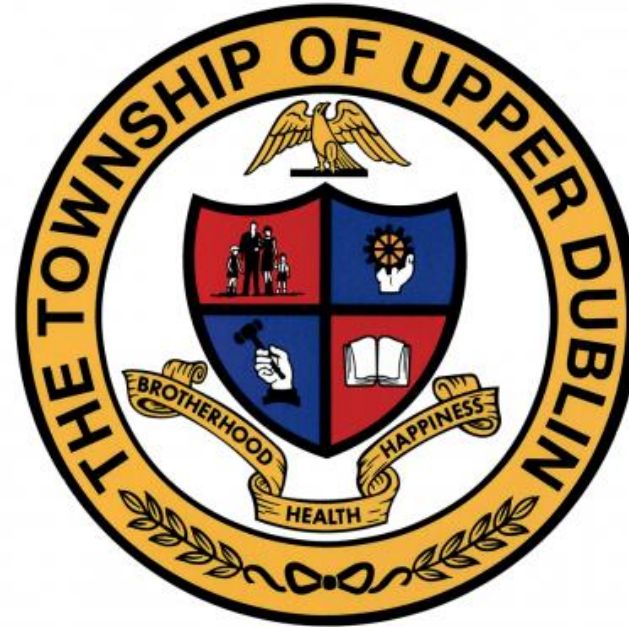
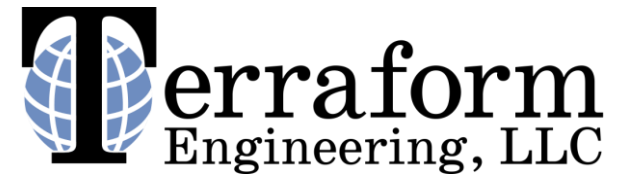


PRESENTATION TO THE BOARD OF
COMMISSIONERS

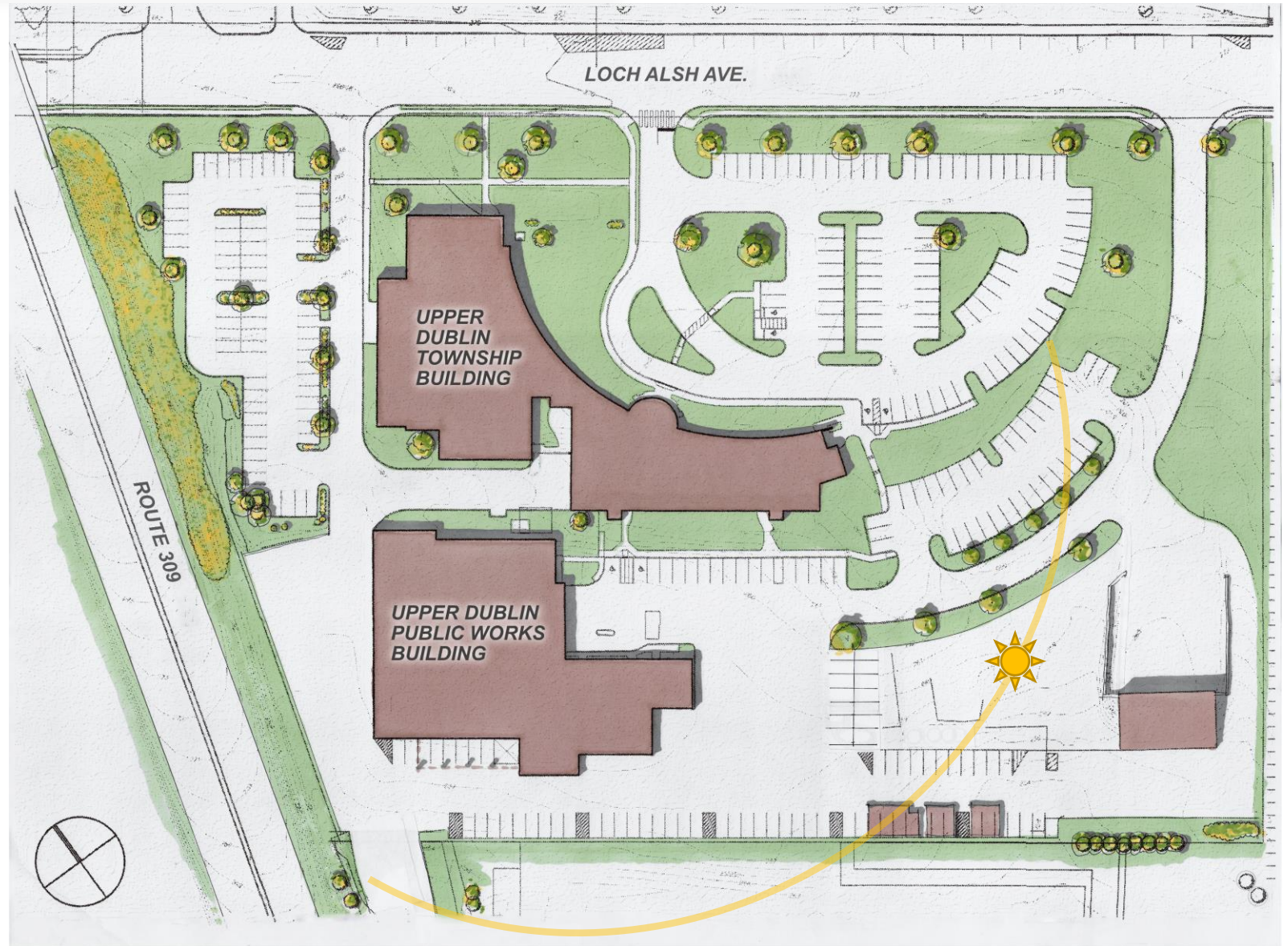


March 14, 2023



EXISTING SITE

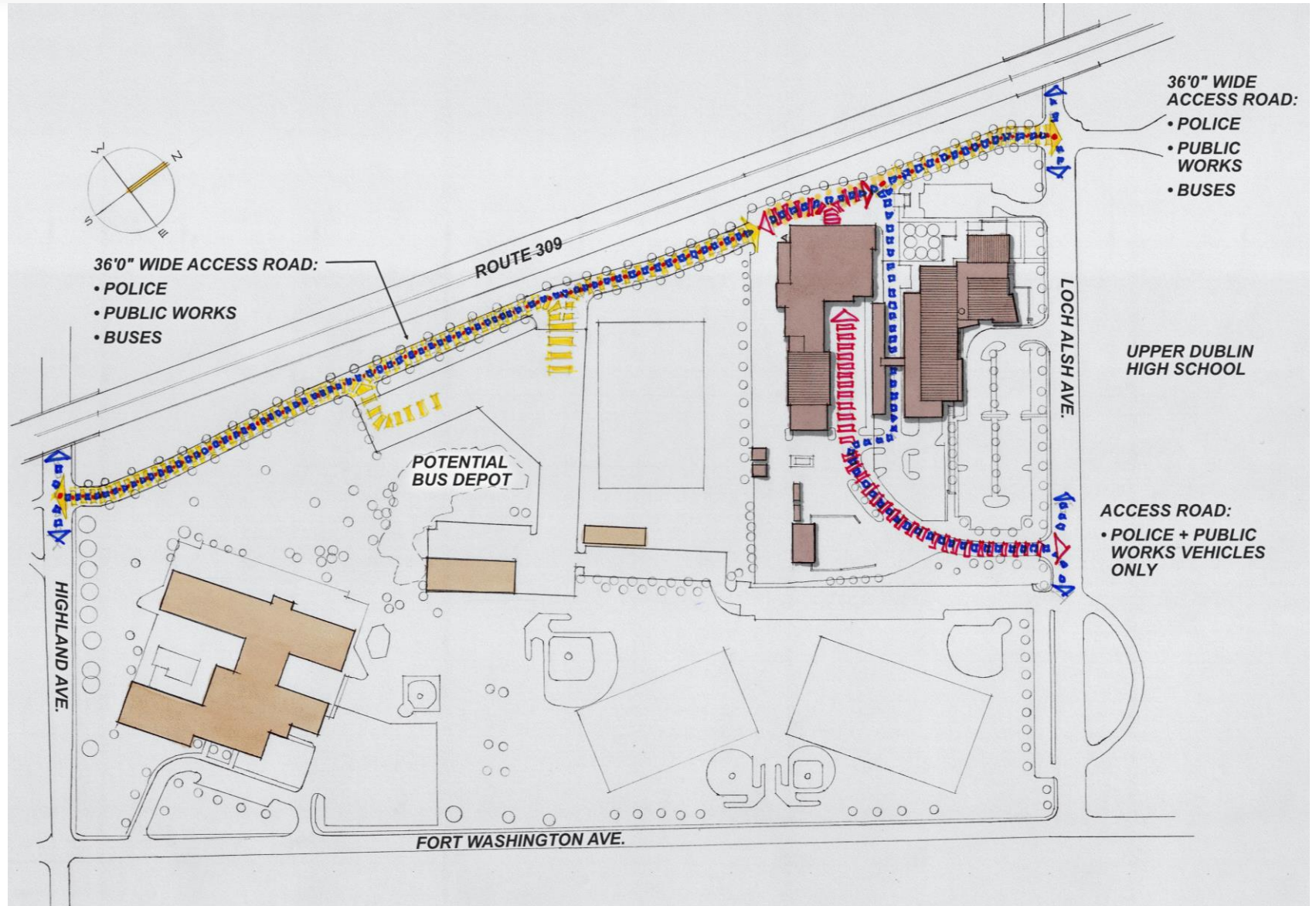
- Site entry points off Loch Alsh Ave.
- Terraced Topography
- Upper-Level public parking lot
- 2-story Township Building with public entry on Upper floor
- Police on Lower-Level
- Public parking to the West serves the lower-level
- Public Works facility



PROPOSED SITE PLAN CONCEPT

Site Plan Overview:

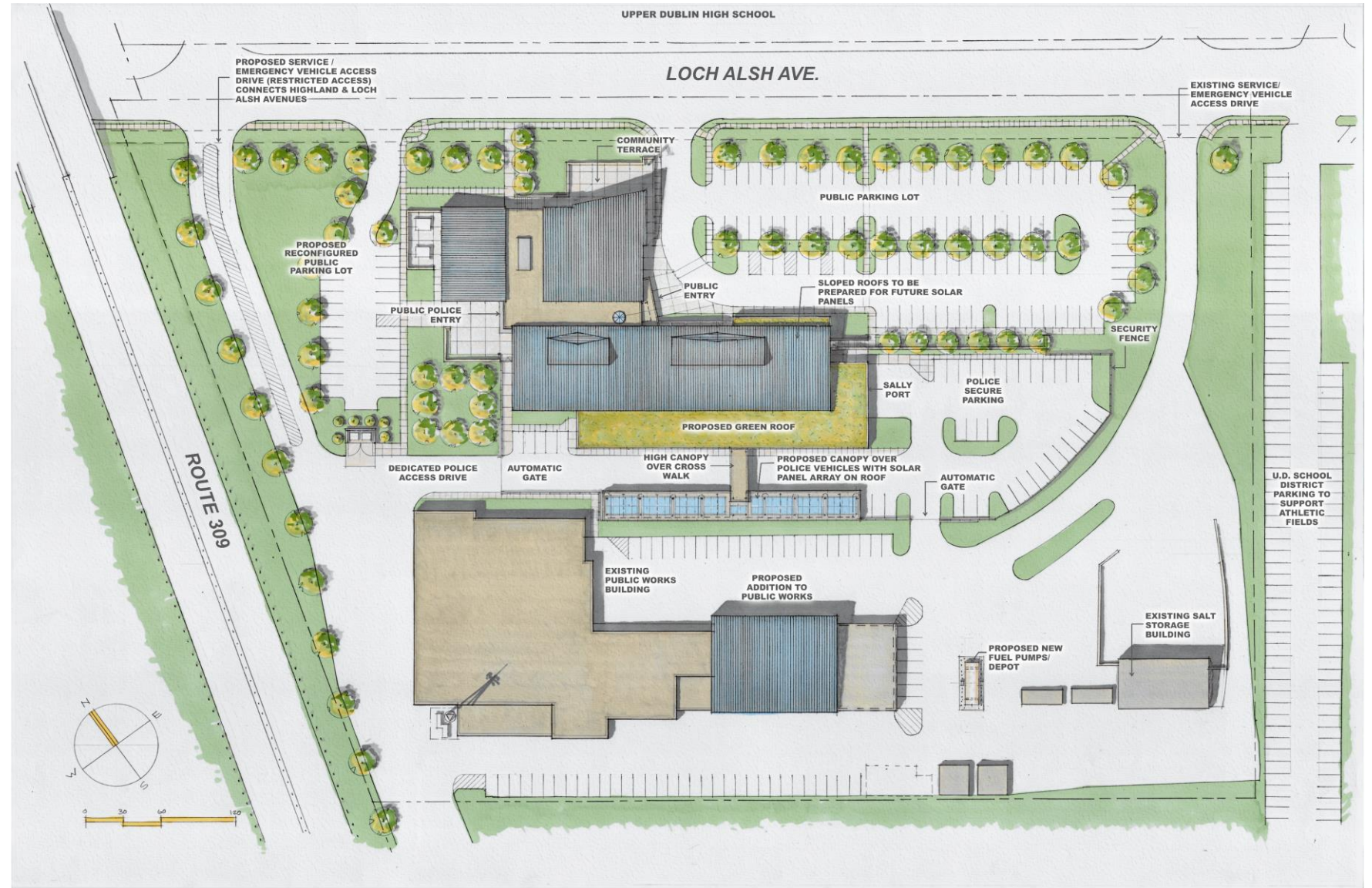
- Proposed extension and widening of Access Drive to connect Loch Alsh Ave. to Highland Ave.
 - for Police, Public Works and potentially School Bus use only
 - no public thoroughfare
- Dedicated drives for Police, Public Works and Bus traffic to the main Access Road



PROPOSED SITE PLAN CONCEPT

Site Plan:

- Secure parking for the Police
- Building and community terrace closer to Loch Alsh Avenue
- 180-190 parking spaces accommodated (not including Public Works parking)
- Township Functions on Upper Level
 - Visitor parking on East Lot
- Police Functions on Lower Level
 - Visitor parking on West Lot
 - Separate traffic flow for Police
 - Secure Police Compound
- South/SW Orientation
- Site plan integrates with existing grading
 - Reduced Site-work costs

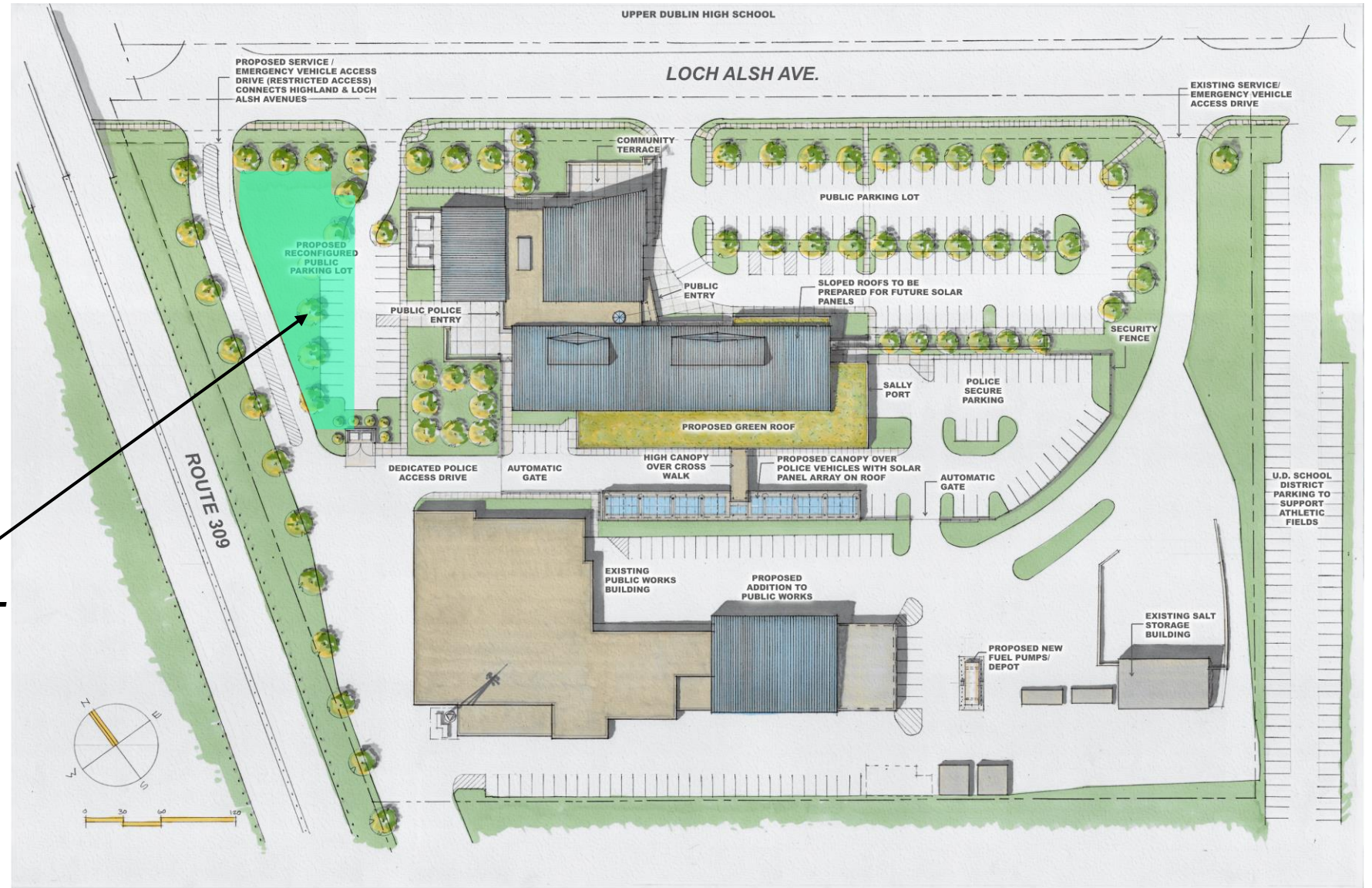


PROPOSED SITE PLAN CONCEPT

Site Plan:

- Complies with Zoning Ordinances including parking needs and setbacks
- Existing driveway locations/ topographic elevations retained
- Allowance for Storm Water (underground piping) and possible Geothermal Well Field
- Existing utility line locations have been considered

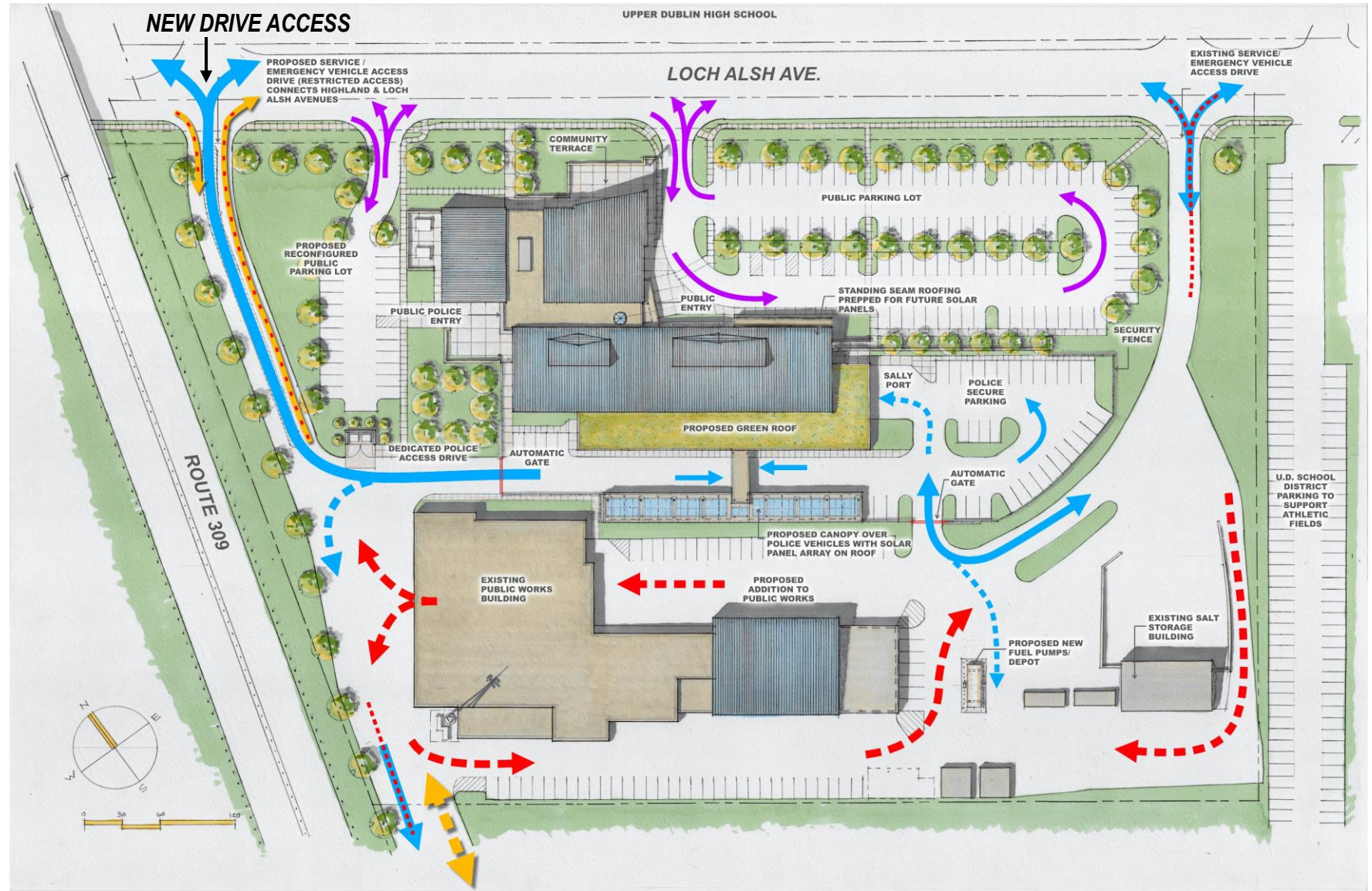
POTENTIAL GEOTHERMAL WELL FIELD LOCATION



PROPOSED SITE PLAN CONCEPT

Site Plan Layout Review:

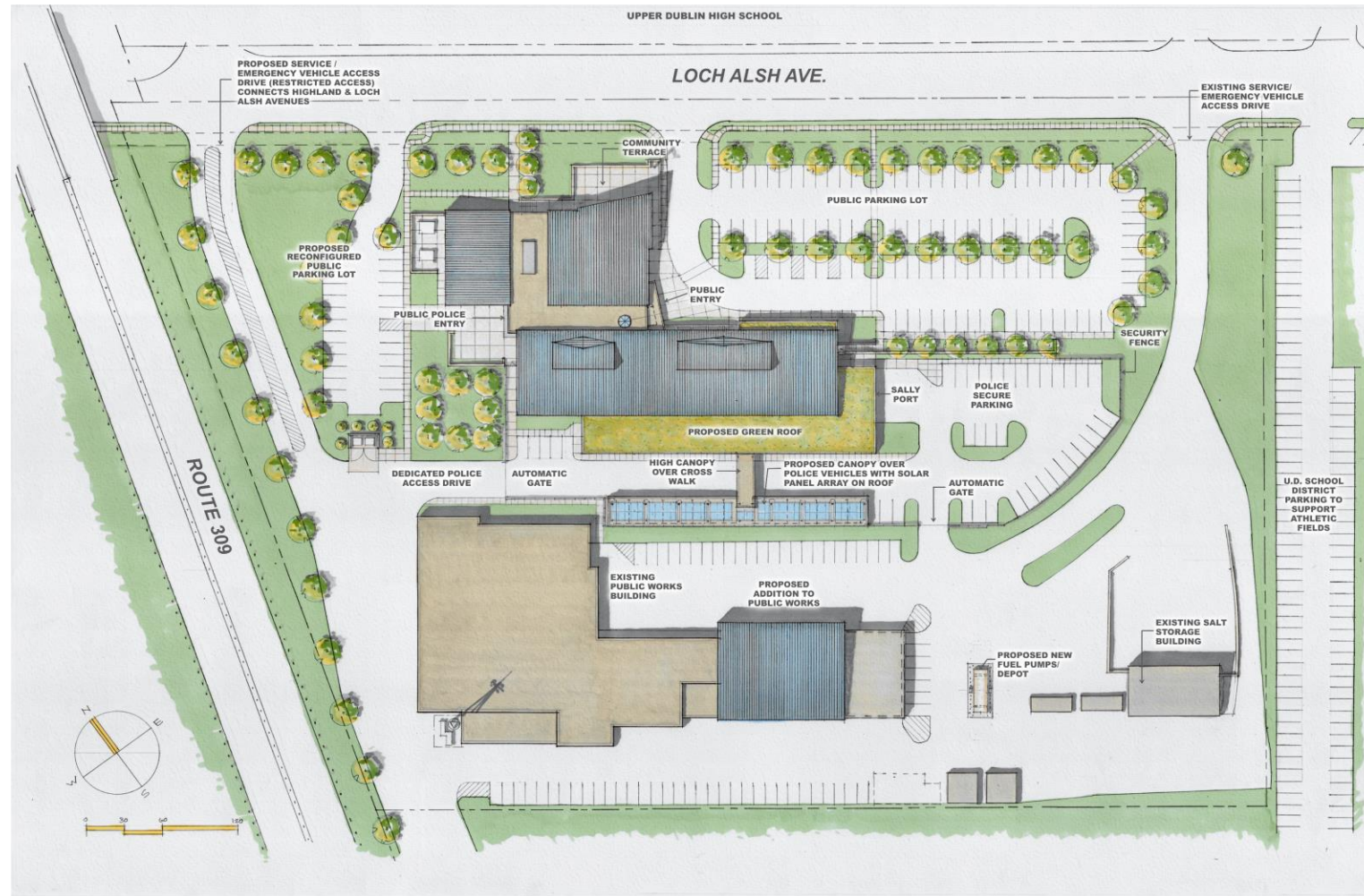
- The Service Drive Extension Connects Loch Alsh and Highland Avenues
- 36' wide Service Drive extension provides direct access to Loch Alsh Ave. for Police, Public Works, and potential future School Busses
- Site Layout provides serviceability of the Public Works and Police Department operations
- Vehicular Access to the new fueling station
- Separate traffic flows (Police, Public Works, Public Parking, and foot traffic)
- Potential future School Bus access



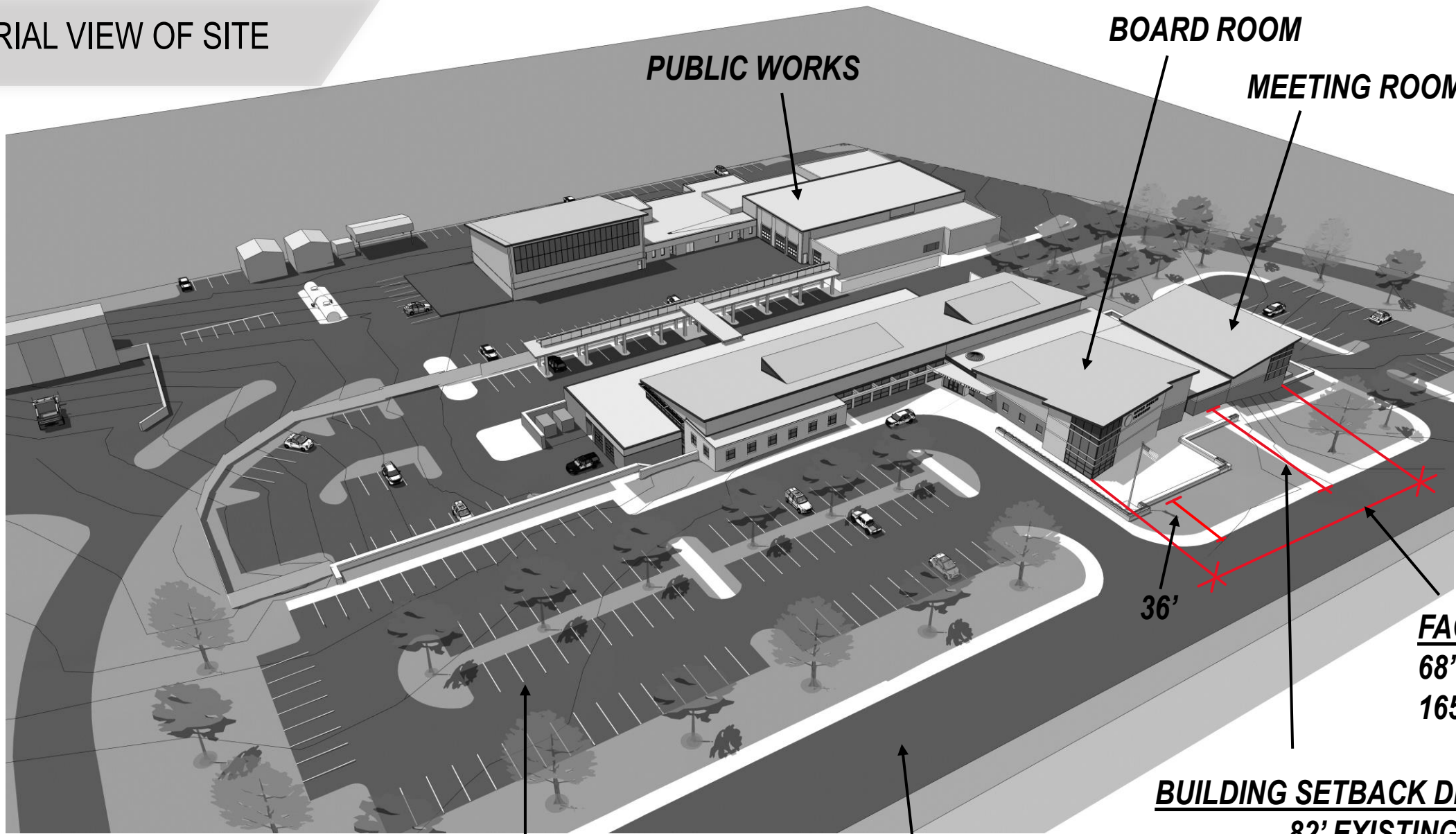
PROPOSED SITE PLAN CONCEPT

Sustainable Design Considerations:

- 2025 and 2040 “Ready for 100” Resolution
- Solar Panels at canopy roof and prep for additional panels
- Geothermal and other energy-efficient HVAC options
- Green “vegetated” Roof over the Police Department
- Facility located on a previously developed site
- Natural daylighting/ exterior views/ energy efficient lighting
- Electric vehicle charging stations
- Consider Tax rebates for sustainable design
- “Best Management Practices” for storm water management
- Bike racks/ enhanced indoor air quality/ recycling station
- Recycled content in building materials
- Water use reduction strategies
- Enhanced Building Commissioning
- Building Life-cycle impact
- Use of low-emitting materials
- Construction Waste management
- Green Building as an education tool



AERIAL VIEW OF SITE



PUBLIC WORKS

BOARD ROOM

MEETING ROOM

36'

FAÇADE LENGTH
68' EXIST
165' PROPOSED

BUILDING SETBACK DIMENSION
82' EXISTING
72' PROPOSED

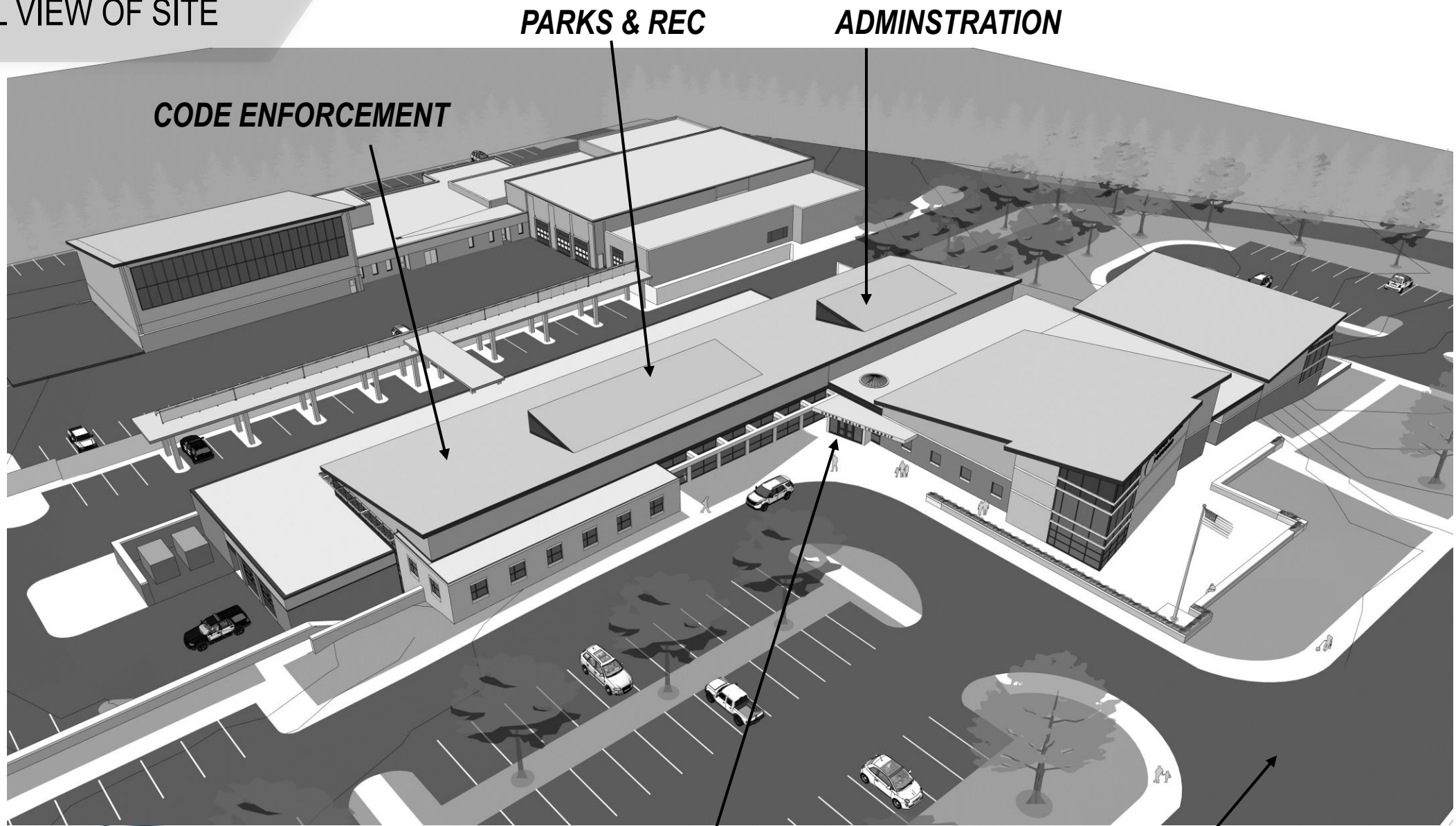
PUBLIC PARKING

LOCH ALSH AVE.



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AERIAL VIEW OF SITE



PARKS & REC

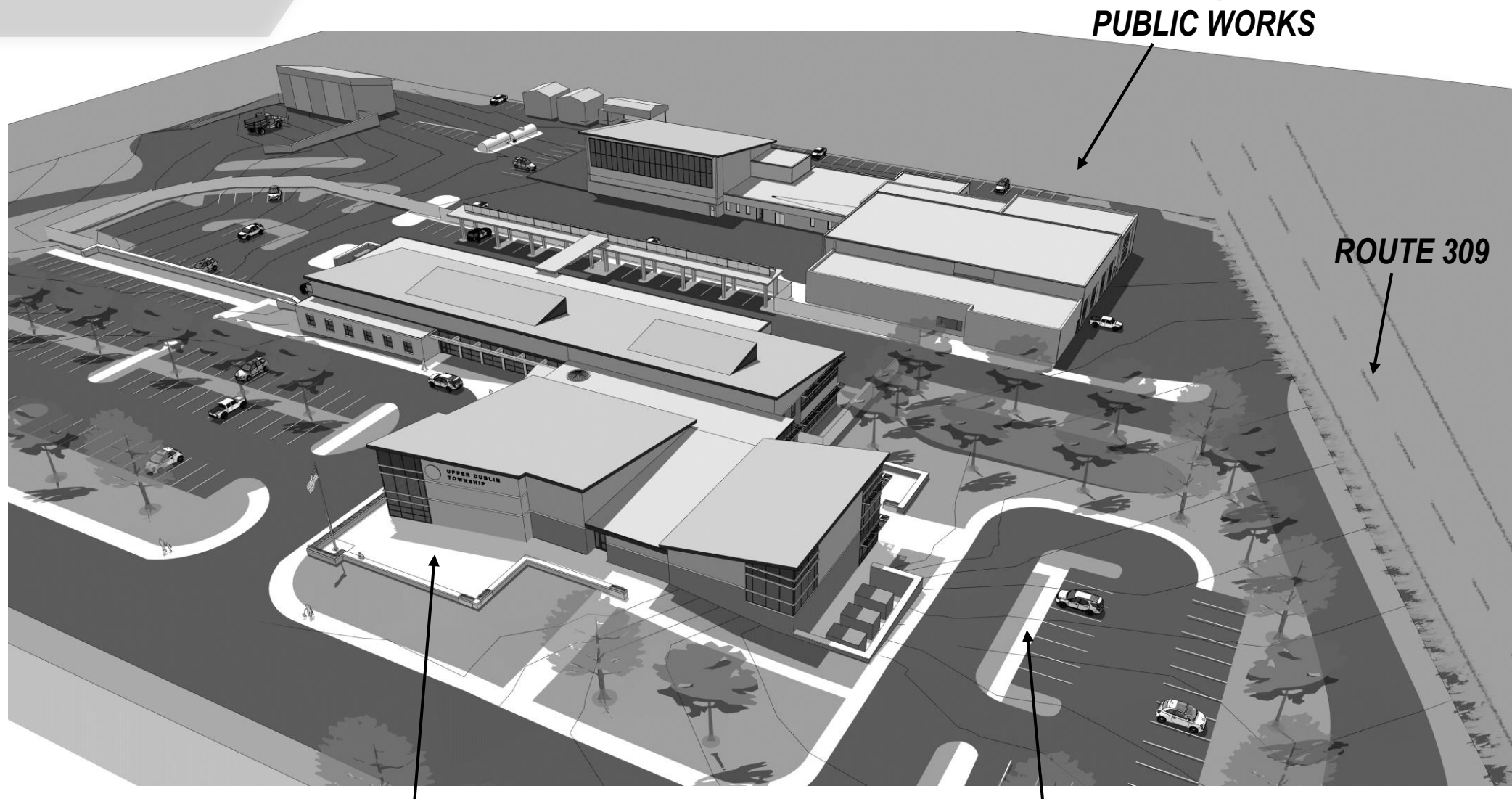
ADMINISTRATION

CODE ENFORCEMENT

PUBLIC ENTRANCE

LOCH ALSH AVE.

AERIAL VIEW OF SITE



COMMUNITY TERRACE

POLICE PUBLIC PARKING AT LOWER LEVEL

AERIAL VIEW OF SITE

**POLICE PUBLIC
PARKING**

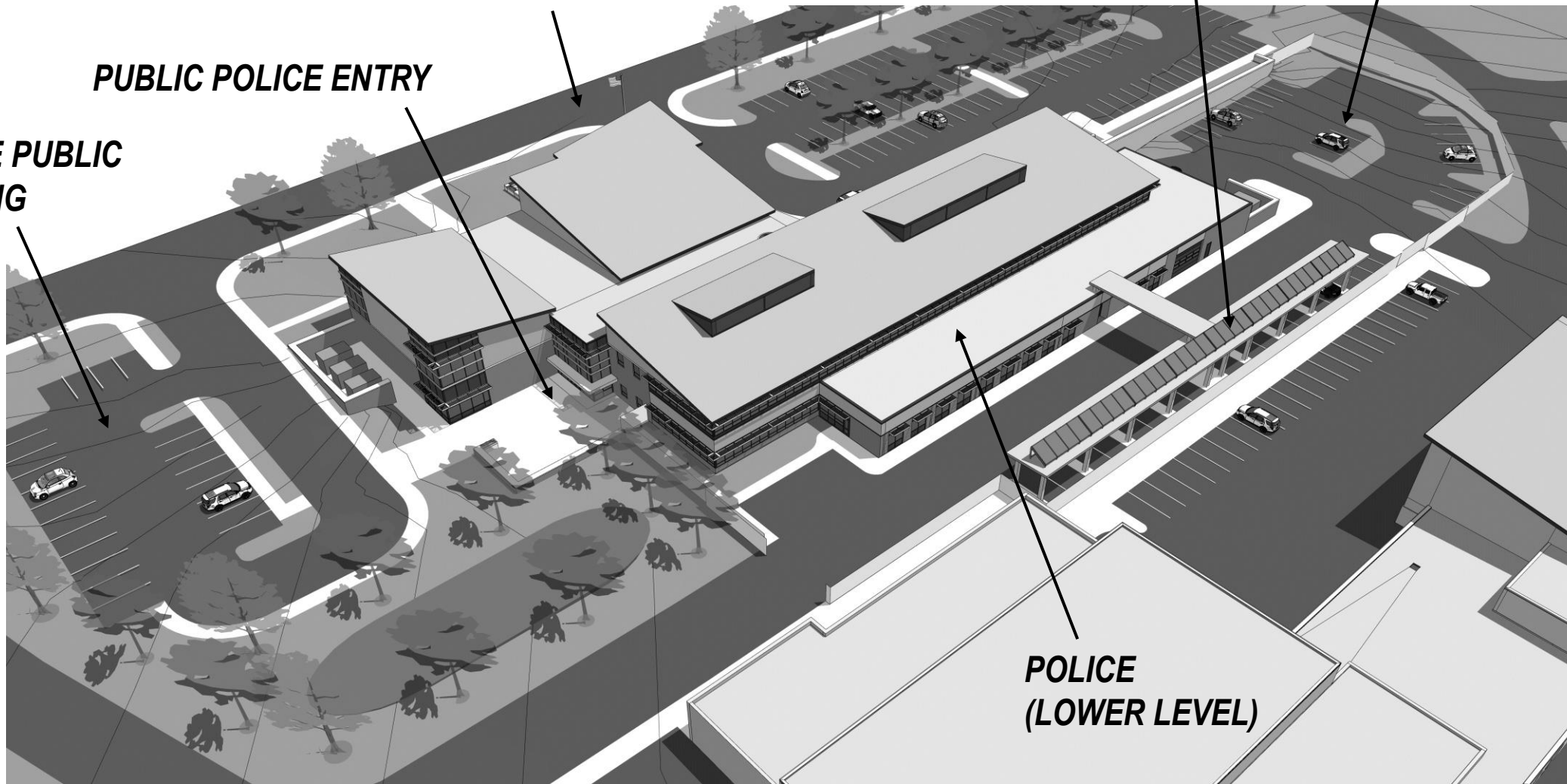
PUBLIC POLICE ENTRY

LOCH ALSH AVE.

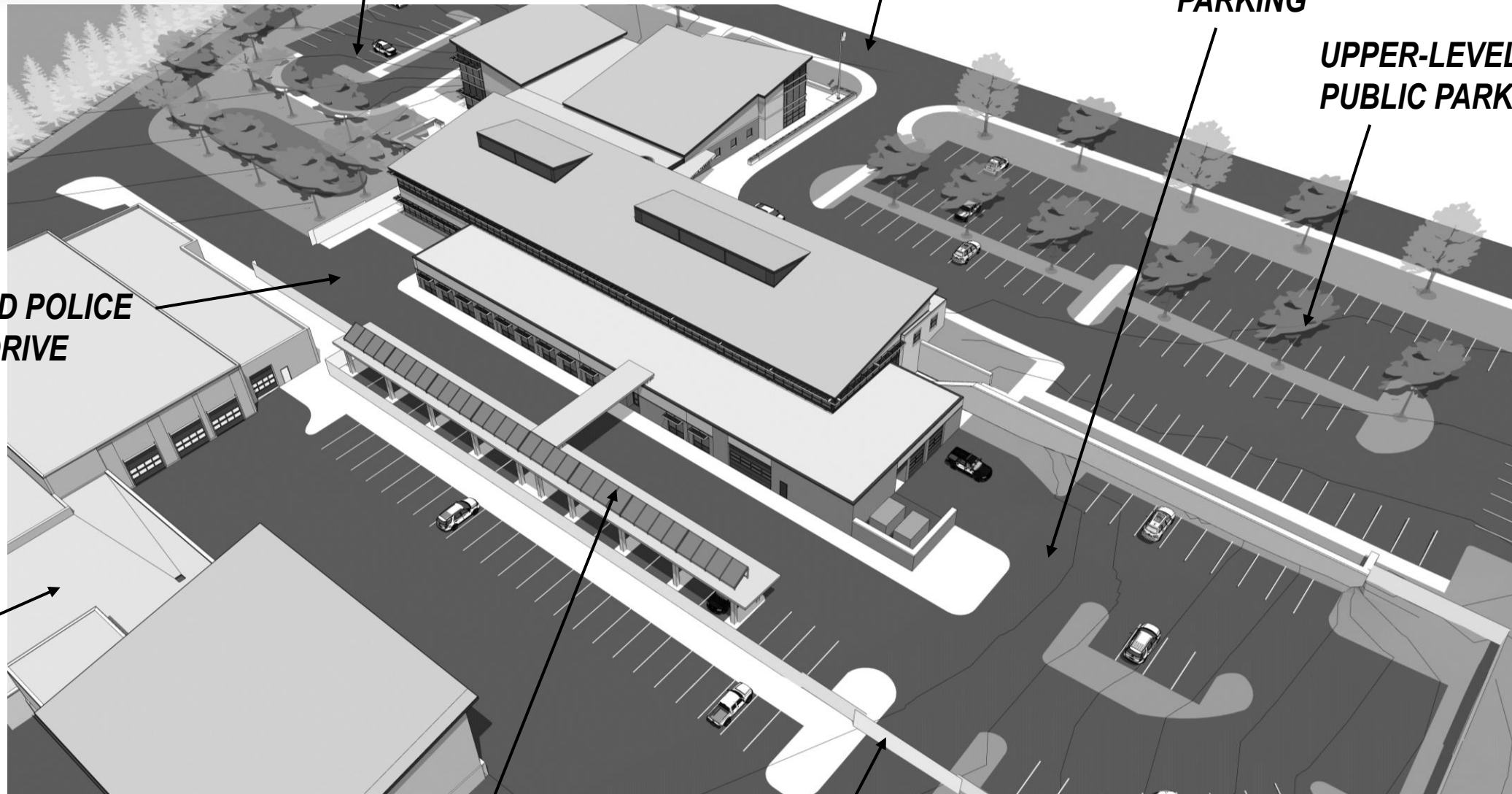
**POLICE VEHICLE CANOPY
W/ SOLAR PANELS**

SECURE POLICE PARKING

**POLICE
(LOWER LEVEL)**



AERIAL VIEW OF SITE



LOWER-LEVEL PUBLIC PARKING

LOCH ALSH AVE.

SECURE POLICE PARKING

UPPER-LEVEL PUBLIC PARKING

DEDICATED POLICE ACCESS DRIVE

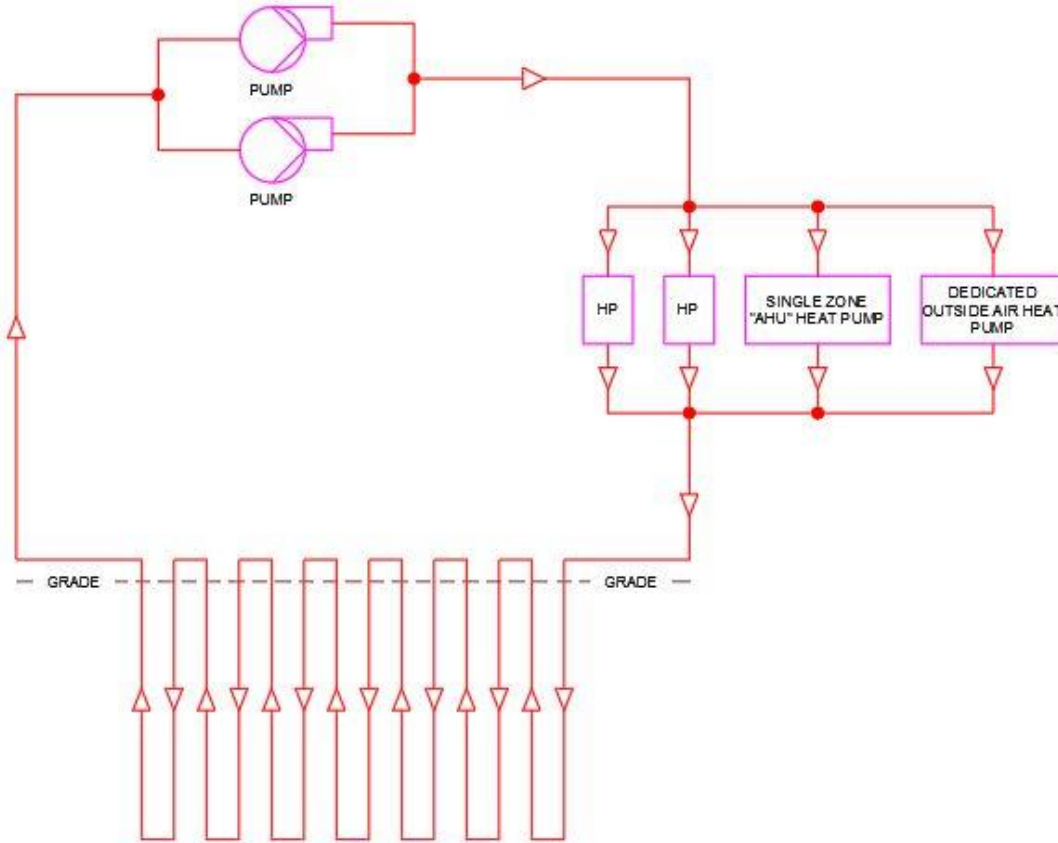
PUBLIC WORKS

COVERED POLICE PARKING

AUTOMATIC GATE



Ground Source Heat Pump w/ DOAS Unit



A water/anti-freeze fluid is circulated through a 2-pipe loop system to water source heat pump units that absorb heat from or reject heat to the fluid.

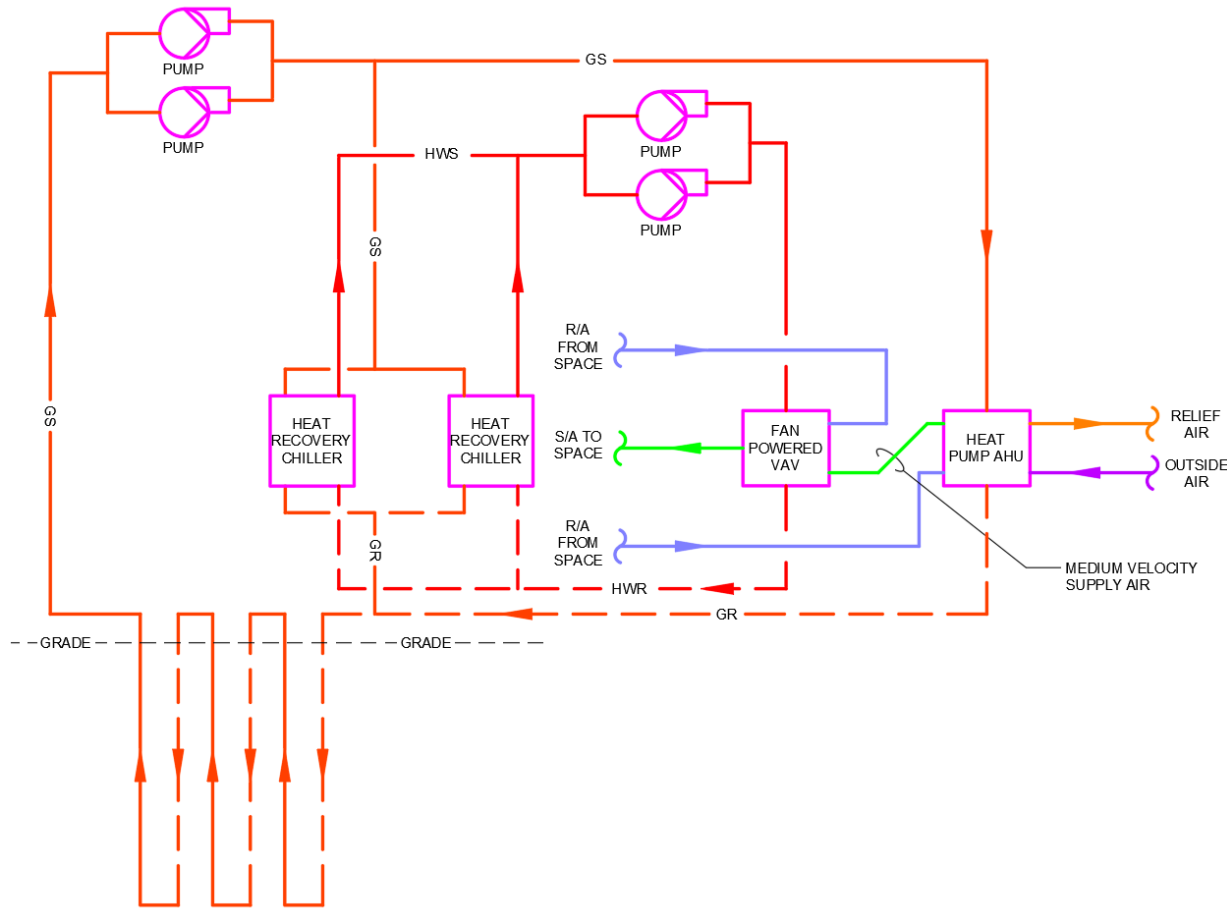
The loop temperature is maintained between temperatures of approximately 30°F and 100°F. The fluid is circulated through pipes acting as heat exchangers in the ground. The heat exchangers are vertical bore holes that are grouted solid after installation of a U-tube heat exchanger.

Piping is routed to each individual Dedicated Outdoor Air System (DOAS) unit and Ground Source Heat Pump (GSHP). There will be several GSHPs per DOAS unit.

The DOAS unit provides pre-conditioned outside air to the return air of each GSHP for space ventilation. The return air from the space and the pre-conditioned outside air are then mixed and either heated or cooled by the GSHP to serve the space.



Ground Source Heat Pump w/ VAV Reheat



A water/anti-freeze fluid is circulated through a 2-pipe loop system to heat recovery chillers and heat pump units that absorb heat from or reject heat to the fluid.

The heat pump loop temperature is maintained between temperatures of approximately 30°F and 100°F. The fluid is circulated through pipes acting as heat exchangers in the ground. The heat exchangers are vertical bore holes that are grouted solid after installation of a U-tube heat exchanger.

Geothermal Piping is routed to each Heat Recovery Chiller (HRC) unit and Heat Pump Air Handling Unit (AHU). Hot water pipes are routed from the Heat Recovery Chillers (HRC) to VAV boxes (VAV).

The Heat Pump AHU provides cool conditioned air to each VAV box. The VAV box can modulate its primary air damper and reheat the air to satisfy the space temperature setpoint.

The VAV boxes will serve offices, breakrooms, and common spaces. There will be one VAV box per room.



Estimated Total Costs Over 20 Years

Total Costs Over 20 Years						
System	Construction			Maintenance	Energy*	Total
	\$/sq. ft.	Cost	IRA (30% Reduction)***			
GSHP w/ DOAS	70	\$4,200,000	\$2,940,000	\$1,020,000	\$1,754,179	\$5,714,179
GSHP w/VAV	80	\$4,800,000	\$3,360,000	\$947,597	\$2,083,072	\$6,390,669
RTU	55	\$3,300,000	N/A	\$728,981	\$2,461,783	\$6,490,764
VRF	50	\$3,000,000	N/A	\$1,312,058	\$2,279,118	\$6,591,176

* Assumed to increase at the rate of inflation (2% inflation assumed).

** Initial electric rate of 0.116 \$/kWh and initial fuel rate of 1.602 \$/Therm, assumed to increase at 1% above the rate of inflation.

*** Construction cost reduced by 30% to account for direct payment of 30% of the value of the mechanical contract. Direct payment received from the Inflation Reduction Act.



Systems Summary

GSHP w/ DOAS	
Pros	Cons
<p>Lowest Overall Cost Complies with 2040 Energy Goals Most Energy Efficient</p>	<p>Shared thermostats – increased occupant complaints Many refrigerant compressor circuits to maintain (approximately 40 compressors)</p>
GSHP w/VAV	
Pros	Cons
<p>Each room has individual temperature control. Variable Air Volume Boxes are simpler to maintain than heat pumps (no compressors in VAV boxes) Complies with 2040 Energy Goals</p>	<p>Less energy efficient than GSHP w/ DOAS. Service contract is needed for heat recovery chiller. Large central air handling equipment on roof. (Service on roof)</p>
RTU w/VAV	
Pros	Cons
<p>Easiest to maintain and operate Second Lowest Overall Cost (Lowest if IRA is not considered) Individual Temperature Control and VAV box simplicity</p>	<p>Does not comply with 2040 Energy Goals Least energy efficient system Large central air handling equipment on roof. (Service on roof)</p>
VRF	
Pros	Cons
<p>Complies with 2040 Energy Goals Each room has individual temperature control. Fan Coils are simpler to maintain than GSHP heat pumps (no compressors in Fan Coils)</p>	<p>Most maintenance intensive (light commercial quality) Highest electrical consumption (must find renewable source 2040 although system will likely be replaced before that time)</p>



Systems Comparison

Category	GSHP w/ DOAS	GSHP w/VAV	RTU	VRF
Construction Cost	\$2,940,000*	\$3,360,000*	\$3,300,000	\$3,000,000
Annual Energy Cost	\$65,283	\$77,523	\$91,617	\$84,819
20 Year Costs	\$5,714,179	\$6,390,669	\$6,490,764	\$6,591,176
Central Plant	Pumps	Pumps/Chiller	Boiler	None
Piping	2 Piping Mains Above Corridors	4 Piping Mains Above Corridors	2 Piping Mains Above Corridors	Multiple refrigerant pipe runs throughout
Fans	Located in Mech. Rooms and on the Roof	Located on the Roof	Located on the Roof	Located in Mech. Rooms and on the Roof
Compressors	Located in each GSHP and DOAS on Roof (Approx. 40 compressors)	Located in Chillers and DOAS (Approx. 10 compressors)	Located in each RTU on the roof (Approx. 8 compressors)	Located in HPs and DOAS (Approx. 8 compressors)
Filters	In each GSHP and DOAS	In each FPV and DOAS	In each FPV and RTU	In each FC and DOAS
Thermostats (Control)	Offices and Common Spaces share thermostats	Individual Thermostatic Control per room	Individual Thermostatic Control per room	Individual Thermostatic Control per room
2040 Renewable Energy Goal Compliance	Yes	Yes	No	Yes
Average Equipment Life Expectancy	13-20 Years	13-20 Years	15 Years	13-15 Years

* Construction cost reduced by 30% to account for direct payment of 30% of the value of the mechanical contract. Direct payment received from the Inflation Reduction Act.



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1. 100% Renewable Electricity by 2025.
 - On site solar or green energy purchasing is required for all Power.
2. 100% Renewable Energy by 2040 including heating.
 - Requires on site solar or green power purchasing or geothermal for heating (no gas fired heating equipment).

Currently reviewing the Inflation Reduction Act and potential direct payments to offset cost premiums.

1. Took effect in January 2023 and agencies are currently establishing processes.
 2. Public entities can be eligible for direct payment.
 3. 30% direct payment toward solar or geothermal is part of the plan.
 4. Process and confirmation still a few months away.
- Solar can be alternate bid to allow time to verify direct payment approval and amount.
 - Geothermal decision needs to be determined; it affects the design.

LEED Checklist - Sustainability



LEED SCORECARD
Upper Dublin Township Building
 BD+C New Construction v4 + v4.1
 3/2/2023



28	25	41	16	TOTAL	110 Pts				
Y	Y?	?	N		D/C	EP	RP		
1				INTEGRATIVE PROCESS	1 Pts				
1				IPc1: Integrative Process	1	D			
3	2	1	10	LOCATION AND TRANSPORTATION	16 Pts				
			16	LTc1: LEED For Neighborhood Development Location	16	D			
1				LTc2: Sensitive Land Protection	1	D			
		1	1	LTc3: High-Priority Site (v4) OR High Priority Site and Equitable Developmen	2	D	3	2	
1			4	LTc4: Surrounding Density and Diverse Uses	5	D			
			5	LTc5: Access to Quality Transit (v4.1)	5	D	3	3	
	1			LTc6: Bicycle Facilities	1	D			
1				LTc7: Reduced Parking Footprint (v4.1)	1	D	3		
1				LTc8: Green Vehicles (v4) OR Electric Vehicles (v4.1)	1	D			
2	2	6		SUSTAINABLE SITES	10 Pts				
				Required SSp1: Construction Activity Pollution Prevention		C			
1				SSc1: Site Assessment	1	D			
		2		SSc2: Site Development - Protect or Restore Habitat (v4) OR Protect or Restr	2	D	3		
		1		SSc3: Open Space	1	D			
1	2			SSc4: Rainwater Management	3	D	3		
		2		SSc5: Heat Island Reduction	2	D	3		
		1		SSc6: Light Pollution Reduction	1	D			
2	3	4	2	WATER EFFICIENCY	11 Pts				
				Required WEp1: Outdoor Water Use Reduction		D			
				Required WEp2: Indoor Water Use Reduction		D			
				Required WEp3: Building-Level Water Metering		D			
1	1			WEc1: Outdoor Water Use Reduction	2	D			
2	1	1	2	WEc2: Indoor Water Use Reduction	6	D	3	4	
		2		WEc3: Cooling Tower Water Use (v4) OR Optimize Process Water Use (v4.1	2	D	2	2	
1				WEc4: Water Metering	1	D			
6	10	17		ENERGY AND ATMOSPHERE	33 Pts				
				Required EAp1: Fundamental Commissioning & Verification		C			
				Required EAp2: Minimum Energy Performance		D			
				Required EAp3: Building-Level Energy Metering		D			
				Required EAp4: Fundamental Refrigerant Management		D			
	3	3		EAc1: Enhanced Commissioning	6	C			
6	6	6		EAc2: Optimize Energy Performance	18	D	3		
		1		EAc3: Advanced Energy Metering	1	D			
		2		EAc4: Demand Response (v4) OR Grid Harmonization (v4.1)	2	C			
1	2			EAc5: Renewable Energy Production (v4) OR Renewable Energy (v4.1)	3	D	3		
		1		EAc6: Enhanced Refrigerant Management	1	D			
		2		EAc7: Green Power and Carbon Offsets (only v4)	2	C			
5	2	2	4	MATERIALS AND RESOURCES	13 Pts				
				Required MRp1: Storage and Collection of Recyclables		D			
				Required MRp2: Construction and Demolition Waste Management Planning (v4)		C			
		1	4	MRC1: Building Life-Cycle Impact Reduction	5	D	3	3	
1	1			MRC2: Bldg Product Disclosure & Optimization - EPDs (v4.1)	2	C	3		
1	1			MRC3: Bldg Product Disclosure & Optimization - Sourcing of Raw Mat. (v4.1)	2	C	3		
1	1			MRC4: Bldg Product Disclosure & Optimization - Material Ingredients (v4.1)	2	C	3		
2				MRC5: Construction and Demolition Waste Management	2	C	3		
4	4	8		INDOOR ENVIRONMENTAL QUALITY	16 Pts				
				Required EQp1: Minimum Indoor Air Quality Performance		D			
				Required EQp2: Environmental Tobacco Smoke Control		D			
	2			EQc1: Enhanced Indoor Air Quality Strategies	2	D	3		
3				EQc2: Low-Emitting Materials (v4.1)	3	C	3		
1				EQc3: Construction Indoor Air Quality Management Plan	1	C			
		2		EQc4: Indoor Air Quality Assessment	2	C			
		1		EQc5: Thermal Comfort	1	D			
1	1			EQc6: Interior Lighting	2	D			
1	2			EQc7: Daylight	3	D			
		1		EQc8: Quality Views	1	D	3		
		1		EQc9: Acoustic Performance	1	D			
5	1			INNOVATION IN DESIGN	6 Pts				
1				IDc1.1: Purchasing Lamps	1	D			
	1			IDc1.2: Green Building Education	1	C			
	1			IDc1.3: O+M Starter Kit	1	C			
1				IDc1.4: Integrated Analysis of Building Materials	1	C			
1				IDc1.5: Exemplary Performance TBD	1	D			
1				IDc1.6: Exemplary Performance TBD	1	C			
		1		IDc1.7: Parksmart Measures	1	C			
		1		IDc1.8: Community Contaminant Prevention	1	C			
		1		IDc1.9: Innovation TBD	1	C			
		1		IDc1.10: Innovation TBD	1	C			
1				IDc2: LEED® Accredited Professional	1	C			
1	3			REGIONAL PRIORITY	4 Pts				
			1	LTc3: High-Priority Site (v4) OR High Priority Site and Equitable Development (v4.1)	1	D	2		
			1	LTc5: Access to Quality Transit (v4.1)	1	D	3		
	1			SSc4: Rainwater Management	1	D	2		
		1		WEc2: Indoor Water Use Reduction	1	D	4		
		1		WEc3: Cooling Tower Water Use (v4) OR Optimize Process Water Use (v4.1)	1	D	2		
		1		MRC1: Building Life-Cycle Impact Reduction	1	D	3		

See LEED Plan for further details

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Please note, most projects lose 3-6 points during the review process.



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1. Integrate energy consultant Paul Spiegel in the planning process.
2. Draft LEED checklist will be used to keep sustainability at forefront.
3. Formal certification will only be pursued with a grant to offset costs.
4. Solar Alternate will be included pending tax credit direct payment.
5. Geothermal for HVAC.
6. Waste diversion from landfill, recycling of building demolition.
7. Site will have new storm water management system and Best Management Practices.
8. Building Energy code compliance for building envelope, HVAC, lighting etc.

1. Approval of Building placement and general site layout.
2. Approval of Building massing and any specific direction.
3. Direction on Energy Goals Compliance.
4. Approval of solar as Alternate Bid.
5. Direction on HVAC system or additional information.
6. Confirmation on sustainability checklist but not pursue LEED formally unless there is a grant.



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