise in this world, they impact our decisions in school design. Making sure that a secured entrance is in the design along with dealing with lockdowns is important to the design team. This balanced with the next topic can be a challenge but not impossible.

Sustainability

Energy efficient systems and daylighting were the main highlights of the tour. Daylight and connectivity between spaces are important for learning and teaching and can make a significant impact to test scores and absenteeism.



Bond Planning

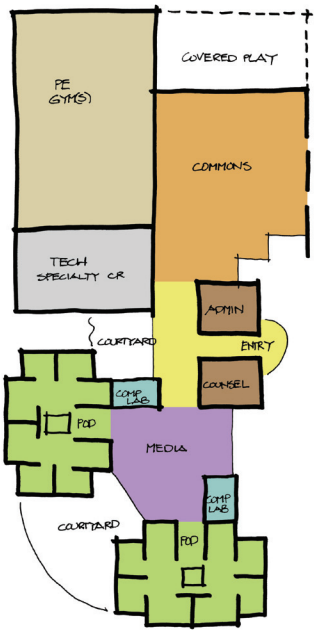
In the spring of 2009, a Parkrose Bond Coordinating Committee was formed by the District for purposes of evaluating the conditions of the District schools and identifying long term requirements for improvements and needs for the Parkrose School District. The District, with Dull Olson Weekes – IBI Group and their engineering team, prepared an overall Capacity Study and Facility Assessment of District Facilities. This was completed and submitted to the District in June 2009.

The next 10 months, following the Capacity Study and Facilities and Facility Assessment of District Facilities report, the Parkrose Bond Coordinating Committee began developing and prioritizing the list for bond projects at all of the District's sites and facilities. Subsequently, the committee reviewed and discussed bond funding options, conducted a voter survey, and developed communication strategies.

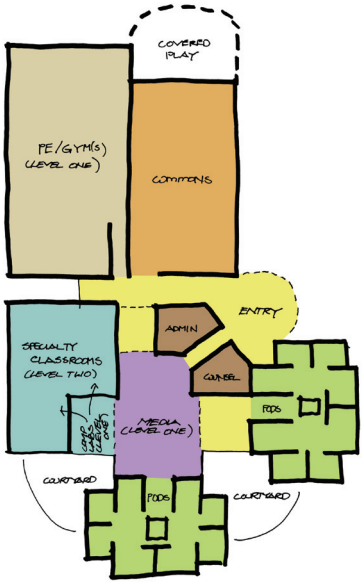
In early 2011 recommendations were presented to the Board for a capital improvement program, a resolution for Bond Measure 26-123 was filed and the bond issue passed in May, 2011.

Building Symposium Options

During a half day session, participants from the District and Parkrose Middle School explored various options for configuration of the building elements. The participants were broken down into small groups, with each group developing basic building concepts. The groups looked at the building as a whole, as well as focusing on possible classroom pod arrangements. At the end of the session, all sketches were pinned up and the group was asked to rank the options by placing dots on the most preferred schemes.



building diagram - sketch A

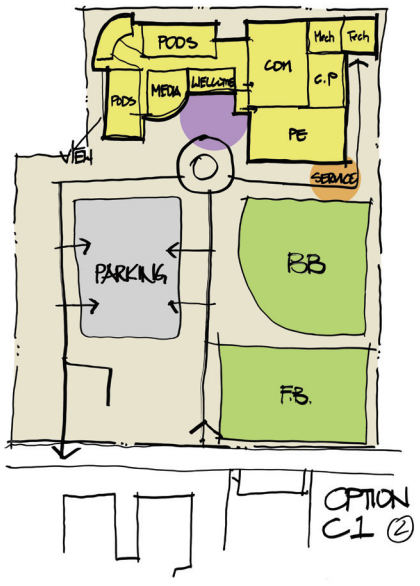


building diagram - sketch C

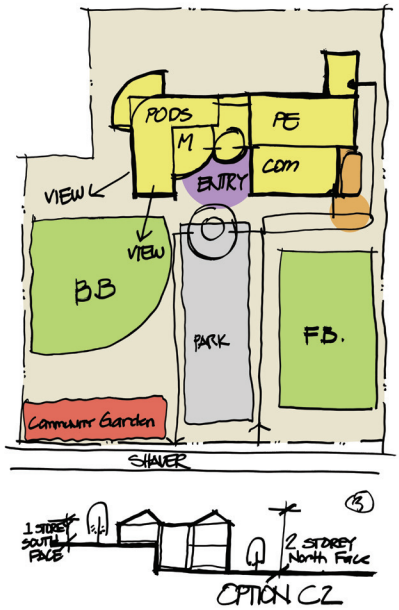
building diagram - sketch D

Site Symposium Options

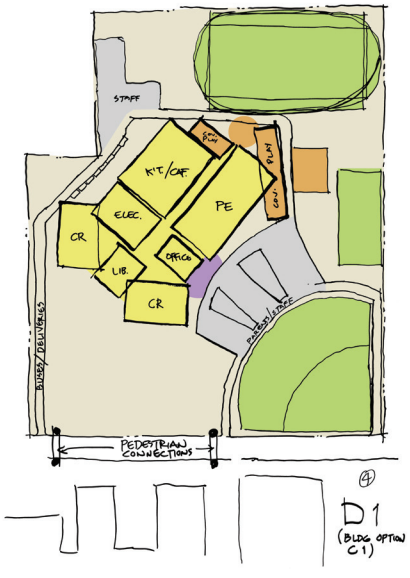
At a second half day session, participants from the District and Parkrose Middle School went through the same exercise as at the building symposium, and explored various options for configuration of the site elements. This included looking at locations for the building, playfields, and parking. Participants were again broken down into small groups, with each group developing basic concepts with an emphasis on understanding site circulation for cars, buses, delivery vehicles, and pedestrians. At the end of the session, all sketches were pinned up and the group was asked to rank the options by placing dots on the most preferred schemes.



design sketch - option C1



design sketch - option C2



design sketch - option D1

Guiding Principles

A core foundation for the project was the development of a set of guiding principles intended to serve as a road map for all future decision making. At a series of meetings held at the Parkrose Middle School, PMS staff and District participants crafted the following principles based on their belief of what is possible for this new building, their hopes for themselves and their students, and their aspirations for the community.

Excellence

Parkrose Middle School will embrace the highest aspirations of the community. It should be inspiring, innovative, transformative, aspirational, and a powerful professional place to learn.

Student Centered

Parkrose Middle School will be leaner-focused and embrace the social, emotional, cultural and physical needs of all students and staff. This not only includes educational needs, but the diversity of cultural, social, emotional and psychological needs of each student as well. The new Middle School will feel like it's a place that students and staff always want to be.

Flexible, Adaptable, Accessible

Middle School will have a life of 50 years or more. Future programs, technological needs, educational directions and community expectations over time will evolve. Therefore, one will consider ways to physically adapt the facility, technology and building systems to address future needs.

Sum Greater Than the Parts

Middle School is the integration of Individuals, Community and Education. Everyone will consider the needs of each and support the interconnecting interests of each so that the sum is greater than the parts.

Safety

Middle School will be a safe environment. The physical arrangement and organization of the building and site should be controllable both passively and actively. Foster ownership through a culture of belonging and respect for students and families will be evident and supported in the school.

Resources

Middle School will be durable and easily maintained. It will be economical to run and operate. The building will use the earth's resources wisely.

The Whole Place (Site & Building)

Middle School should be sustainable, technology-infused, light-filled, cohesive, welcoming, exciting, encouraging and comfortable.

Schematic Design Area Program

The following area program includes a detailed list of spaces with square foot areas assigned to them.

Note that measurements for room area calculations are to inside face of walls.

Summary		
	Area	Student Capacity
Administration	2,375	0
Counseling	2,400	0
Learning PODs	40,205	960
Multipurpose Room	1,900	60
Special Needs	2,200	5
Specialty Classrooms	10,675	175
Media Center	4,260	0
PE/Athletics	21,750	70
Food Service/Commons	13,205	0
Support	8,820	0
Subtotal	**107,790**	**1,270**
Net to Gross / Capacity Efficiency Factor	**30%**	**0.85**
TOTAL GROSS AREA / CAPACITY	**140,000**	**1,080**

1 **Capacity Calculations**

Learning PODs = 30 Students/Classrooms x .85 Efficiency Factor
PE = 35 Students/Classroom x .85 Efficiency Factor
Art / Band / Choir / Tech / Health = 35 Students/Rooms x .85 Efficiency Factor

2 **Teaching Stations**

Total Teaching Stations = 45 (including Life Skills)

3 **Capacity**

Total Capacity = 1080 Students
Total Teaching Stations that provide capacity = 42

Welcoming Center

Administration

Room	Qty.	SF/Room	Total	Capacity	Notes
Reception/Lobby	1	500	500	0	
Principal	1	200	200	0	
Assistant Principal	2	200	400	0	
Conference Room	2	200	400	0	
Workroom	1	250	250	0	
Secured Storage	1	150	150	0	
Storage	1	100	100	0	
Staff Toilets	1	75	75	0	
Office Manager	1	100	100	0	
Staff Room	0	0	0	0	Use Cafeteria Staff Room
Volunteer Room	1	200	200	0	
Community Room	0	0	0	0	
Total			**2,375**	0	

Counseling

Room	Qty.	SF/Room	Total	Capacity	Notes
Reception/Lobby	1	300	300	0	
Counselor	2	150	300	0	
Conference Room	1	150	150	0	
ISS	1	500	500	0	
Itinerant Offices	4	125	500	0	
Attendance	1	150	150	0	
Secured Storage	1	100	100	0	
Storage	1	100	100	0	
Staff Toilets	1	75	75	0	
Health Room	1	150	150	0	
Health Toilet	1	75	75	0	
Total			**2,400**	0	

Learning PODs (8 Total)					
Room	**Qty.**	**SF/Room**	**Total**	**Capacity**	**Notes**
Classrooms	24	950	22,800	720	Math, Humanities, ELL, Resource, Foreign Language
Science	8	1100	8,800	240	
Commons/Flex Space	8	650	5,200	0	
Science Prep	3	200	600	0	
Student Toilets (set)	3	480	1,440	0	
PLC Prep Room	4	200	800	0	
Small Group	0	0	0	0	See Speciality Spaces
Staff Toilet	4	60	240	0	
Production Room	1	250	250	0	
Storage	1	75	75	0	Share between all PODs
Total			**40,205**	960	

Multipurpose Rooms					
Room	**Qty.**	**SF/Room**	**Total**	**Capacity**	**Notes**
Multipurpose Room	2	950	1,900	60	Swing Space for POD Programs Locate near PODs
Total			**1,900**	60	

Special Needs					
Room	**Qty.**	**SF/Room**	**Total**	**Capacity**	**Notes**
Resource Classrooms	2	0	0	0	Located in Learning PODs
Testing Room	1	75	75	0	
Life Skills	1	1100	1,100	5	
Conference Room	1	150	150	0	
Time Out	1	75	75	0	
Special Needs Toilet	1	200	200	0	
Storage	1	100	100	0	
Special Needs Offices	2	150	300	0	
ELL	2	0	0	0	Located in Learning PODs
OT/PT	1	200	200	0	
Total			**2,200**	5	

Specialty Classrooms					
Room	**Qty.**	**SF/Room**	**Total**	**Capacity**	**Notes**
Art Room	1	1250	1,250	35	
Art Office	1	100	100	0	
Art Storage	1	100	100	0	
Kiln	1	75	75	0	
Band Room	1	1500	1,500	35	
Band Office	1	125	125	0	
Choir Room	1	1300	1,300	35	
Choir Office	1	125	125	0	
Practice Rooms	3	100	300	0	One with recording capabilities
Music Storage	1	100	100	0	
Tech Lab	1	1200	1,200	35	
TV Studio	0	0	0	0	deleted
Planetarium/Science Lab	0	0	0	0	
Foreign Language	0	0	0	0	Located in PODs
Production Room	0	0	0	0	deleted
Small Classrooms	2	500	1000	0	Use for pullout activities
Computer Labs	2	1200	2400	0	Testing
Health Classroom	1	1100	1100	35	Locate near Gym(s)
Total			**10,675**	**175**	

Media Center					
Room	**Qty.**	**SF/Room**	**Total**	**Capacity**	**Notes**
Reading Room	1	3750	3,750	0	3200 at Sherwood; 3750 at Redmond MS
Conference Rooms	2	80	160	0	
Workroom/Office	1	200	200	0	
AV Storage	1	150	150	0	
Total			**4,260**	**0**	

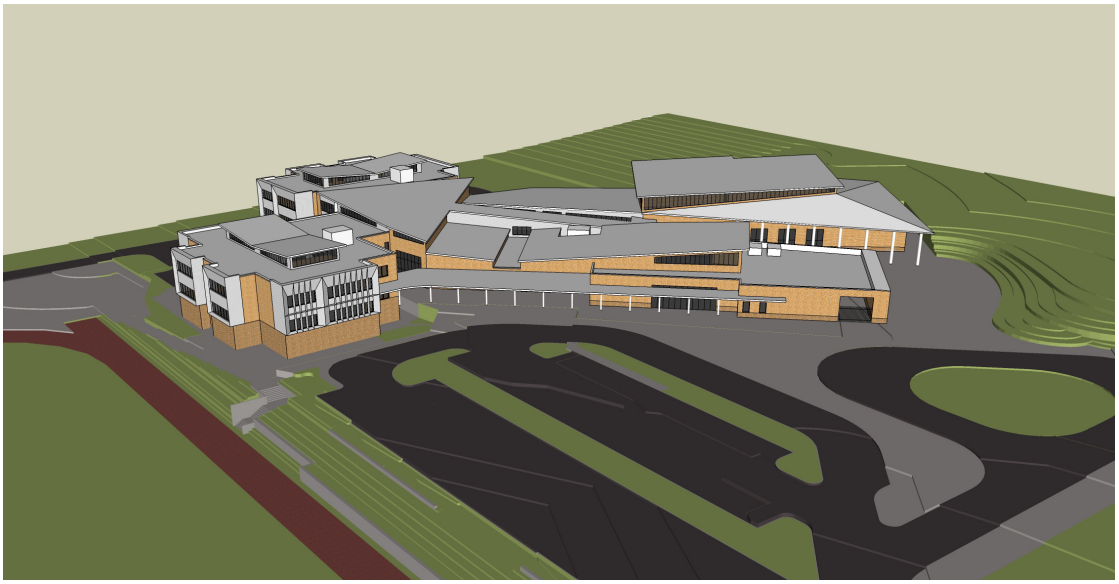
PE/Athletics					
Room	**Qty.**	**SF/Room**	**Total**	**Capacity**	**Notes**
Gym 1 (seating for 1000) (*1)	1	7500	7,500	35	
Gym 2 (*1)	1	5750	5,750	35	
Weight/Fitness (*1)	1	750	750	0	
Wrestling	0	0	0	0	Deleted
Boy's Locker Room	1	2000	2,000	0	
Girl's Locker Room	1	2000	2,000	0	
PE Storage	1	300	300	0	
Athletic Storage	1	300	300	0	
Staff Offices	2	250	500	0	
Mat Storage	1	150	150	0	
Covered Play	1	2500	2,500	0	(actually 5000 sf)
Total			**21,750**	**70**	

*1: Have staff allocate 14,000 sf for gym(s), fitness and wrestling.

Food Service/Commons					
Room	**Qty.**	**SF/Room**	**Total**	**Capacity**	**Notes**
Commons	1	5500	5,500	0	3 lunches
Commons Storage	1	400	400	0	
Production Kitchen	1	4000	4,000	0	incl office, toilet, frz, cooler, storage
Staff Room	1	600	600	0	
Student Lounge	0	0	0	0	
Reading Room	0	0	0	0	See Table Storage Alcove
Student Store	1	200	200	0	
Stage	1	1500	1,500	0	Locate adjacent to the Gym
Stage Storage	1	75	75	0	
Snack Bar	0	0	0	0	
Student Toilets	2	240	480	0	
Loading Dock/Recycling Center	0	0	0	0	
Table Storage Alcove	1	300	300	0	Use for "Reading" at lunch
Breakfast Cart Storage	1	150	150	0	
Total			**13,205**	**0**	

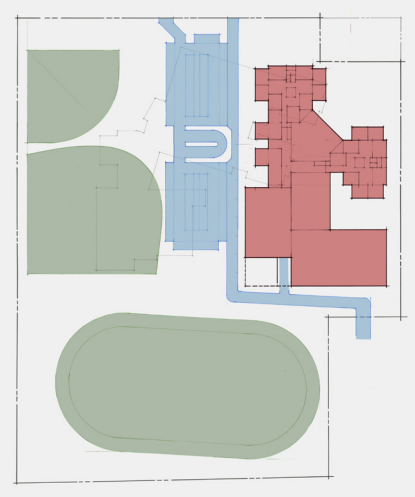
Support					
Room	**Qty.**	**SF/Room**	**Total**	**Capacity**	**Notes**
Custodial Office	1	150	150	0	
Custodial Rooms	4	75	300	0	
Building Storage	1	500	500	0	
Mechanical/Boiler	1	4000	4,000	0	
Electrical	1	250	250	0	
District IT Dept.	1	2150	2,150	0	
Auxilliary Hub Rooms	4	60	240	0	
Main Data Hub Room	1	250	250	0	
Student Toilets	2	240	480	0	
Lockers	1000	0.5	500	0	
Family Toilet	0	0	0	0	Use School Toilets
Total			**8,820**	**0**	

Site Design Concepts

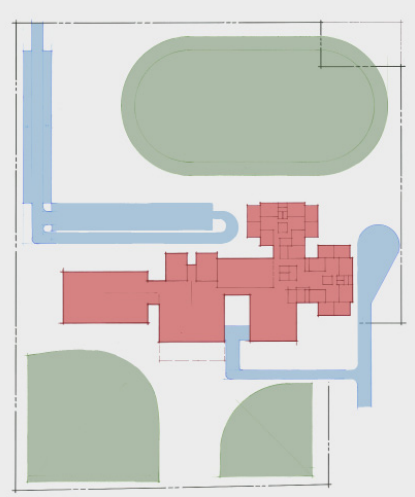


Site Design

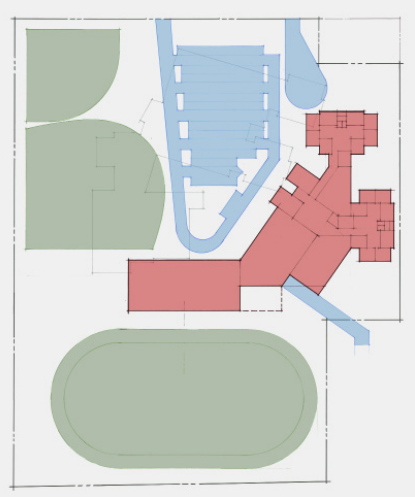
The site for the new middle school is the existing site of the current school, which must remain in operation during construction; coupled with the natural terrain that divides the site into three plateaus, this presents quite a building placement challenge. After considering many different building locations within the site, the overall site organization of parking, field placement, fire access and school bus circulation continued to place the building in the middle section of the site tight to the eastern property line. This placement largely avoids the existing building allowing a new track and field to be placed between the street and the new building providing a green space foreground and an elevated prospect over the new field toward the high school for the middle school. The existing tennis courts will remain and due to site constraints and terrain a new baseball field will be located across Shaver on the high school property. Vehicle access will be reorganized with separated bus drop-off, parent drop-off and parking areas.



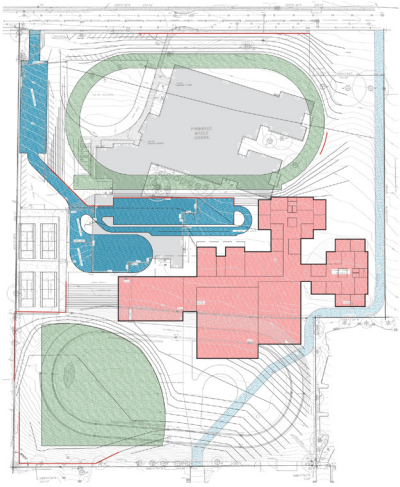
site scheme A



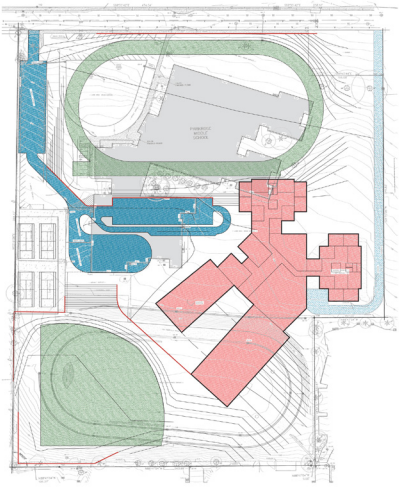
site scheme B



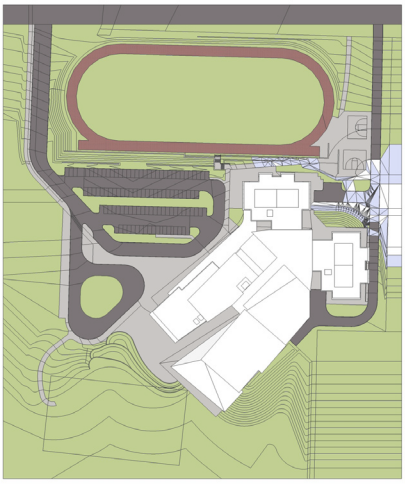
site scheme C



site diagram - scheme C

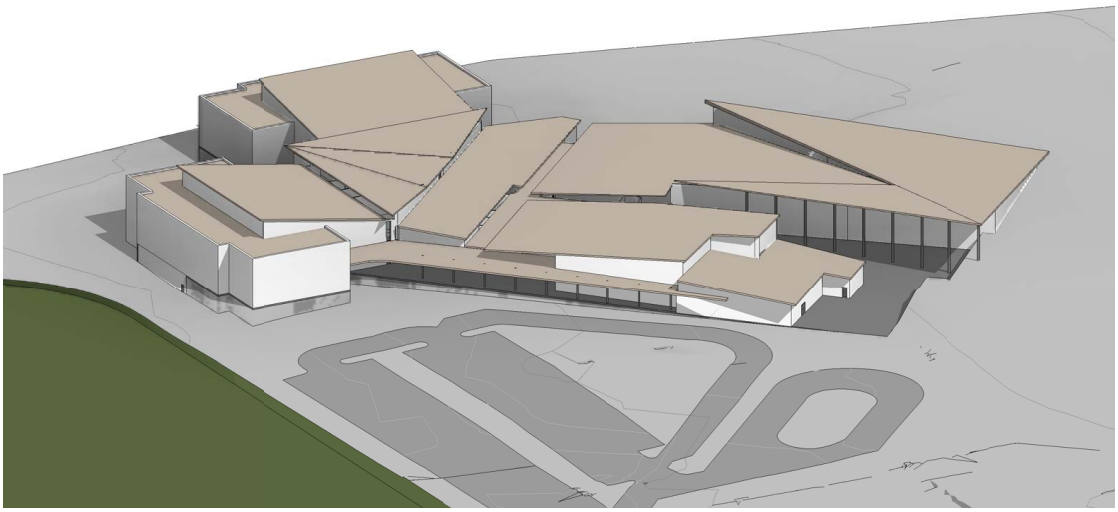


site diagram - scheme D



site diagram - scheme final

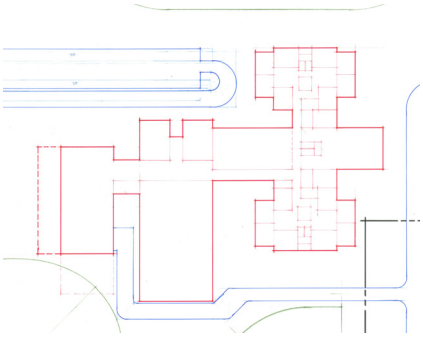
Building Design Concepts



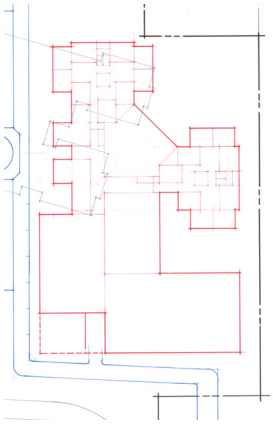
Building Design

The new middle school building is a synthesis of District and community guiding principles, educational strategies, site parameters and sustainable building practices. The educational studios, planned in a joint effort with the district, are arranged in small groups incorporating a science room, a shared extended learning area, and a small pull-out or professional space. The studios flank the library/media center which is the terminus to one end of the primary circulation spine. The other end leads to a large exterior courtyard flanked by the commons and athletic spaces, providing a large covered play area and an extension of the various enclosing spaces. Natural light is considered a design element critical to educational environments and provided in all spaces possible. The placement of the building on the site along with similar building materials of brick and metal panel will unite the high school and middle school sites into a single campus like appearance.

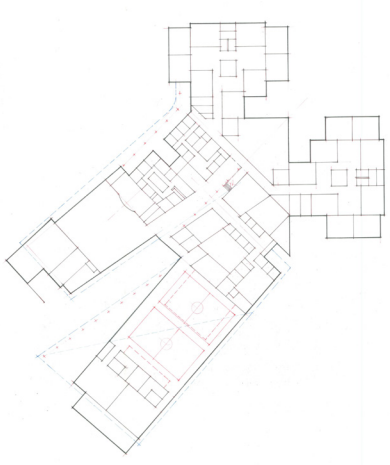
building diagram - sketch D



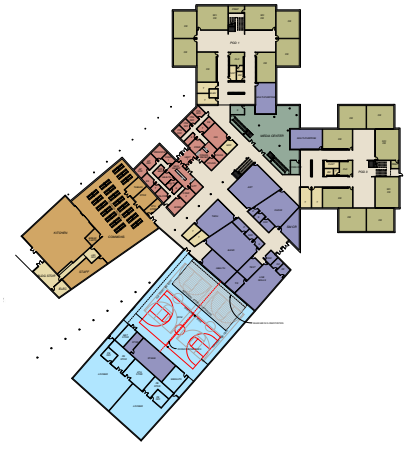
building diagram - sketch C



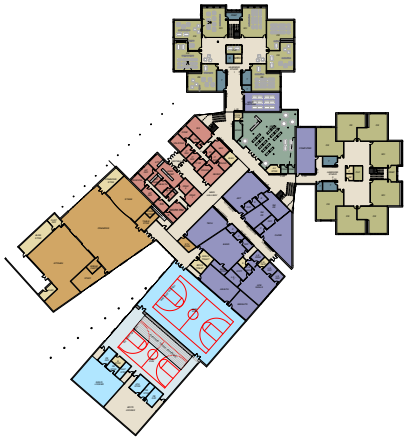
building diagram - sketch A



building diagram - march 5

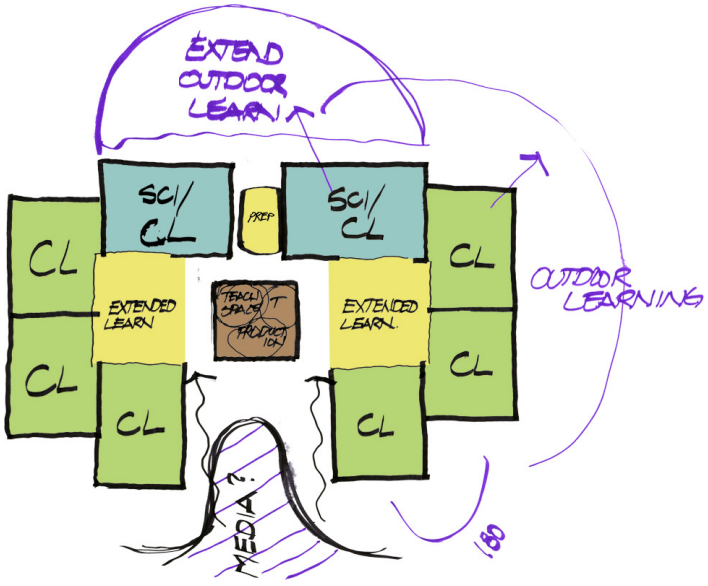


building diagram - march 14



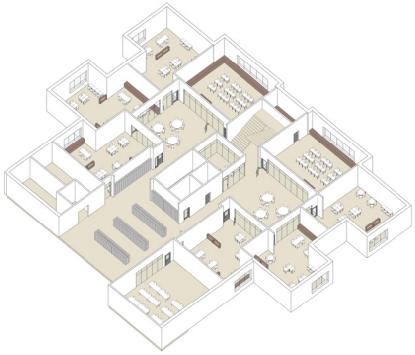
building diagram - april 10

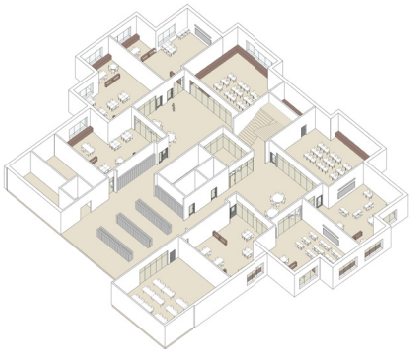
Classroom Concepts

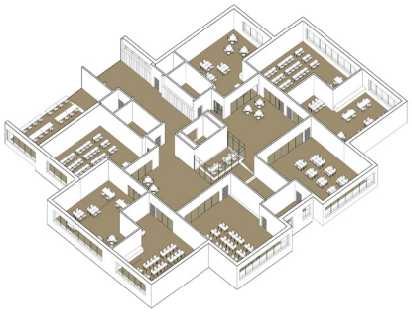


Classroom Concept

The basic building block of the learning areas is a studio space configured in the shape of a capitol letter ‘L’ with each leg being of equal width, termed the ‘fat L’. This shape accommodates the formation and functioning of small learning groups while providing a sense of separation. This perspective recognizes that non-traditional contemporary learning environments encourage students to fully participate in activities with others as they learn and actively help direct their knowledge acquisition. Extending this spatial concept further, four studios are grouped together; including a science focused space, around a shared flexible extended learning area that supports differentiated teaching practices and varied group learning. Paired with another identical group, each set of eight studios then shares a more quit break-out space and either a multi-purpose studio for long term focused subject staging or a computer lab. The close proximity of these spaces to the media center also allows greater flexibility and individual responsibility with learning.





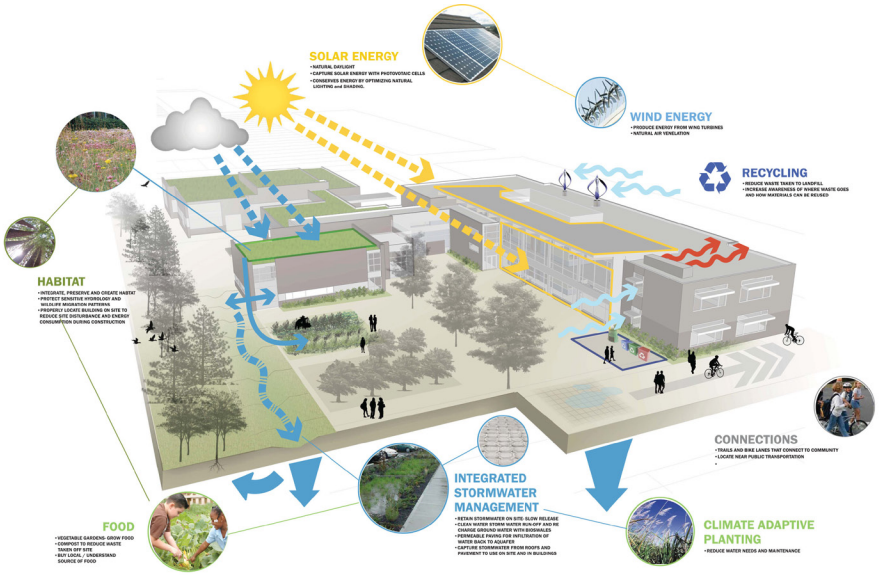


classroom pod concept 1

classroom pod concept 2

classroom pod concept final

Sustainability

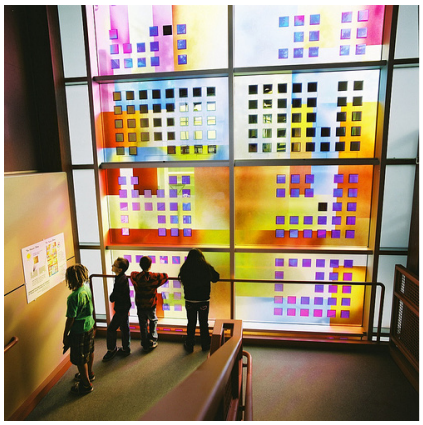


Sustainability

Sustainability is based on a simple principle:
everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment

Through a series of discussions with the Parkrose Community and with the Middle School Design Team, goals and objectives for sustainable building practices have been suggested for the new middle school. There is a desire to create a school that is energy efficient and makes a light footprint on the earth over the life of the building. The community has encouraged the design team to think about sustainability in very broad terms, including how the building is built, how it functions, and how durable and long lasting it is. Several key themes emerged:

Key Themes in Sustainability for Parkrose



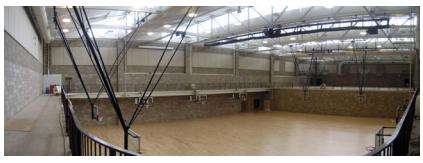
Energy efficiency: a building that uses as little energy to operate as possible, and minimizes long term maintenance costs.
Natural light: use daylight as the primary source of light wherever possible.
Low water use: be as efficient as possible with water use for the building and landscaping.
Safe materials / indoor air quality: create an indoor environment that is safe and healthy.
Re-use and recycle: re-use elements from the existing building where possible, utilize recycled products in the new building where possible, recycle construction waste.
Proper sound control: design an indoor environment that has the highest level of acoustics possible.
Community use: build a building that the entire community can take pride and ownership in.

Sustainable Classrooms

Sustainable classrooms have been identified as a key priority in the design of the building. The goal is to create learning environments in which a premium is placed on the following design issues:

- Indoor Air Quality / Ventilation
- Low Emitting V.O.C. Materials
- Acoustics
- Daylighting

Measurement



The community and the design team recognize the importance of setting high standards for sustainable design in the new middle school. There is

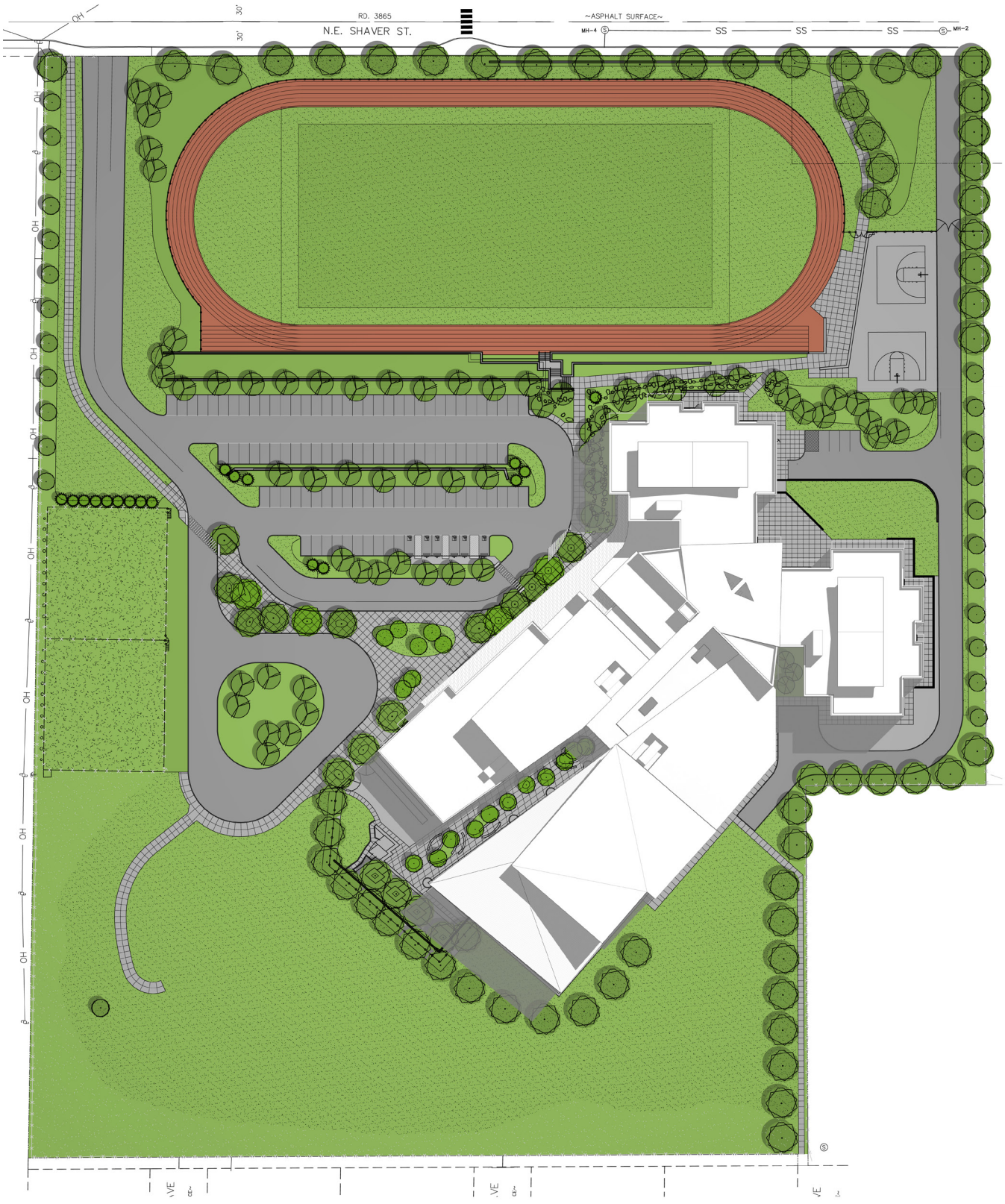
an interest in exploring a rating standard such as Leadership in Energy Efficient Design (LEED) which provides various levels of ratings for sustainable design. As the development of the design continues over the coming months, the design team will explore the costs and benefits of the LEED system, with an overriding goal of providing the most long term benefit to the community as a whole.

Next Steps

The design team will continue to develop sustainable strategies for the new middle school in an effort to provide a long lasting solution that is sustainable in the broadest sense. Ultimately, the challenge will be to think about the following as we move forward:

We have a unique opportunity to step away from “what was”, avoid hanging on to “what is” and consider “what should be”.

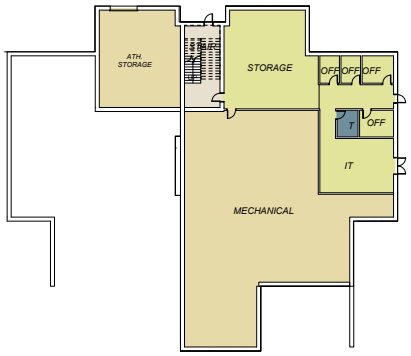
Schematic Design Drawings



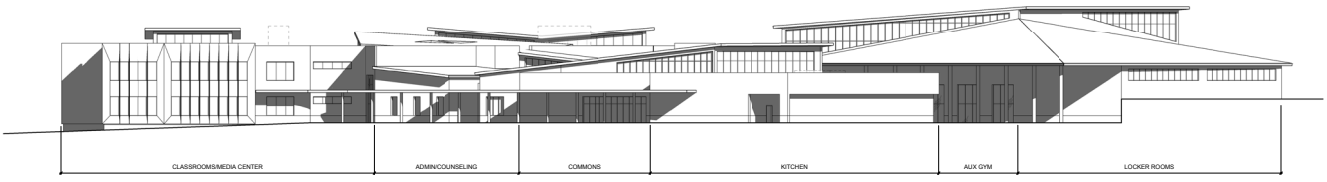
site plan

1st floor plan

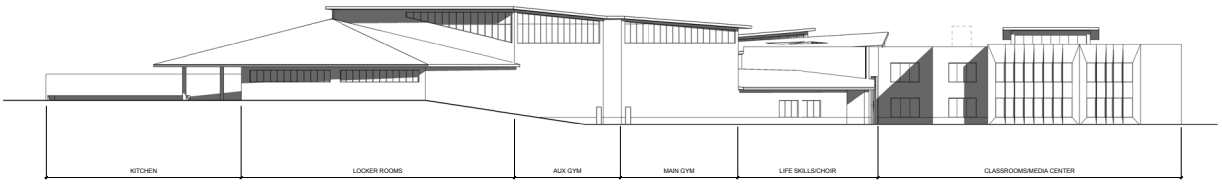
2nd floor plan



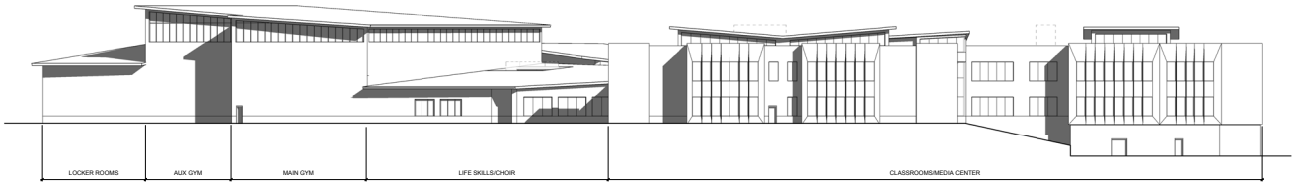
basement plan



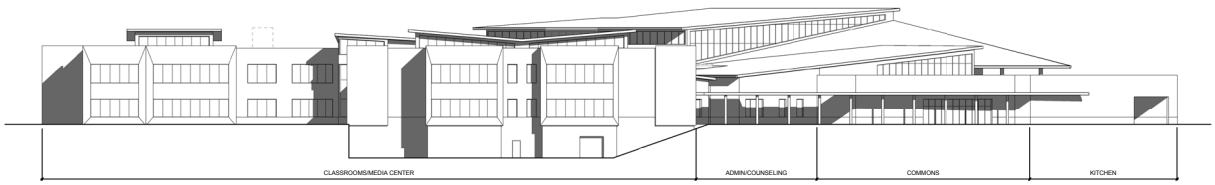
west elevation



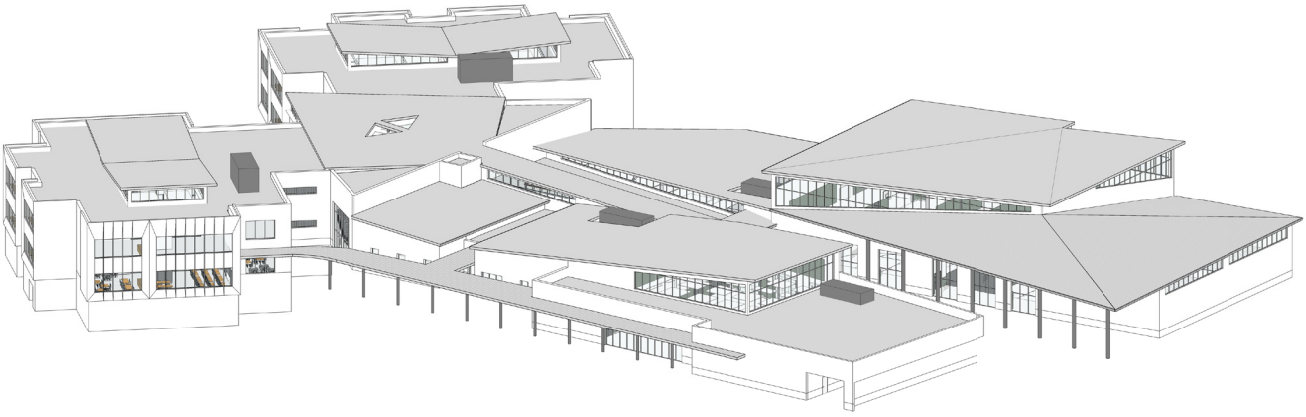
south elevation



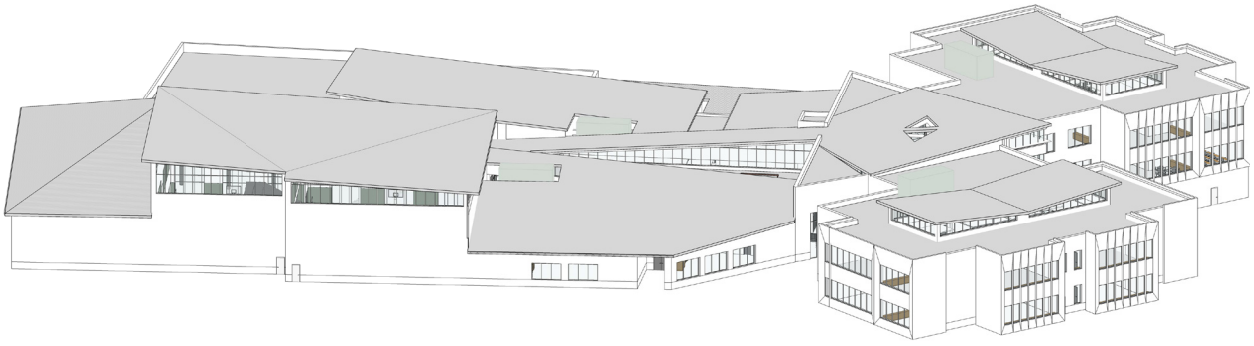
east elevation



north elevation



3d view



3d view

view from entry drive

view from play field

aerial view

view of classroom pods

Consultant Narratives

Civil

Project Description

Description

The proposed site for the new middle school is located on site of the existing Parkrose School District Middle School. The site is immediately west of the I-84 freeway near the NE 122nd Avenue exit on NE Shaver Street. The overall site is approximately 17 acres and has a roughly rectangular boundary configuration. The site is currently developed as the existing Parkrose Middle School facility and includes the school building, associated parking and roads, playfields, and landscaping.

The construction of the new middle school will need to occur in phases. The first phase will involve the construction of the new building. The design for the new middle school building has been configured on the site to allow the existing middle school building to remain in operation during the construction. Once the new middle school is close to completion, the existing middle school can be demolished and the second phase will include the construction of new access roads, parking, and a new track/field facility.

The site is located in a predominantly residential area. NE Shaver Street is the main access right of way along the north edge of the site. There are also several public streets that dead end at the school site along the south boundary. The south roads will not be developed into vehicle access in the new school configuration. The following sections outline the site design elements for the development of the new primary school.

In general, the project consists of the design of a new 1,000 student middle school for Parkrose School District. Included in the development of the site design will be new parking areas for approximately 100 vehicles, and a bus loop sized for 2 shifts of 7 buses each.

Additional associated improvements include new utility extensions into the site, retaining wall systems to address site grading constraints and the construction of a new varsity baseball field on the south side of NE Shaver Street (across the street). NE Shaver Street is currently developed with curbs and sidewalks. Other than new driveways, right-of-way improvements are not anticipated.

Design Jurisdiction

Description

The site is currently within the City of Portland boundary and is considered to be within the City's design jurisdiction. The standard City of Portland development standards will apply to the site design. The following list summarizes the design development standards that will be used.

1. Parking/ Landscaping: City of Portland
2. Storm Drainage: City of Portland BES
   (DEQ UIC Program for Drywells)
3. Sanitary Sewer: City of Portland BES
4. Water Supply: City of Portland
5. Public Right-of-Way: City of Portland
6. Grading & Erosion Control: City of Portland

Cleaning and Demolition

Description

As described above, the site is currently developed and will ultimately require relatively extensive demolition of existing structures and site development.

Design Criteria

Site clearing and demolition will comply with City of Portland Code, including acquiring necessary demolition permits and approved haul routes. See the EROSION CONTROL section for discussion of site stabilization erosion control measures during demolition and earthwork activities.

Materials

A recycling program will be in place during demolition to reclaim appropriate materials. Grubbing topsoil volumes will be stockpiled and used as site topsoil in the new landscape schemes.

Site Grading and Earthwork

Description

The site has noticeable topography from one side to the other and there will need to be a significant amount of excavation and re-grading to accommodate the proposed building, parking areas, and landscaping. A geotechnical investigation has been performed to confirm existing site substrata and determine foundation requirements within these fill areas.

The report associated with the geotechnical investigation indicates that the site is generally underlain with competent native silts and stiff gravels. A preliminary take-off the earthwork quantities appears below.

Preliminary Earthwork Quantities

Activity	Cut Material (cy)	Fill Material (cy)
Phase 1 – New Building & Upper Field		
Topsoil Removal & Stockpile	4,000	
General Service Road Grading Cut	1,500	
General Service Road Grading Fill		1,500
Building Excavation	24,000	
Building Fill Material		12,500
Utility Spoils Material	3,000	
Footing Excavation Spoils	1,500	
Storm Drainage Spoils (DW & Bioswales)	1,000	
Waste Excess Soil @ Varsity Field (across street)		8,000
Waste Excess Soil @ Upper Field		9,000
Place Topsoil		4,000
Totals	***35,000***	***35,000***
Phase 2 – Track/Field & Parking Lot		
Topsoil Removal & Stockpile	2,000	
General Access Road Cut	1,000	
Track/Field Excavation	7,000	
Track/Field Fill		6,000
Parking Lot Fill		2,000
Storm Drainage Spoils (DW & Bioswales)	1,000	
Waste Excess Soil @ Upper Field		1,000
Topsoil Placement		1,000
Totals	***11,000***	***11,000***
Totals	***46,000***	***46,000***

Erosion Control

Description

Due to the size of the earthwork footprint and the extensive grading involved with the project, an extensive erosion control plan will be required to conform to City of Portland Bureau of Environmental Services (BES) requirements. This will include the following elements:

1. Silt fencing to protect existing and new slopes from runoff during construction.
2. Inlet protection filters on all catch basins and drains.
3. Compost blankets and stabilization seeding on all newly constructed earthwork slopes.
4. Straw mulch (minimum 3” thick) on all opened earthwork areas during construction.
5. Multiple biobag check dams on bioswales before entering storm systems.
6. Rocked truck entrance and wheel wash facility.
7. General silt fencing on all slopes around the site.
8. Plastic sheeting or seeding over stockpiled soil areas.

Design Criteria

The land-disturbing area for this project is significantly greater than 1 acre and normally an Oregon Department of Environmental Quality (DEQ) 1200-C Erosion Control permit would be required. This particular site, however, will incorporate on-site infiltration for all stormwater. There will be no offsite discharge to a public storm system or surface waters of the state. As such, a DEQ 1200C permit will not be required.

Materials

Erosion control materials including silt fencing, biobags, filter material, compost blankets, and protective rock will be designed to comply with City of Portland BES Best Management Practices (BMP's).

Parking and Paving

Description

The development of the new school will incorporate new circulation roads and parking areas. Per the applicable building code, approximately 100 parking spaces have been provided in the preliminary site layout design.

Site Development Areas

Site Area	New Impervious Areas (sf)	New Landscape Area (sf)
Parking	30,000	
Bus Loading	16,500	
Service/Circulation	55,500	
Roof Area	100,000	
Track	31,350	
Sport Court	9,100	
Tennis Courts (existing)	24,150	
Sidewalk/Plazas	45,000	
Stormwater Bioswales		18,750
Landscape Areas/Lawns		313,138
Football Field		95,000
Totals	**311,600 sf 7.2 acres)**	**65,000 sf (9.8 acres)**

Water Supply

Description

There is an existing public water main in NE Shaver Street along the north side of the site that currently supplies water to the existing school building. A new service is proposed into this existing water main at the northeast corner of the site for onsite domestic, fire, and irrigation water.

A new fire water line with backflow device is proposed that will loop around the building. Fire hydrants will be provided around the building for perimeter protection. Approximately five new hydrants are proposed to be installed on-site. A separate potable water line with a meter and backflow assembly will also be provided for the building domestic water supply. Once the new school is constructed, the existing school building and associated water connections will be demolished.

Design Criteria

The design of the water system will be in accordance with the City of Portland standards. The potable water system will be designed for a programmed student count of 1,000 students. This represents the same count as the existing building. Sizing of the new water supply will be determined based on a peak flow from calculated fixture counts, but a preliminary size of 3” line with a 2” meter has been estimated.

Materials

The materials of the water system will be in accordance with the Plumbing Specialties Code. PVC C-900 piping is proposed for the 8” fire water loop around the site and Schedule 40 PVC is proposed for the 3” potable line.

Sanitary Water

Description

There is an existing 8” public sanitary sewer line running under NE Shaver along the north side of the site. The existing school historically had an onsite sanitary drain field, but in recent years a connection to this public sanitary sewer was established.

A new sanitary sewer connection is proposed for the new school building. This will allow for the new school to be constructed while the existing school remains in operation. Once the new school is constructed, the existing school building and associated sanitary sewer connection will be demolished.

Design Criteria

The design of the sanitary system will be in accordance with the City of Portland standards. The sanitary sewer lateral will be designed for a programmed student count of 1,000 students. This represents the same count as the existing building. Sizing of the new water supply will be determined based on a peak flow from calculated fixture counts, but a preliminary size of 6” line has been estimated.

Materials

The materials of the sanitary system will be PVC piping with precast manholes.

Storm Drainage

Description

Stormwater runoff from the impervious areas of the site will be addressed in a number of ways. Stormwater from roof runoff and other impervious areas will be directly infiltrated onsite through the use of drywells. Runoff from paved areas will be treated with stormwater planters.

Design Criteria

The design of the storm system will be in accordance with the City of Portland Stormwater Management Manual. GHD met with Ed Mathews at City of Portland BES to review appropriate stormwater requirements for the site. At the time of this narrative, geotechnical infiltration testing had not yet been performed, but given the quantity of existing drywells currently on the site, infiltration is expected to be good.

The City will expect to see an approach to stormwater management that includes complete onsite infiltration of the 10-year design storm through the use of vegetated facilities (planters or bioswales) and/or drywells. Overland emergency flow routes will need to be incorporated into the design to allow for drainage of storm events beyond the 10-year design storm.

The proposed schematic design incorporates stormwater planters for all pavement runoff from roads and parking areas. Infiltration will be incorporated within the plants and in new drywells located around the site. Drywells will also be used for infiltration of roof runoff.

The design team has considered the use of the existing drywells around the site. In many cases, the dyrwell structure would have to be significantly altered because of the extensive grading proposed on the site. In addition the condition of the existing drywells is unknown and they would need to be tested. The current design is based on decommissioning the existing drywells and providing new facilities for the school.

Materials

The materials of the sanitary system will be in accordance with the City of Portland Stormwater Management Manual. Standard PVC piping will be used for storm drainage and precast manhole structures will be used for the drywells.

Subdrainage

Description

At the time of writing this narrative, the geotechnical work has not been completed. Based on preliminary information, however, it does not appear that ground water will be an issue. The soils may be difficult to work in wet weather, however, and significant drying operations may be needed in order to utilize excavated native material as structural fill.

Materials

Traditional perimeter footing drains will be installed on all exterior wall footings.

Landscape Narrative

The landscape site improvements related to the new replacement Middle School building include two areas. The first are the grounds surrounding the new building. The second is the site of the replacement baseball field north of NE Shaver across from the Middle School grounds.

School Site Improvements

Landscape related improvements on the school site include:

- Site grading;
- Retaining walls, generally running east west, taking up the grade in planting areas, as needed to accommodate the south to north down-sloping site;
- A new 400 meter track with natural turf sports field inside the track;
- (2) Half-court basketball areas paved in asphaltic-concrete (AC), with concrete seat walls and small gathering plaza east of the new track;
- ADA compliant portland cement concrete (concrete) routes from the new building to NE Shaver on the east and west sides of the track, concrete stairs down to the track, and stepped concrete seat-walls on the southern edge of the track;
- Additionally concrete and AC pavement are within the south court yard; for access around the building; to the parking; to the bus and parent pick-up and drop off areas; to replace the existing path up to the southeast corner of the property; and up to the grass multi-use area above and south of the building;
- A series of interconnected stepped concrete platforms are provided stepping up the slope at the southern edge of the south courtyard;
- Fencing and gates for the northern edge of the site to limit access to the track and services road; along the western and southern open edges of the courtyard nested by the southern wings of the building; and along the northern end of the eastern edge of the site to provide continuous fencing all along this area;
- Bicycle parking along the southern face of the west building wing;
- Basketball play/exercise area under the covered area in the south plaza;
- Landscape plantings including lawn areas, shrub and ground cover plantings; and storm water management area plantings throughout the site and in small planters within the sizeable areas of pedestrian paving;
- Landscape irrigation, to be supplied from the existing on site water well;
- Topsoil and amendments for lawn and other planting areas;
- Renovation of the existing tennis court fencing (fabric and posts as required);
- Steel handrails and guard rails along pavement edges as shown.

Site grades have been formed to provide for ADA compliant pedestrian circulation, mowable lawn slopes, and otherwise as needed to fit the building and surroundings into the site which has an elevation difference of over 50 feet from south to north across the site.

Site Slopes

Where grade differences between ‘pads’ is too great to provide suitable slopes retaining walls have been incorporated to take up the grades. At this time reinforced concrete is the presumed material for these retaining walls. As site design and detailing is refined, use of boulders and rock filled gabions may be incorporated to serve as retaining walls. The issues of cost, graffiti discouragement and eradication, and aesthetics will be factored to arrive at the final recommendations for wall materials.

Track

The new track is located immediately adjacent to NE Shaver. This is to replace the track which is being displaced by the construction of the new school building. This location of the track was selected to allow for the construction of the new building while the existing school still serves students. The track will be 400 meters in length. It is dimensioned to be longer and narrower that the typical track to provide more free space for required slopes

between the track and building-parking area ‘pads’. The track materials will be comprised of a compacted gravel sub-base, AC paving base, and resilient track surfacing coating.

East of the track an area of pavement will be provided on both sides of the eastern walk connecting the Middle School to the street. The eastern area will be AC paved, have basketball hoops, and striping for (2) half courts for Physical Education (PE) and recreational play. Along the western edge of the courts a low concrete wall is provide for seating and accommodation of the grade differences between the walk and courts. West of the walk is an expanded are of concrete paving where PE classes can gather before taking to the track and sports field for instruction and play.

The form and dimension of the track are designed to accommodate a soccer and American football field, with buffer area, within the track’s inside edge. This too is to replace the existing field area displaced by construction of the new building.

Pedestrian Areas

Pedestrian pavement areas are provided for access, waiting, gathering, and recreation around the site. Where recreational games (e.g. basketball) are planned, AC paving is indicated because of its uninterrupted smoothness providing a superior surfacing for these uses. Concrete is provided for all other areas because its longevity and the variety of possible surface textures allowing for better slip resistance. This latter quality is especially important at this site where the cold east winds can bring about icy conditions frequently and often.

Except in one location, grades along walk have been kept at or below 1 foot (vertical) to 20 feet (horizontal) to attain compliance with ADA accessibility requirements without the provision of hand rails. Handrails are both costly and unattractive nuisances and are best avoided. Additionally, these shallower slopes are preferred in locations, such as this site, where ice can make steeper walks very problematic. In all locations cross slopes are kept at or below 2% to assure ADA compliance.

Concrete steps with handrails are provided on the southern edge of the track to provide a ‘shorter’ route from the school building to the track. The stairway is designed with only short runs of stairs and handrails to minimize their attractiveness for undesirable uses (e.g. skate boarding). At the bottom of the stairs a series or stepped concrete seat walls are shown paralleling the track. These provide seating for classes and other users and spectators for the track and field.

At the southern edge of the plaza an interconnected arrangement of concrete ‘platforms’ are provided for gathering, socialization, and movement. Adjacent platforms vary in elevation (12, 18, 24, and 29 inches). This provides for a wide variety of seating and forms for gathering as well as energy absorbing movement. An access ramp at the west end of this assembly provides for ADA access to the varying platform heights. This stepped assembly, in addition to providing for a variety of activities, also serves as an interesting form at this end of the plaza and provides for accommodation of the up-sloping hillside without having to resort to an overly tall retaining wall.

The finish of the walls and these stepped areas will be detailed to provide for minimum maintenance, ease of graffiti removal, to be comfortable, and aesthetically pleasing for desired users, while discouraging to undesired users.

Fencing

Two types of new fencing are to be provided for the site. Along the southern and western edges of the track and then across to the eastern property line a 4 foot tall metal picket fence is to be provided. Where this alignment crosses the new access road along the eastern property line, a double swinging gate will be provided. This will be an automated gate which will be opened by card access. This relatively low fence is meant to prevent unauthorized vehicle access to the playing field and eastern edge of the property in a manner which is visually ‘friendly’.

This same type of fencing, at a height of 6 feet, is to be provided to close off access to the plaza area on the south side of the building. Double swing gates will be provided along the western edge of this fence to allow for fire and service vehicle access.

New chain link fencing will be provided in only two areas. The first will be along the eastern property line, at the northern end, to provide full fencing all along this edge.

The second will be at the existing tennis courts. The existing fence fabric has no vestige of galvanized coating and all the wire surfaces are rust coated. While most appear to retain the required strength, time and weathering will eventually lead to failure of the fence fabric. Replacement of the fabric would be most cost effectively done as part of this improvement package. The posts for the fencing appear to be sound, but further detailed examination needs to be done to assure their longevity. A negative evaluation of the posts will lead to a recommendation of their replacement along with the replacement of the fence fabric.

The current tennis court surface shows no defects and this design does not include resurfacing of the courts. The concrete and wood capped walls along the edges of the courts do have some cracks, but appear to be structurally adequate. Surface cleaning and repainting will be part of the improvement recommendations. More involved work on these walls will only be included if new fence posts and footing are required and only to the extent that the walls are impacted by this work.

Bicycles

Bike racks for (72) bicycle parking spaces, as required by the City, are to be provided along the southern edge of the west wing. The building roof will be extended to provide for coverage of 50% of the racks are required. Inverted ‘U’ shaped galvanized steel pipe will be provided as racks for securing the bikes. A lockable fence enclosure around the racks will be discussed with the District.

Basketball hoops affixed to the building wall will be provided under the roof covering in the south plaza. AC paving and stripping will be provided for the hoops.

Planting

Lawn will provide for the majority of coverage for planting areas on the site. Site grading has been designed to maintain a maximum slope of 1 (vertical) to 4 (horizontal) to accommodate lawn in the majority of the newly graded site areas.

All new lawn areas will have rock free amended topsoil provided to a depth of at least 6 inches. The lawn covering the sports field inside the track will have rock free amended topsoil provided to a depth of at least 12 inches. This field area will also be provided with a system of sub-grade drains to maximize utility of this key area.

All non-lawn planting areas will have a 4 inch deep layer of organic amendment provided and tilled into the top 8-10 inches of soil.

Use of rain water as a ‘resource’ and the City requirement that rain water from 100% of the 10 year rain storm event be kept on site makes utilizing site planting areas for storm water management an important part of the project design. Storm water areas will be provided in such a manner that they will be efficient to maintain, add dynamic character, interest, utilitarian function, and positive aesthetic element to the site’s landscapes. Near the building rain water channeled to fall from roof tops and surface water running from pavements will be directed into storm water ‘gardens’.

Planting areas not used for direct storm management and not suitable for lawn will be covered by a combination of trees, shrubs, and ground covers. Plant selection and design will emphasize minimization of irrigation and maintenance and maximization of aesthetics during the time schools are in session.

Planting for property edges, along street frontages, and in parking lots will be provided as needed to comply with all relevant City codes.

Irrigation

Underground pop-up irrigation will be provided for sports field and other actively used lawn areas. This is necessary to allow the grass to hold up to heavy use and to provide a safe playing surface. Irrigation for other lawns will be provided as needed to establish full lawn covering. Shrubs, ground covers, and storm water management area plants with minimal requirements for watering will be specified. Means for watering to establish these plants will be provided as appropriate.

Some shrub and ground cover beds, in areas near the building will be provided with underground pop-up irrigation for establishment and long term growth and health. This latter category of planting area will be very limited.

The existing irrigation well and pump have not been tested for volume and pressure for quite some time. At present there are no records of the results neither of past testing nor of current production. The well and pumping system will be tested to determine adequacy for meeting expected irrigation demand.

Baseball Site Improvements

The new building will occupy the location of an existing ball field. Early examination of the site determined providing a replacement field on the school site would be overly costly, would lead to an undersized field, would require the loss / demolition of at least (2) of the existing tennis courts, would not be in a conveniently accessible location, and would lead to safety and security complications in adjacent areas of the site. Just north of the Middle School site there is a large open lawn area on the High School property which receives very little use. This site is large enough to accommodate a much larger baseball field, at a lower cost, and with only minor complications.

The work on this site related to the new replacement baseball field includes:

- Removal of the western most strip of parking stalls from the parking lot to the east;
- Site grading to provide a properly sloping infield, outfield, and adjacent spectator and dugout areas;
- Fencing for the backstop, baseline, and outfield fences;
- Dugouts with metal roofs and chain link fenced sides;
- Bull pens with synthetic turf covering and chain link sides;
- AC paving for access to the ball fields and around the backstop area;
- Special soils for skinned portions of the baseball field;
- Topsoil and amendments for lawn areas;
- Lawn planting within and around the edges of the field;
- Tree planting to replace existing trees removed by this work;
- Irrigation, supplied by the on-site pump and well.

The parking area to the east of the site has an excess of parking stalls. Removal of the westerly most line of stalls will allow for the baseball field to be located further to the east, providing adequate center field distance.
The site currently slopes down from south to north at a relatively shallow grade, but one which is greater than is suitable for the relatively flat infield and shallowly sloping outfield of a baseball field. The required site grading for

the new Middle School building will result in an excess of excavated soil. Utilizing this soil to re-contour the area of the ball field, along with grading of the ball field site will allow for a cost savings to the project while providing an suitable replacement field.

The new field will be set well north of NE Shaver Street and to the south and east of the tennis courts to assure the field fits with these adjacent uses.

Ball field fencing will be provided to further contain activities and prevent interference with adjacent uses. 35 foot tall chain link and netting fencing will be provided all along the left field fence, down 2/3s of the right field fence, and along the mid-portion of the outfield fence. 8 foot and 10 foot tall chain link fencing will be provided around the remainder of the field to prevent access and as needed to comply with current safety standards.

Dugouts will be provided with chain link sides and gates. Metal roofing will be provided for cover. This will provide for safe, secure, and durable dugouts for the field.

Fenced bull pen areas will be provided with synthetic turf surfacing. This will provide a durable surface mimicking the playing field, but without the need for maintaining live turf.

AC paving will be provided to and around the backstop and dugout areas. This will provide a durable surface for players and spectators which will also meet accessibility requirements.

The special sand-silt-clay soil mixture developed specifically for ball fields, and available in nearby Troutdale, will be called for covering the pitcher's mound, home plate area, base lines, and other portions of the dirt (skinned) infield. This material will be provided in a 8"-10" deep layer covering these areas. Additionally, ball field clay brick will be called for on the pitcher's mound and home plate area.

Lawn will be planted within the field and in the surrounding areas to provide for the required playing surface an covering over areas disturbed by construction. The need to sub-grade drainage will be reviewed and it will be provided where suitable.

The construction of the ball field will require removal of a number of existing trees. New trees are to be installed to meet the City requirements for mitigation of the removal of existing trees. Evergreen trees will be used as replacements. These will serve as wind screens, when mature help to control foul balls, and not drop leaves which will blow onto the field and surrounding lawns.

Underground / pop-up irrigation will be provided to water the playing field areas. Irrigation mainline with quick couplers will be provided around the perimeter for establishment of lawn cover beyond the field. Water for this irrigation is planned to be supplied from the existing site irrigation well. During this year's irrigation season site irrigation supplied by this well will be carefully evaluated to verify it is adequate for this area too. The additional watering requirements for the new soccer field at the north east corner of the High School property is a new factor which has yet to be evaluated. This summer the pump and well will be evaluated to verify there is adequate capacity to provide for the old and recently new fields as well as the additional capacity to provide for this proposed baseball field.

As noted on the Landscape Site Plan, there is an existing "Peace Labyrinth", comprised of pavers and other surface materials which will need to be relocated. The process and other requirements for this move will be evaluated and clarified in the next phase of the project.

Structural

Introduction

Parkrose Middle School is located in NE Portland near the intersection of NE Shaver Street and NE 122nd Avenue. The existing middle school is to be torn down and replaced by a new middle school.

Code and Standards

The 2010 Oregon Structural Specialty Code (OSSC) will be the governing design document for the structural and non-structural components of this project. The following reference documents shall also be used:

- Concrete Design – Building Code Requirements for Structural Concrete (ACI 318)
- Steel Design – AISC Steel Construction Manual, 13th Ed.
- Building Loads – Minimum Design Loads for Buildings and other Structures (ASCE 7)
- Masonry Components – Building Code Requirements and Specification for Masonry Structures (TMS 402-08/ ACI 530-08/ASCE 5-08)

Design Criteria

The following design criteria shall be used for this project:

General Loading

Classrooms	40 psf
Office	50 psf
Lobbies and First Floor Corridors	100 psf
Corridors above First Floor	80 psf
Storage Areas	125 psf
Common Areas	100 psf
Snow Loading	25 psf + drift
Soil Bearing Pressure	1500 psf (increase 500 psf for short term loading)

Lateral Loading

Wind load effects on the structure as a whole and on individual elements will be considered with recognition of its variation over the height of the building and orientation to the wind.

Wind loading criteria are as follows:

- Wind Speed = 95 mph (3-second gust), Exposure B
- I = Wind Importance Factor = 1.15

Earthquake design will be based on the following:

- Occupancy Category III, I = Importance Factor = 1.25
- Seismic Design Category D
- Site Class D
- Site Specific Spectral Response Accelerations Ss = 0.934 S1 = 0.321
- Design Spectral Response Accelerations SDS = 0.701, SD1 = 0.376

Structural Systems Description

General

The Parkrose Middle School will be a 140,000 square foot structure with two two-story classroom wings, a single story Art and Technology area, a single story Commons and Kitchen area and a single story Gym and Auxiliary Gym. The structure will be steel framed in combination with CMU bearing walls and founded on conventional concrete spread footings.

Classroom Wings

The classroom wings will be steel framed with concrete over metal deck on the second floor and metal deck at the roof. The roof deck will be supported by wide flange beams at approximately 8 feet on center and steel wide flange girders. In addition to the main roof, there is a pop up roof that will be framed by posting up off the main roof framing members. The pop up roof will also be framed with wide flange beams.

The second floor will be a composite slab consisting of 3 inches of concrete over a 3-inch metal deck. The composite slab will be supported by steel wide flange beams and girders. The beams and girders will be supported by tube steel columns. At the northern most classroom wing there will be an 8,000 square foot basement. The basement walls will be 10” cast in place concrete and the floor construction will be similar to the second floor. The ground floor and basement will be a 4-inch reinforced slab-on-grade.

Lateral loads will be resisted by 8” CMU shear walls supported on continuous wall footings. The classrooms will be seismically separated from the media center at the fire separation wall with a seismic joint.

Gymnasium/Commons/Cafeteria/Offices/Lobby and Media Center

The gymnasiums and kitchen/commons areas are tall, one-story, column free spaces. The roof will consist of metal roof deck supported by long spanning steel open web joists spaced at approximately 8 feet on center. There will be a long span custom steel truss separating the Main Gym from the Aux Gym which will support the long span open web joists. The roof joists will be supported by either 12”, solid grouted, CMU bearing walls or 12” carbon cast concrete panels at the perimeter. Several openings will be provided in the tops of these walls to provide daylight.

The roof above the locker rooms will have attic space to accommodate mechanical equipment. There will also be mechanical wells above the conference rooms and above the health areas adjacent to the main gym. The mechanical wells will consist of concrete over metal deck supported by wide flange members and tube steel columns.

Additional masonry shear walls will be provided separating the Commons and Kitchen as well as the PE Storage and The Auxiliary Gym. The walls at these areas will be 8” CMU. The ground floor will be a 4-inch reinforced slab-on-grade. Lateral loads will be resisted by the CMU or precast concrete shear walls. A seismic joint will be located at the fire separation wall at both the Main Gym and the Stage areas.

Foundation System

Based upon the preliminary geotechnical report provided by Earth Engineers Inc., dated March 12, 2012, conventional shallow footings will be used to support the structure. Foundations that bear on the existing upper fill soils and silty soils will have a reduced bearing capacity. Some footings may require over excavation and replacement with granular structural fill in order to control settlement.

Spread footings shall be located under all columns and continuous wall footings shall be placed under shear walls and load bearing walls. The slab on grade shall be a conventional 4” reinforced concrete slab that will be stepped or depressed as needed.

Exterior Walls

The exterior skin of the building is assumed to be a mix of brick veneer, metal panels, and glazing. The backup system for the skin will be light gage metal stud framing that is supported on the ground floor and runs past the second floor slab and roof. This framing shall be connected to the second floor and roof structure with vertical slotted clips. The brick veneer will be supported on the ground floor with steel lintels over windows.

Mechanical

HVAC Systems Options

VAV (Variable Air Volume):

Central air handlers located in mechanical lofts or on roof that serve variable air volume zone devices. The air handlers are ducted to each zone device (VAV box). Cooling is provided by central chiller system or air handler specific condensing units. Heating is provided from a central hot water boiler system that feeds the heating coils at the air handler and VAV zone devices. Displacement ventilation can be added to this system. Air side economizers are used at the air handlers and provide the ventilation air for occupants. If the central cooling plant is use a ground coupled heat pump system can also be added.

VRV (Variable Refrigerant Volume):

Individual heating and cooling fan coil units in each zone are connected via refrigerant piping to multiple outdoor heat pumps. Heat recovery between zones via the refrigerant fluid provides efficient operation. Dedicated ventilation air units with heat recovery provide some space heating and all the ventilation needs of the occupants. The heat source for the dedicated ventilation unit is gas fired boilers. There is no central chiller but rather combinations of outdoor heat pump units.

Chilled Beam:

Individual radiant heating and cooling panels (beams) are located in the ceilings of occupied areas. Each zone has a combination of panels. These panels are connected to the central heating and cooling plants. Heating is provided from a central hot water boiler system that feeds the heating coils at the panel to radiantly heat the space and occupants. The central chilled water plant provides the cooling water to each panel to cool each space. A ground coupled heat pump system can also be added to improve efficiency. Dedicated ventilation air units with heat recovery provide some space heating and all the ventilation needs of the occupants. The heat source for the dedicated ventilation unit is gas fired boilers.

Ground Source Heat Pump:

Two options exist for application of a ground coupled system.

The first is to pipe condensing water from central air handlers equipped with water cooled compressors to the ground loops installed in a well field. This condensing water well field acts as the heat sink for the building. These central air handlers would look like those used in a VAV option with the exception that the built-in compressor

would provide the central heating and cooling. There would still be a need for the same zone devices as the VAV system with the central boiler system. Displacement ventilation is an option with this type of system.

The second is to add to the central heating and cooling plant (boiler plant and chiller plant) a heat pump chiller. This chiller can provide either hot water or cold water for heating or cooling purposes. This water cooled chiller is then connected to the well field with the condensing water piping similar to that of the option above. The central heating and cooling plants would be reduced in size since they only need to operate when the heat pump chiller cannot carry the building load or there is a need for either heating water or cooling water when the heat pump chiller is operating in a set heating or cooling mode. The ground source heat pump in this configuration can be used with VAV systems or Chilled beam systems.

System Operation

Each classroom will have its own temperature control zone to maintain space temperature between 70 deg. F. to 75 deg. F. Digital controls will be used to operate the HVAC equipment. Ventilation air to each classroom will be provided at a rate to meet or exceed building code requirements. However, control strategies and equipment will be installed to monitor the volume of ventilation air and air quality of the spaces to reduce ventilation air to save energy but still provide a healthy learning environment.

Science classroom will be equipped with systems that allow 100% exhaust of the space when experimentation is taking place.

Computer classrooms will be equipped with HVAC systems that allow cooling of these spaces event if other classrooms on the same system are in heating mode.

The office area will have its own HVAC system to allow operation of this area without operating other portions of the school.

Gymnasiums will be provided with single zone air handler units with capacity control. The air volume will stage based on needs for cooling or heating in the space. The lockers will be conditioned by drawing air from the gyms and then exhausting through those spaces. The exhaust air will pass through an air-to-air heat exchanger to extract the energy of the exhaust air and use that energy to temper the ventilation air to the gym.

The cafeteria will be provided with single zone air handler units with capacity control. The air volume will stage based on needs for cooling or heating in the space. Heat recovery of the ventilation air may be used. The kitchen will be conditioned by a dedicated heating and cooling unit. Type I or II hoods will be provided at the kitchen depending on whether grease vapors are present in the exhaust of the appliance below the hood. Ducts and fans serving the Type I hoods will be rated for grease containing exhaust and will be designed to allow cleaning. The kitchen hoods will be provided with make-up air.

The indoor emergency generator will be provided with sufficient ventilation for cooling and combustion. The natural gas fuel source will be supplemented with a small on site propane storage tank to allow the generator to operate at least as long as required by code.

The elevator equipment room, MDF and IDF rooms will be provided with split system cooling units. These allow 24/7 cooling operation regardless of the operation of the central HVAC system.

Modifications to the HVAC system of the existing middle school will be made as required to allow partial demolition to coordinate with the new school construction.

Plumbing System

A separate domestic water heating system is proposed for the kitchen area, locker rooms and classroom wing. The systems will be made up of at least 2 condensing (high efficiency) gas fired tank style water heaters. Each system will be equipped with a mixing valve to control supply water temperatures to no more than 120 deg. F. The water stored in the water heaters will be 140 deg. F. Each system will have a means of maintaining the hot water so that wait times for hot water at each outlet is minimized. Hot and cold water will be distributed with a combination of copper and PEX piping.

Water closest and urinals will be low water consuming type fixtures equipped with flush valves. Faucets in the restrooms for students will be operated with automatic sensors.

Modifications to the plumbing system of the existing middle school will be made as required to allow partial demolition to coordinate with the new school construction.

Fire Protection

The entire building will be fire sprinkled with a NFPA 13 system. If the covered play structures are combustible construction a dry system will be used for protecting these areas.

Electrical

Project Description

The new replacement middle school will be located on the same site as the existing school. The building will be approximately 140,000 square feet consisting of two stories above grade and a ground level daylight basement. The construction will be phased to allow use of the existing school while new is being built. The project will be designed to meet LEED.

Electrical

Normal Power

Portland General Electric will serve power to the building via a utility pad mounted transformer located at grade adjacent to the building.

A 2000 Amp, 480Y/277 Volt, 3-phase, 4-wire service is proposed to serve the new middle school. The main distribution panel for the building will be located on the ground level of the building with direct egress door to the outside. The electric meter will be located on the exterior of the building to allow ease of utility meter reading without entering the building. Normal power loads will be segregated throughout the power distribution system into lighting, mechanical, kitchen and plugs. Lighting and mechanical equipment will be served from the 480Y/277 volt power distribution system. Step-down transformers will provide 208Y/120 volt, 3-phase, 4-wire to serve computers, receptacles, and other small loads. Electronic grade panels with integral surge suppression will serve sensitive computer and electronic loads.

Standby Generator Power

A standby generator system will be located inside the building on ground level. The generator system is estimated at 75kW. The generator will serve both emergency and other loads with two automatic transfer switches. Emergency loads include egress lights, exit signs, communications, security, fire alarm, and generator. Other loads will consist of kitchen walk-in refrigerator/freezer.

Photovoltaic Collector System

Potentially a 50kW photovoltaic collector system will be provided for the new middle school. The proposed system will utilize high performance photovoltaic panels mounted on the roof to directly convert the sun's energy into electricity.

Communications Raceways

A cable tray system will be provided throughout the hallways and corridors for routing of communication cables. The proposed cable tray system is a 24-inches wide by 4 inches deep steel wire basket type.

Junction boxes and empty conduits with pull strings to cable tray will be provided for all communication outlets, gymnasium sound system, cafeteria sound system and security system.

Conductors

Copper conductors in raceways will be provided for all feeder and branch circuiting. THHN/THWN stranded copper. In rooms with accessible T-bar ceilings, metal clad cables are proposed for the lighting and receptacles circuiting to accessible junction box near door.

Receptacles

Receptacles will be rated 20 ampere commercial grade and provided for rooms as follows:

- Receptacles will be provided for all finished areas, equipment rooms and attics.
- Receptacles will be provided in classrooms and circuited to share a minimum of four branch circuits.
- Receptacles will be provided in science classrooms and circuited to share a minimum of eight branch circuits with emergency power off pushbutton.
- Receptacles will be provided at all workstations.
- Ground fault circuit interrupter receptacles (GFCI) will be provided at restrooms, sinks, exterior, roof, kitchen and any other areas required by the NEC.
- Dedicated receptacles will be provided for large office equipment as required.
- Receptacles will be provided on racks and walls of all communication rooms.

Lighting

The lighting system will be designed to exceed requirements of the State of Oregon Energy Code. The proposed system will be at least 30-percent more efficient with strategic use of high efficiency lighting and energy savings lighting controls.

- Classrooms will be designed to have energy efficient fluorescent lighting with automatic occupancy sensors, photocell controlled continuous dimming and local wall switches for local override.
- Offices, small rooms and individual toilets will be designed with energy efficient fluorescent lighting and local wall mounted occupancy sensor with integral on/off controls.
- Corridor, hallways and toilets with be designed to have fluorescent lighting controlled by low voltage switching activated by the security system.
- Cafeteria and gymnasium spaces will be designed with high-bay fluorescent lighting with occupancy controls and wall mounted switches for local override controls.
- Stage will be designed to have a theatrical lighting and dimmer system.
- Exterior lighting and controls will be designed to meet the Illuminating Engineering Society of North America illumination guidelines and comply with local dark sky ordinances. Lights will have low voltage controls activated by photocell and integrated with the security system for turning on/off lights.
- The track field is not anticipated to have any sports lighting for even events.

Fire Detection and Alarm

Microprocessor based analog and addressable fire alarm system will be designed for the new middle school. Smoke detection will be provided in classrooms, corridors, public areas, storage rooms, electrical rooms, mechanical rooms and communication rooms. Audible and visual alarming devices will be provided throughout the building. Remote fire alarm annunciator panels will be provided at the main entrance and inside the main office.

Distribution Antenna System

An active distribution antenna system will be provided for the emergency radio coverage for the building in accordance with requirements of Oregon Fire Code Chapter 5 Section 510 Emergency Responder Radio Coverage in Buildings and Appendix J. Signal strengths in at least 95-percent of the building shall be -95dBm within the building and -100dBm outside the building.

Technology

Telecommunications Cabling System

All voice, data, paging, and security (video surveillance) systems shall utilize an Internet Protocol (IP) transport system on a universal structured cable system. Station cable shall be Category 6 balanced twisted pair. Individual cables (in quantities to be determined) shall be placed between Telecommunications Outlets (“TO”) and the closest Telecommunications Room (“TR”).

The main Equipment Room (“ER”) will be located just off the library (current location). A new twelve-strand 50/125m OM3 fiber optic cable will be placed between the ER and the existing Telecommunications Room (“TR”) in the south classroom wing. The existing copper tie cable will be retained.

A typical classroom will have two TO locations within the room. Locations designated as Computer Labs will have multiple TO locations for enhanced connectivity. Common areas and gymnasiums will typically have two or four TO locations. Media Center will have clusters with a multiple TO locations. Administrative areas will receive TOs at the rate of two per office or work area.

Wireless Access Points will be designed to prove one hundred percent coverage of the entire school as well as the immediate exterior to allow connectivity in while walking between buildings or in the playground areas. Wireless Access points will receive a single Category 6 cable.

A Telecommunications Outlet will be placed in the immediate vicinity of the HVAC control system allowing network access as well as a fall back dial-up connection for emergency and vendor access.

Main Equipment Room (ER)

The existing area (adjacent to the Library) may be repurposed as a part of this project. NIS will re-design the existing space to providing a secure and environmentally correct room. Specifically:

- Reconfigure existing to provide the southernmost +/- 8 feet of the existing room
- Wall off this space with a 3'0 door – swing out of the room
- Specify new lighting and power
- Finish three walls with painted ¾ inch plywood backboard
- Specify split system HVAC (Mitsubishi Mr. Slim or equal). The air conditioning unit shall serve only the ER and a thermostat to control the unit shall be located in the ER. The mechanical condensate piping shall be located away from racks and equipment and shall drain outside the ER. HVAC Design shall include an automatic restart to previous set points after a power outage.
- Specify uninterruptable power system (UPS) to support all active electronics in this room
- Reconfigure rack system to include additional rack and cable management
- All cable for the main building will terminate in this room

Telecommunication Racks

The ER shall contain two 19" x 7' freestanding telecommunications equipment rack for mounting patch panels, cable management and active electronic equipment such as routers and Ethernet switches. Racks shall be arranged side by side in a row to facilitate routing of cabling between patch panels and the networking equipment. The racks shall be ganged with 6" wide double – sided vertical management hardware placed between the racks and at the outside ends of the racks. Racks shall be placed in a manner that will allow a minimum of 3 feet of clearance from the front and rear mounting surfaces and on one side.

Ladder Tray

A ladder tray shall be installed across the racks and to the south wall. The ladder tray shall be a minimum of 12" wide. Ladder tray shall include a cable drop out accessory where cables exit tray. Ladder tray shall be secured to the top of the racks using mounting plates and J-bolts in accordance with manufacturer's instructions.

Telecommunications Room (TR)

The existing Telecommunications room in the south wing of the school may be repurposed for this project. It will require some modifications and the construction of a code compliant wall to separate this room from the adjacent storage space. The rack shall be repurposed with the addition of vertical cable management and ladder tray to provide seismic bracing as well as a cable transition path. Cable in the south wing will be run overhead and require additional surface mounted raceway to accommodate the distribution throughout the classroom areas.

Power Distribution

The ER and shall be equipped with a 120 volt, 30 amp dedicated circuit terminated in an NEMA 5-30 receptacle for the UPS.

The TRs and shall be equipped with a 120 volt, 20 amp dedicated circuit terminated in an NEMA 5-20 receptacle for the UPS.

Additional duplex convenience outlets shall be placed at 6-foot intervals around the perimeter of the room at 18 inches above the finished floor.

Both the ER and TR shall be equipped with a rack mounted Uninterruptible Power Supply (UPS). Manufacturer to be APC or similar units and incorporate network management allowing District staff to remotely monitor all UPS functions as well as remotely power-cycle the UPS. UPS shall be sized to accommodate projected equipment load with a fifty percent (50%) expansion factor.

Power distribution within the racks or cabinets shall be UL® listed commercial grade power distribution units (PDU) mounted vertical or horizontally to meet the Owners specific requirements. Units will be constructed with a metal case that allows bonding to the telecommunications rack assemblies and therefore to building system ground.

Audio Visual (A/V) Requirements

All classrooms appear to be equipped with projectors which utilize a short-throw application allowing near direct mounting of the projector to the viewing surface (Smart Boards). This project will specify new pathway (surface mounted) and control cabling for the projector will be routed to the immediate vicinity of the teacher's workstation and allow for interface of VGA, S-Video, USB, and HDMI inputs. Final configuration will be based on Parkrose School District's needs and expectations.

Design criteria will provide for each learning space to be equipped with sound reinforcement that amplifies the teacher's normal speaking voice. System will operate wirelessly and utilize free-space optics that provides complete coverage within a defined space without allowing interference from adjacent learning areas. Sound reinforcement will also accommodate input from video source to provide amplified presentation in all areas of the learning space. Output will be a minimum 20 watts of full range audio covering acoustic frequencies between 120 Hz to 13 kHz.

Intercom and Paging

Intercom and paging for Parkrose Middle School will be based on replacement of the Rauland system with an Internet Protocol (IP) based system that interfaces with the schools Local Area Network (LAN) as well as the Wide Area Network (WAN) supporting District wide connectivity. This will allow access and maintenance / updates to be controlled from the District office. This system may incorporate analog speakers that are clustered together in logical elements and driven from an IP based controller that ties back into the schools LAN. This configuration will provide granular addressing of speakers to allow the building zones to be tailored to programs and automatically configured to meet special assembly or emergency paging requirements.

Video Surveillance

Typical configuration places cameras at all entry points, parking lots, key exterior locations where additional monitoring is desired and interior locations where high value contents are concentrated such as computer labs or media centers. The video surveillance system will be IP based and employ high megapixel camera that balance of detail and overall system cost as such relates to storage devices.

Acoustical

This report is provided as a guideline for acoustical considerations in the design of engineering systems for this project. Designing to the recommendations herein will assure that there will be no acoustical problems with the layout, dimensioning and materials of these systems. Although strict adherence to all of the items is not necessarily expected, departure from one, or some of them, may require adherence to others.

Room Acoustics

- Control of the acoustics within occupied rooms for the project will involve primarily the use of acoustical ceiling and wall treatments in quantities and arrangements that should provide optimum room acoustics for the planned room use.
- Most rooms in the project (private offices, conference rooms, classrooms, etc.) are expected to include typical acoustical treatment in the form of suspended acoustical ceilings with mineral fiber ceiling tiles. Typically the suspended acoustical ceilings will be a cloud type (excluding the science rooms on the first floor).
- If LEED certification is desired, acoustic treatment equal to the square footage of the entire ceiling will be required to meet the acoustic prerequisites for LEED for Schools. In this situation, all classrooms and “core learning spaces” would need additional acoustic wall panels installed to compensate for the smaller square footage of the cloud ceilings.
- For the Choir classroom approximately 12 sq. ft. of floor area should be provided for each anticipated student. In addition, the typical minimum recommended ceiling height for a choir room is 14’ to 16’. In this area, a combination of fiberglass acoustical panels and sound diffusion panels will be installed on the walls and ceiling.
- For the Band classroom approximately 25 sq. ft. of floor area should be provided for each anticipated student. In addition, the typical minimum recommended ceiling height for a band room is 18’ to 25’. In this area, a combination of fiberglass acoustical panels and sound diffusion panels will be installed on the walls and ceiling.
- For the Commons/Stage, wood-type acoustic panels will be suspended from the ceiling. The suspended acoustic panels on the ceiling will typically be augmented by areas of fabric-wrapped or perforated/scored wood-type acoustical wall panels. Approximately 1750 square feet of acoustical panels (wall and ceiling) will be needed for the Commons and Stage.
- For the media center, suspended acoustic ceiling clouds will be installed. The suspended acoustic panels on the ceiling may be augmented by areas of fabric-wrapped or perforated/scored wood-type acoustical wall panels.

- The ceiling of the gymnasium will be acoustical metal decking. The acoustical metal deck will typically be augmented with areas of fabric-wrapped high impact acoustical wall panels. Approximately 1500 square feet of high impact acoustical wall panels will be needed on the walls of each gymnasium with a 3” acoustic metal deck.
- The lobbies and corridors will use either suspended acoustical tile systems or suspended wood-type acoustic ceiling panels.

Building Sound Isolation

- Sound isolation of occupied areas from either other occupied areas, or, building equipment and service areas will typically be provided using metal stud structure, gypsum board surfaces, and glass, or, mineral fiber insulation in stud cavities.
- Use of standard 24-26 gauge metal studs installed 24” on center, with insulation in the stud cavities, usually require only a single layer of 5/8” gypsum board on each side for classrooms, and 2 layers on one side for restrooms.
- Where heavy gauge (20 gauge or thicker), or, 16” on center spacing is required, additional layers of gypsum board, or, the use of resilient channels on one side of the stud will be required to achieve the same isolation as the standard gauge stud walls.
- The application of cushioned linoleum in lieu of bare concrete on the second floor classroom wing will help reduce footfall sound transfer to the classrooms below.
- Building sound isolation for the music room will require additional attention.
  - The walls in the music rooms should be either masonry wall construction #4 or drywall and 6” heavy gauge metal stud construction #2S.
  - The entry doors to the music room should be solid core metal doors with full perimeter seals, a removable center latching post and automatic bottom closures. Alternatively, an acoustically rated STC 43 double door assembly could be used.
  - The entry door to the administration suite across the hall should be a standard metal door with full perimeter seals and an automatic bottom closure.
- Any operable partition separating adjacent classrooms or the cafeteria from the gymnasium should have a minimum STC rating of 50.
- The walls surrounding quiet rooms will be composed of metal stud framing, batt insulation in the cavity and gypsum board on each side. In addition a furred out interior wall will provide an additional layer of reinforced gypsum board to address impact noises from students hitting the walls. The doors for these spaces will be solid core doors with full perimeter seals and automatic bottom closures.
- Typically, classroom floor/ceilings should provide a minimum laboratory Sound Transmission Class (STC) rating of 50. This can be achieved with 3” thick concrete topping over a 3” metal deck. This assumes a cloud ceiling in the space below.
- Typical classroom floor/ceiling assemblies should provide a minimum laboratory Impact Insulation Class (IIC) rating of 45 (preferably IIC 50). Providing only a laboratory IIC rating of 45 would result in impact sound being audible at times, especially when chairs are moved or when the students leave the classrooms as a group. This assumes a cloud ceiling in the space below.

- Carpeted floor finishes provide the most significant improvement in impact isolation when using standard construction practices. The anticipated laboratory IIC rating of the proposed structure (see items 2.8) with carpet would be IIC 65+. This is the preferred method of impact isolation control, and should always be used when frequent movement and/or “marching” (Pre-school activity classrooms) are located above other occupied spaces.
- For the Science Rooms where cushioned vinyl or another semi-resilient floor finish such as rubber or cork on the proposed structure (see items 2.8), the anticipated laboratory IIC rating would be IIC 47 to 51 (depending on material). At this rating, footfall sound will be reduced and muffled, but still faintly audible. This assumes that the first floor classroom ceilings (below the science rooms) would cover the entire ceiling, as opposed to cloud ceilings as designed in the other classrooms beneath carpeted second floor classrooms.

Building Equipment Noise and Vibration Control

- Large rooftop mechanical equipment (packaged units, air handlers, etc.) should be installed over unoccupied spaces, or service areas. If installed over classrooms, or, core learning spaces, application of concrete slabs beneath and around the equipment may be required for adequate control of noise radiating through the roof.
- In addition to 3.1, roof penetrations for duct over core learning and office areas should be sealed. The ducts may require wrapping, or, enclosure of the main duct for a determined distance out from the penetration.
- Supply-air and return-air noise traveling down the ducts from primary fans and terminal units will be controlled by applying appropriate lengths of internally-lined duct, and, possibly, pre-manufactured duct silencers.
- For the music rooms, duct silencers will be used at all duct penetrations of the perimeter walls.
- No ductless return systems are anticipated on this project. If return-air plenums are used, transfer ducts will be internally lined with appropriate lengths and bends.
- Supply-air diffusers and return-air grilles will be selected for acceptable noise generation, as well as airflow.
- Vibrating equipment (fans, pumps, compressors, etc.) will be supported on vibration isolation mounts appropriately selected for the location and application.
- Screening of rooftop mechanical equipment located near windows may be required.

Kitchen

Introduction

The Food Service Program will support the Parkrose Replacement Middle School maximum population of 1,000 student's grades 6-8. The Kitchen will not satellite to other schools in the District.

Design Overview

- The Kitchen will be designed to support a breakfast and lunch program staffed with seven employees.
- The menu will focus on healthy choices and will be accompanied with fresh fruits, vegetables, milk, and juice. The current operation accommodates five lunch periods serving on average 500 lunches per day.
- The current breakfast program is very successful with 85% participation and will be continued. Space will be required to support the red delivery carts, cases of cereal, crate assembly, and refrigerated milk coolers. 30 carts deliver breakfast to each room by students every morning.
- Deliveries will be brought directly into the kitchen from the adjacent receiving corridor. A covered receiving dock will help to keep deliveries dry during inclement weather.
- Dry and cold storage rooms will be located within the kitchen with easy access to the receiving area. Storage shelving shall be a combination of the adjustable open wire type and dunnage racks. Remote refrigeration condensing units will be located on the roof or inside a secured service area on grade.
- The existing walk-in freezer was installed within the last couple years and should be relocated to the new Kitchen. The walk-in cooler will be new and if possible larger than what they have now. 900 cartons of milk are served for breakfast alone every day. Milk delivery and storage shall be reviewed in more detail to ensure adequate inventory storage.
- On-site prep will be required supported by work tables and sinks with indirect wastes.
- Meals will be prepared for a cook to serve operation. The Kitchen is self-supporting and prepares hot entrees daily served along with fruit, vegetables, and milk.
- Cooking equipment will support scratch cooking. Natural gas is available and preferred for the cooking equipment. A Type 1 Grease exhaust hood will cover the line-up. There is some existing cooking equipment which shall be reviewed for potential re-use if feasible. Work tables, preparation sinks, and hand sinks will support the various work stations.
- Students will be served on either compostable or plastic trays. A modular serving line will allow for future flexibility. Students will have access to a variety of hot and cold entrees, sandwich bars, self-serve refrigerated milk coolers, and self-serve cold variety bars with veggies and fruits. Controlled entry and exit points will be carefully considered. An Ala Carte Station attached to the Servery will allow for quick purchase menu items.
- Mobile double-sided cashier stations will allow for efficient processing with student key pads.
- Self bussing will be encouraged via recycling/waste receptacles and a tray return window. Warewashing will consist of dishtables, waste collector with spray rinse, an automated warewasher with 180 degree hot water rinse cycle, and triple potwashing sinks.

- Whenever possible equipment shall be made portable. Those items with closed bodies shall be set on raised bases. Open base equipment shall be made with tubular stainless steel legs sets with adjustable bullet-shaped feet or casters.
- Equipment shall conform to all local and national codes. All items shall be designed to National Sanitation Foundation Standards. Wherever possible Energy Star energy efficient equipment will be specified. Working surfaces and cabinet bases shall be stainless steel, polyethylene, and/or plastic laminate.
- The Kitchen Manager's office shall be located in the kitchen with provisions for phone and data lines.
- Staff lockers will be provided.

Finishes

- Kitchen finishes are to be smooth, washable, and light in color. Recommended flooring material is quarry tile or a heat welded seamless industrial strength vinyl with abrasive and integral cove base. A suspended ceiling with mylar coated tiles for easy cleaning shall be used. Recommended wall finish is a washable wall board wainscot material, i.e.: FRP, up to 6 feet high with a semi-gloss painted wall surface continuing up to the ceiling.
- Stainless steel wall flashing will cover the cooking line wall surface and stainless steel corner/channel guards will protect exposed wall corners and partial height walls within the Kitchen and Serving areas.

Roof

Design Overview

Professional Roof Consultants, Inc. (PRC) has reviewed the schematic level concept modeling and understands the project to be constructed with a roof support structure of steel framing with a steel roof deck providing structural slope to drain at a code minimum of ¼" per foot. The school resides within a special wind region with wind design of 100mph and surface roughness category B. The roof decks are to receive rigid R-30 rigid insulation on top of the metal decking which eliminates the need for passive venting, however vapor barriers should be provided for at all compartmentalized structures which may experience periods of elevated moisture levels. The majority of the roof areas are anticipated to be low slope, although the roof shape over the Auxillary Gym at the south end of the school is moderately sloped at approximately 2:12 to address aesthetic concerns of the residential neighbor view. Most other roof areas are elevated or sloped away from the neighbors to the south reducing the concern for aesthetics a bit.

Low Sloped Roofs

For all low sloped roof areas the rigid insulation should be mechanically attached with a least one layer of insulation adhered over top to improve thermal efficiency by reducing bridging via the fasteners and compartmentalize the potential for airflow and vapor drive through the assembly. An overlay board of nonorganic material should also be adhered to improve roof system durability and achieve a UL Class A fire rating; to which a roof membrane should be fully adhered. By virtue of adhesion, air spaces are eliminated which further reduces air flow and most importantly vapor drive which greatly reduces the potential for condensation on the bottom side of the roof membrane.

Of possible membranes, two best choices exist which include asphaltic built-up membranes that offer long term durability and predicable performance, and single ply membranes of which at PVC is preferred. Built-up roof

membranes by their nature are redundant and substantial, which for new construction and given the multilevel roof design will be a suitable surface for other trades to store cladding materials and stage installation reducing the risk to the District of a shortened roof life from construction activities. While PVC and white single ply membranes have an energy star rated solar reflectance, surfacings for built-up roofs meeting this standard can be met if this goal is desirable. PVC offers the best long term and most sustainable single ply option as the material remains weldable throughout its service life, has a more predictable service life, and is recyclable, unlike TPO. Based on the potential for performance risk, an asphalt built-up roof membrane is the best option and will also produce the best return on investment in terms of lifetime performance, maintenance requirements, and over all service life.

Metal Roof

The steeper sloped roof area at the south, for which a metal panel roof system is planned, does not exceed the design limitations of a hydrostatic system, which is essentially a system that is designed to be watertight given the low slope configuration. As the rafter lengths vary on a per facet basis, the slopes will vary from the anticipated 2:12; however the metal panels will provide appropriate weather protection and fire rating with the anticipated slope ranges. As this system is to be installed over locker rooms and showers, a vapor barrier should be provided on the warm side of the insulation assembly. Several steeper sloped shed style roof areas at the south end of the school that are pitched to the north may also accept metal panels and based on the visibility from within the school would benefit from improved aesthetics.

Entry Canopy Green Roof

The entrance canopy roof structure is shown in a dead flat configuration which provides a low profile appearance, and this roof is particularly visible from classroom areas. Drainage and slope configuration may detract from the appearance of the canopy and are yet to be resolved. If a dead flat appearance is desirable, this can be accommodated with various types of roofing or waterproofing membranes however to control the distasteful look of ponding water and moss growth, a garden roof may be considered. Roofs do not have to have a minimum ¼” per foot slope and can be designed for water accumulation in accordance with Section 1611.2 of the Oregon Structural Specialty Code. Other one story roof areas on the south end of the school could be considered for the garden roof option to improve aesthetics; however they do not have the same low risk of damage due to leaks as the canopy area.

Fall Protection

Fall protection systems and methods should be provided for, with fall prevention methods such as perimeter guardrails being the most effective for all users but often not pleasing to the eye, to personal protection equipment tie offs which are less obtrusive but harder to employ being considered.

Upper most roof areas which offer the largest least obstructed surface areas should be considered for photovoltaic equipment installation. Both thin film and crystalline systems can be employed without difficulty.