



Town of Dover Community Center

Building Committee

- HVAC Engineering
- Public Mtg Prep.

Oct 26, 2020

Building a vision Building consensus

1. MEP Overview -15 min
2. Revised Schedule – Option C -10 min
3. Conceptual Alternatives -40 min
4. Criteria For Success -15 min

Caryl Community Center Project



MEP Systems & Sustainability Overview

November 9, 2020

MEP Existing Conditions Overview

HVAC:

- Main heating source: (2) oil-fired cast iron sectional water-tube boilers.
- Combination of perimeter radiation and unit ventilators exist throughout.
- Partially air-conditioned utilizing various systems – window a/c & VRF
- Overheating of spaces due to poorly functioning equipment and lack of controls.

Electrical:

- Existing Main Switchgear outdated and in poor condition.
- Existing 1971, 75kVA indoor Diesel Generator, in poor condition
- Fire Alarm System antiquated and would not meet current codes.
- Lighting is combination of LED and Fluorescent with outdated controls

Plumbing:

- Sanitary goes to existing Septic system that needs to be evaluated for future
- Kitchen plumbing equipment likely not suitable for re-use

Fire Protection:

- No current sprinkler system. New will require fire pump and holding tanks



Overview of Sustainability Goals

Highly Efficient Building Metrics

- LEED – certification or certifiable?
- % savings from Baseline ASHRAE code minimum
- EUI – Energy Use Intensity in kbtu/SF
- Net Zero Energy (Actual or Ready?)
- Carbon Neutrality – No fossil fuels, All Electric
- Water Savings
- Building Envelope – Passive House, etc.

EUI – Energy Use Intensity

- 30 kbtu/SF – very aggressive goal with to achieve Net Zero Energy
- 50 kbtu/SF – comparable code minimum building systems/envelope



HVAC

System Option 1 – (Ground Source Heat Pumps)

- Heating and cooling generated centrally with a 50 ton heat recovery chillers that will extract/reject heat to a geothermal well system.
- Estimating 2.25-tons per well, project will require 24 wells
- Can be combined with electric boiler/chiller to offset peak loads.
- Hot water, chilled water distribution piping
- Dedicated Outdoor Air System (DOAS) w/ Energy Recovery for Ventilation



System Option 2 – (Air-Source VRF with FCU's & DOAS):

- VRF condensing units coupled with fan coil units for individual zone control.
- Refrigerant distribution will extend from each condensing unit to FCU's throughout.
- Dedicated Outdoor Air System (DOAS) with Energy Recovery



HVAC System Matrix

System	Pro's	Con's
GSHP	<ul style="list-style-type: none"> <input type="checkbox"/> Flexibility with range of systems options <input type="checkbox"/> More sturdy/reliable <input type="checkbox"/> Lower operating cost compared to direct electric <input type="checkbox"/> Higher probability of achieving NZE. 	<ul style="list-style-type: none"> <input type="checkbox"/> Higher initial cost (installation) <input type="checkbox"/> More complicated to operate/repair <input type="checkbox"/> Increased maintenance <input type="checkbox"/> Requires central mechanical room <input type="checkbox"/> Location specific (required test wells to determine available capacity)
VRF	<ul style="list-style-type: none"> <input type="checkbox"/> Lower initial cost (installation) <input type="checkbox"/> Lower equipment maintenance costs <input type="checkbox"/> Flexibility with varying tenant schedules <input type="checkbox"/> No central mechanical room <input type="checkbox"/> No piping heat loss <input type="checkbox"/> Metering capabilities for billing 	<ul style="list-style-type: none"> <input type="checkbox"/> Less efficient in cold weather <input type="checkbox"/> Multiple compressors <input type="checkbox"/> Potential for refrigerant leaks <input type="checkbox"/> Aesthetics of exposed equipment <input type="checkbox"/> Limitations on pipe runs <input type="checkbox"/> Rapid development/changes in VRF technology <input type="checkbox"/> Proprietary service requirements <input type="checkbox"/> Limitation on future expansion



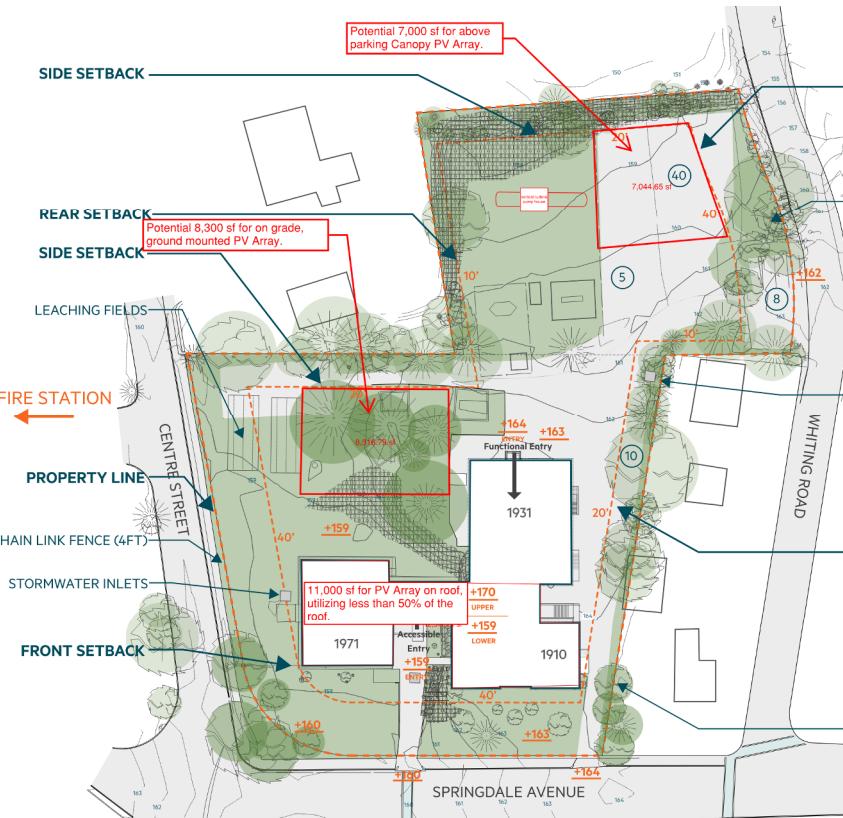
Electrical

PhotoVoltaic Array Considerations

- 30 kBTU/SF goal will require approx. 11,000 sf of solar panels.
- 50 kBTU/SF goal will require approx. 18,000 sf of solar panels.
- Solar Orientation and Shading Impacts

Standby Generator – Warming/Cooling Shelter

- List of building functions needing to be on backup power
- Anticipated Duration of Outage
- Reliance on PV/Batteries
- Diesel/Propane fuel source reliability for re-fueling





Thank you



Questions?



Revised Schedule

Option C

Schedule Overview

Sept-Oct

Program

Create program for
12,000nsf

Cost by NSF

Program outdoor activities

Evaluation: Program
Flexibility: accommodates
and range of activities

Oct -Nov

Major Spaces/ Massing

Create alternatives based on
major spaces with massing

ROM Costs

General site layout

- Notional grading
- Parking location
- Circulation
- Room for expansion

Evaluation: Range

Full range of options for layout/
massing

FEASIBILITY

Dec -Jan

Full Layout/ Elevations

Develop alternatives:
program fully laid out
Conceptual elevations
MEP system narrative

Concept Cost Estimate

Refined site layout

- Rough grading (cut/fill)
- Paving & hardscape
- Planting
- Utilities

Evaluation: Alternatives

Selection of (2) preferred
alternatives using CBA
(include sustainability)

SCHEMATIC

Feb -Mar

Schematic Design

SD drawings walls, doors,
windows etc.
Single line drawings for MEP

Schematic Cost Estimate

SD site plan:

- Rough grading (cut/fill)
- SF for paving & hardscape
- SF & types for planting
- Utilities

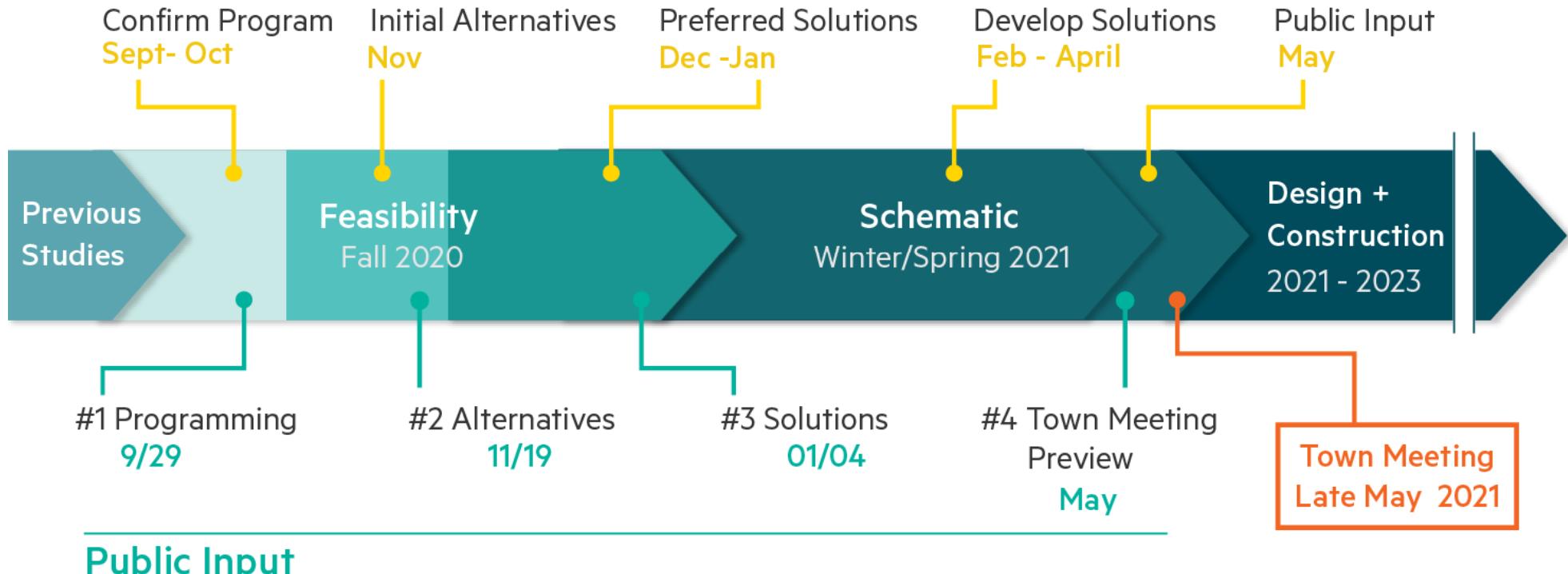
Evaluation: Solution

Accurate SD Cost Estimates
Desired aesthetic
Recommendation for Town Mtg.



Schedule Option C (late May)

Building Committee Meetings





Conceptual Alternatives

Site Analysis

Observations

- 40,000sf on two levels
- 1 functional entry, 1 accessible entry
- Entry is split level
- Limited accessibility
- Lacks functional drop-off
- Current parking is 62 space (Zoning calls for 97 spaces)
- Preservation of mature trees
- Opportunity with site topography

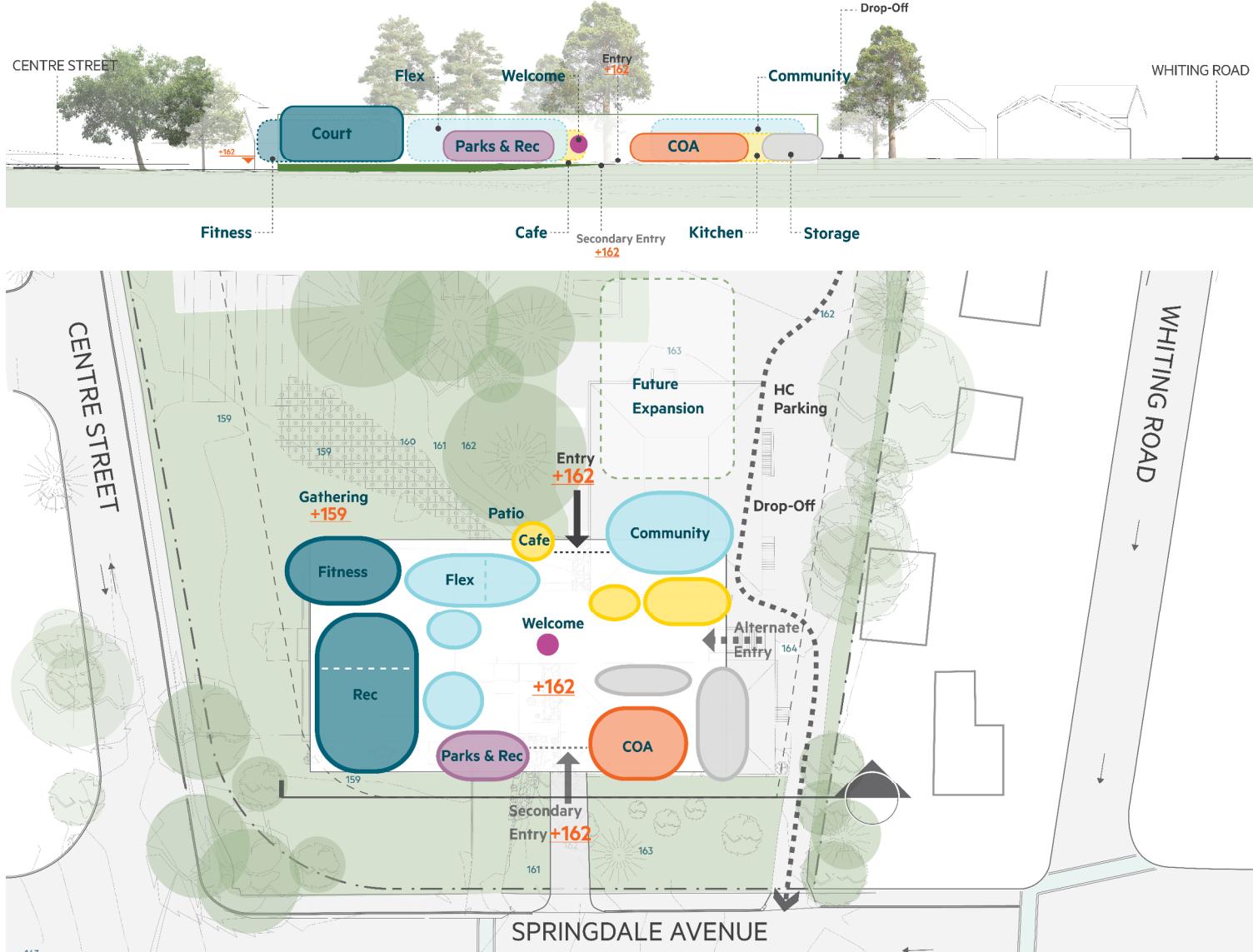
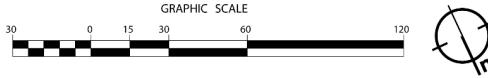


Alternative N1

New - Single Level

Characteristics

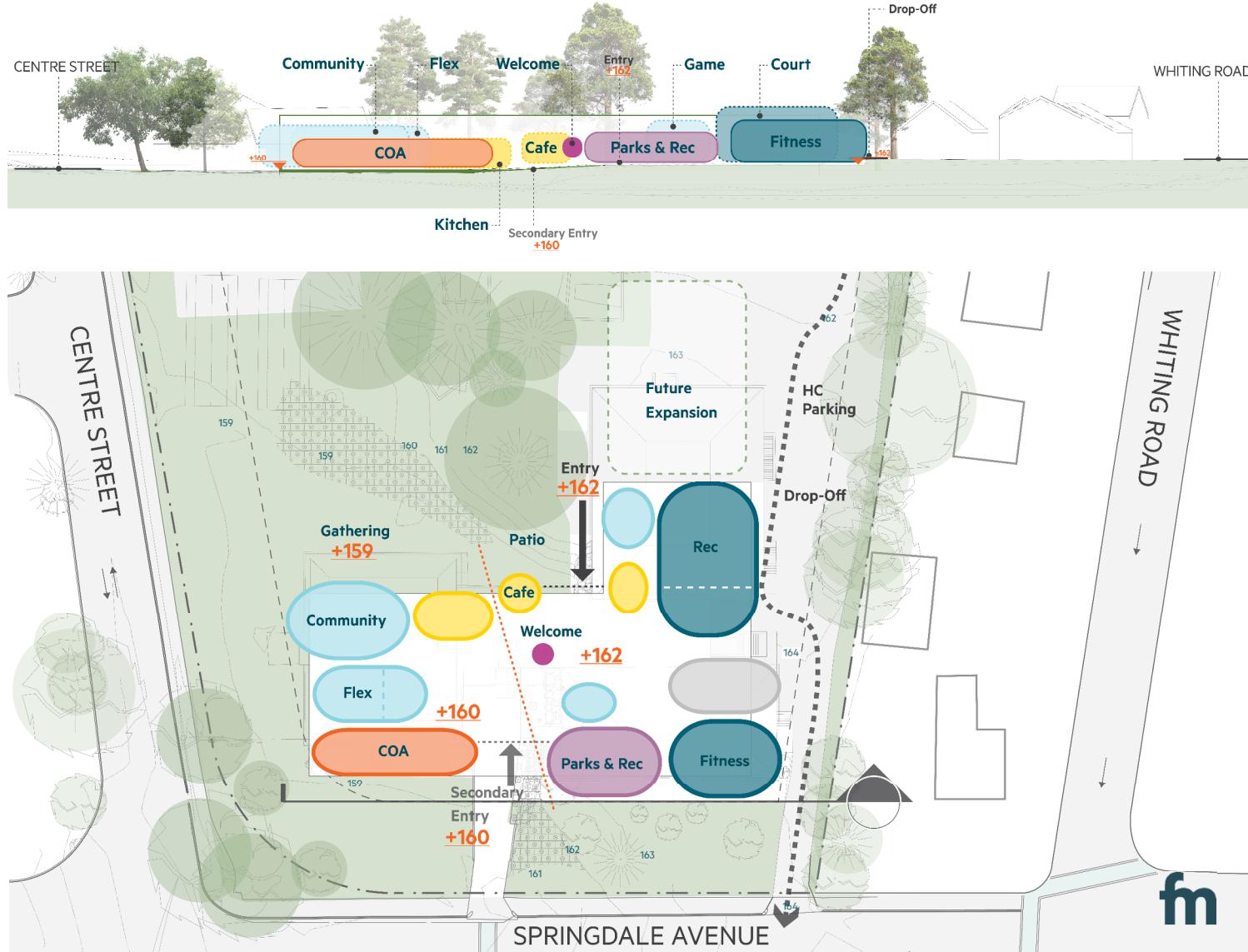
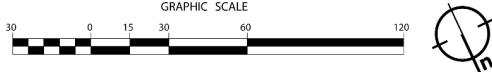
- 18,000sf on one level
- 2 functional entries
- Community Space at Entry
- COA & Parks at Entry
- Area for expansion



Alternative N2 New - Split Level

Characteristics

- 18,000sf on split levels
- 2 functional entries
- Community Space at enlarged outdoor gathering
- COA at Entry & at grade
- Area for expansion

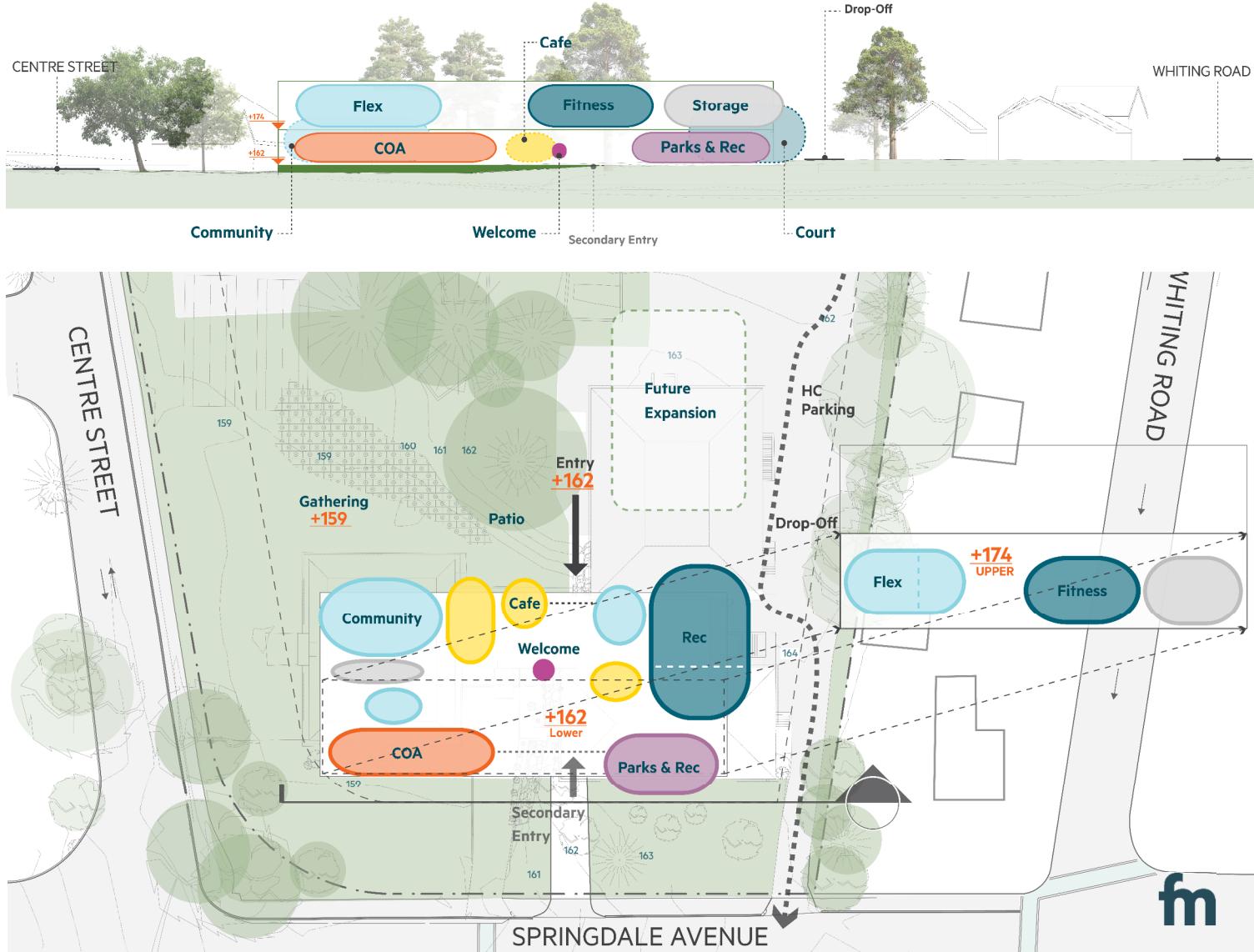
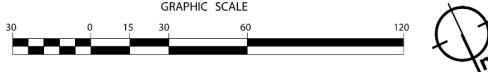


Alternative N3

New - Two Story

Characteristics

- 18,000sf on two stories
- 2 functional entries
- Community Space at enlarged outdoor gathering
- COA at Entry & at grade
- Area for expansion



Alternative R1 Renovation - Vertical Lobby

Characteristics

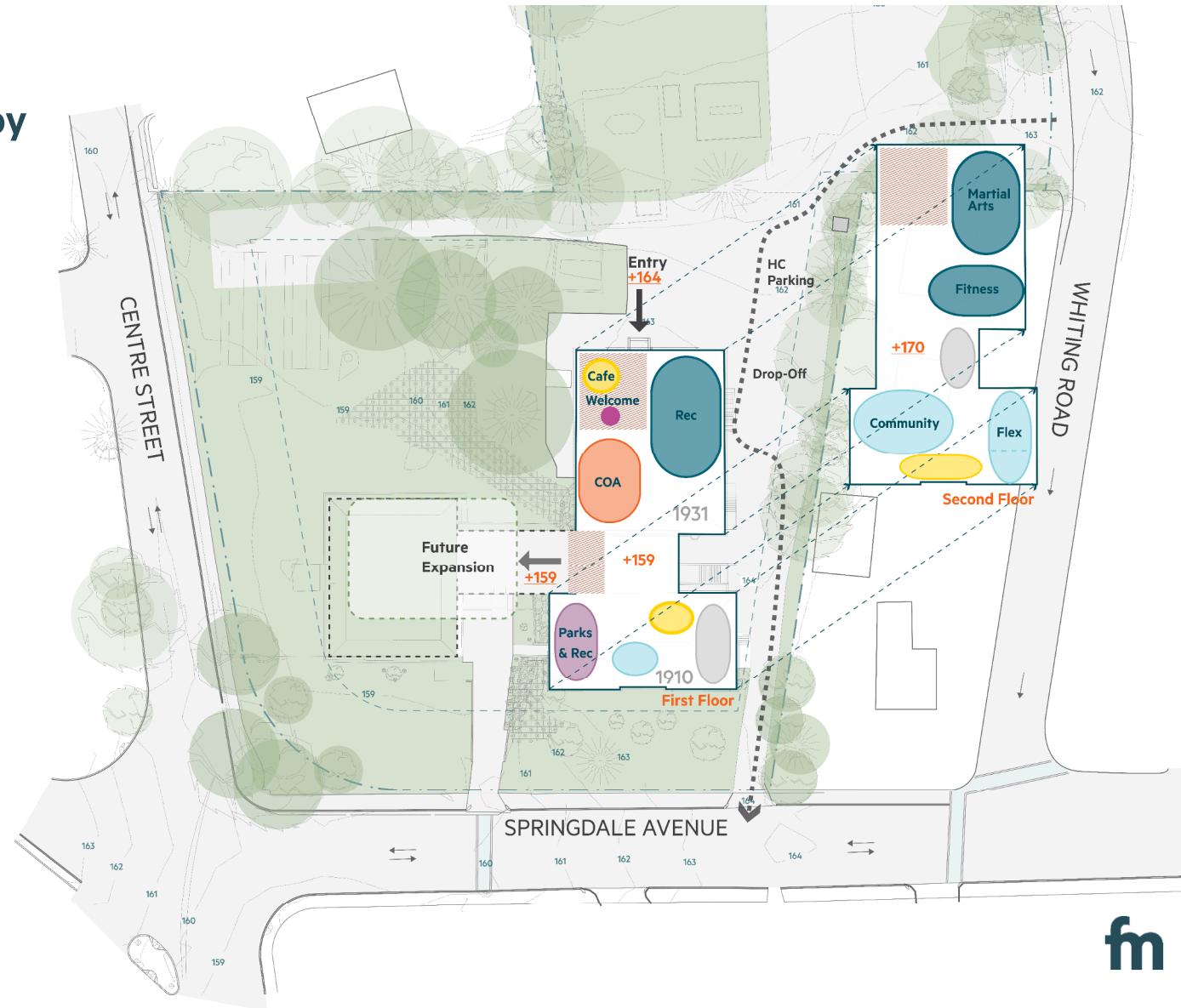
- 22,000sf on two levels
- 1 functional entry at reconstructed lobby
- Rec in existing location
- Community Space in Upper Level of 1910 building
- COA near entry , Lower Level
- Area for expansion

 New Construction

 Existing to Remain

 To be Demolished

GRAPHIC SCALE
30 0 15 30 60 120



Alternatives R2

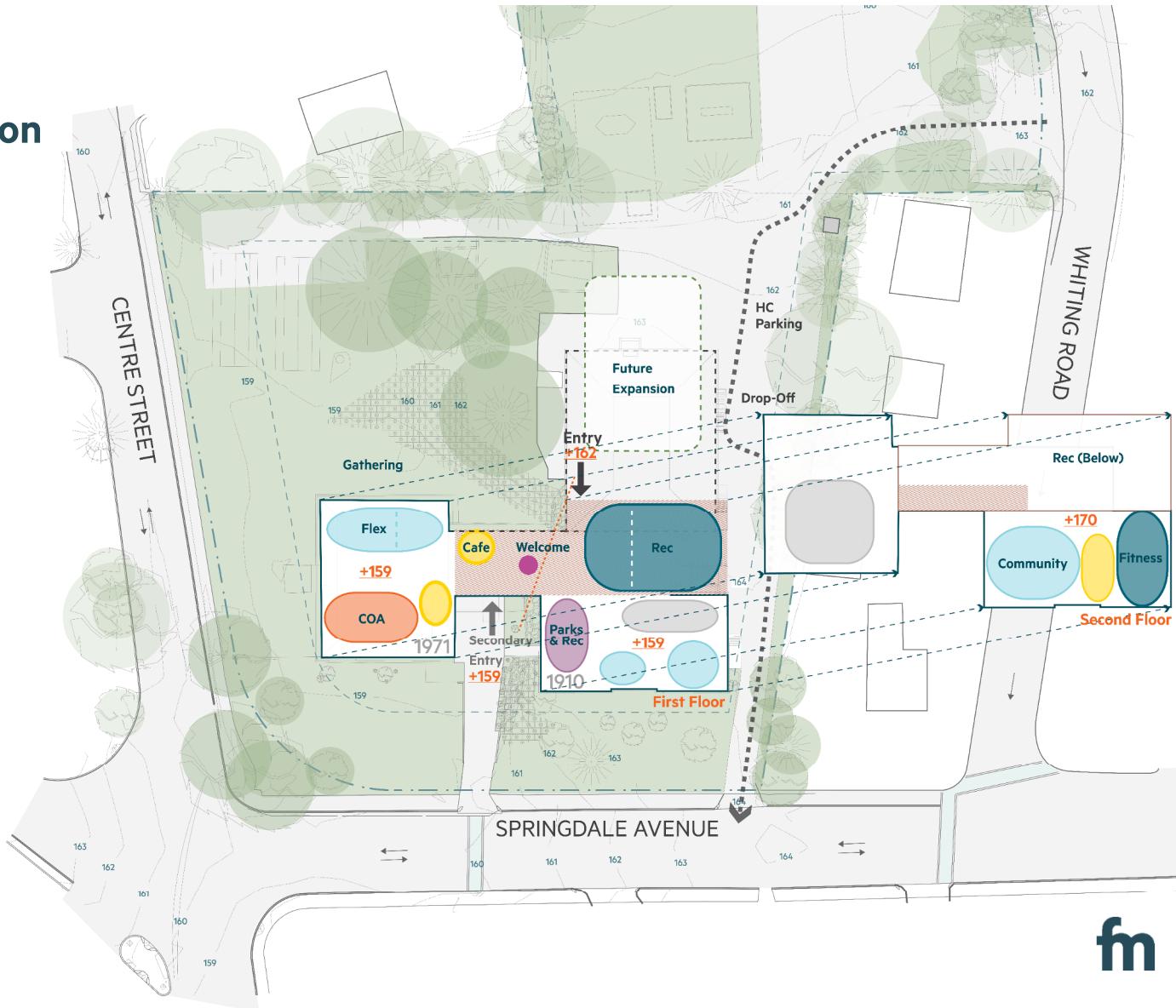
Renovation – Lobby Addition

Characteristics

- 20,100sf on three levels
- 2 functional entry in new addition
- Rec. in new construction
- Community Space in Upper Level of 1910 building
- COA near Springdale
- Area for expansion



A graphic scale with a dial. The scale is marked at 30, 0, 15, 30, 60, and 120. The dial is positioned at the 90 mark.



Alternatives R3 Renovation – Save 1910

Characteristics

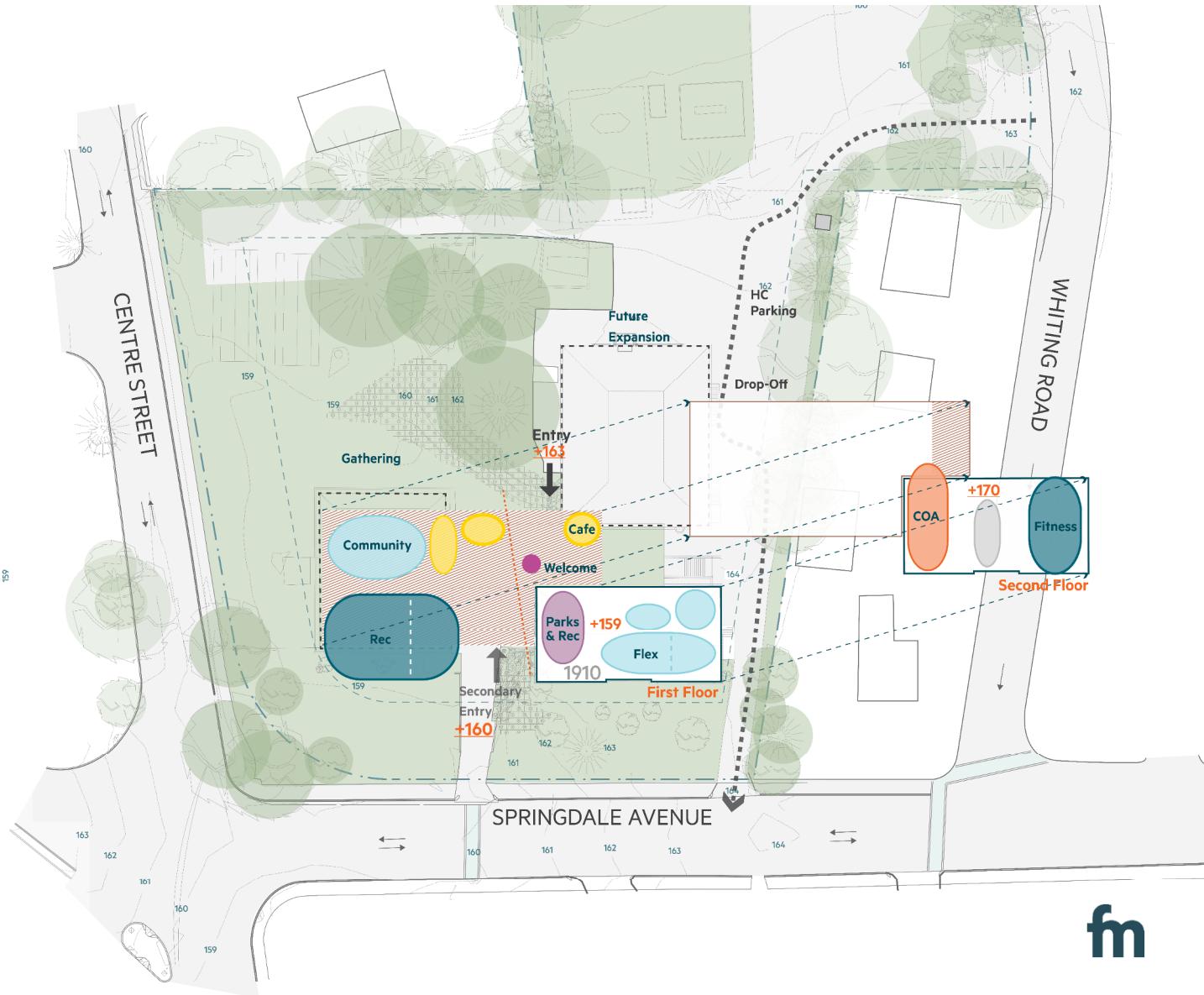
- 18,500sf on three levels
- 2 functional entry in new addition
- Rec in new construction
- Community Space in new construction
- Level of 1910 building
- COA overlooking entry, Upper Level
- Area for expansion

 New Construction

 Existing to Remain

 To be Demolished

GRAPHIC SCALE
30 0 15 30 60 120





Criteria for Success

Evaluating Alternatives

Criteria for Success – For Evaluating Alternatives

CBA = Choosing by Alternatives (Lean Construction terminology)

General

	Prerequisite	Project is within the Town's fixed budget of approximately \$13M, new or renovation
	Prerequisite	The building and site comply with all the Town bylaws and Town master plan goals
CBA	Universal Design	Provides full A.D.A. and MAAB compliance, and pursue universal design principles
	Schematic Design	Maximizes grant opportunities

Functionality

CBA	Advantageous adjacencies	Well-designed with efficient layout and maximal percentage of space (area) with flexible uses
	Prerequisite	Well-designed with efficient layout and maximal percentage of space (area) with flexible uses
	Prerequisite	Provides for multi-generational programming (babies to seniors)
	Prerequisite	Meets specific core program needs of Council On Aging and Park & Recreation
CBA	Optimized for expansion	Project meets the present service needs of the community and those of the next 20 years
CBA	Relation of entry and drop-off / HC parking	Provides a clearly identifiable and universally accessible entrance
CBA	Visual control of entry(ies)	Provides a <i>Welcome Desk</i> at main entry for central control
	Prerequisite	Provides efficiency and ease of workflow for the staff
CBA	Programmed exterior space	Creates programmable exterior space

Criteria for Success

Experiential (user experience)

	Prerequisite	Creates a warm, safe, secure, and welcoming atmosphere for residents and staff)
CBA	Creates heart of community	Creates an open environment that encourages residents to meet, network and work
	Schematic Design	Has aesthetically pleasing architecture: rooms feel light; spacious; and connected to the outdoors
CBA	Daylighting and ventilation	Healthy interior environment (including foreseeable pandemic conditions): mitigates airborne pollutants; maximizes operable windows (for ventilation); maximizes comfortable daylighting, uses healthy building materials

Community

CBA	Addresses Springdale/Town Center	Building and site are architecturally harmonious with the local architecture and will be described as architecturally charming and graceful, vibrant, appealing, and appropriate for Dover
	Schematic Design	Building and site inspires community pride
	Schematic Design	Building and site development encourage community engagement and ongoing involvement, as focal point of community life
	Prerequisite	Serves the whole, multi-generational community
	Prerequisite	Maximize stakeholder participation in study process

Criteria for Success

Sustainability

Feasibility

Energy efficient, environmentally friendly building with sustainable energy systems with an ease to operate

Schematic Design

Minimum 20% energy savings over existing building to support Dover's MA commitment as a Green Community

CBA **Solar orientation for PV**

Solar ready design, while respecting mature trees

Schematic Design

Utilize durable and easily maintainable building materials

CBA **Zoning of shelter spaces**

Resiliency: robust infrastructure to support the community in weather event such as power-loss or heat-wave