City of Melrose
Melrose High School
Athletic Complex
Feasibility Study

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MELROSE HIGH SCHOOL ATHLETIC COMPLEX
FEASIBILITY STUDY

SECTION 1 – BACKGROUND AND FEASIBILITY STUDY OBJECTIVES

The existing athletic facilities at Melrose High School are not compliant with Massachusetts Interscholastic Athletic Association (MIAA) and National Federation of State High School Associations (NFHS) geometry and are in chronically marginal condition. The pending relocation of the existing track affords an opportunity to reorganize the athletic campus, resulting in significant improvements. Gale Associates, Inc. (Gale) was engaged in the fall of 2010 to assist the City of Melrose (the City) with the development of a feasibility study for the renovation of the Melrose High School Athletic Complex. The resultant feasibility study is intended to identify and address the priority needs of the High School and the City, to make best use of available space, and provide cost-effective, yet state-of-the-art, planning solutions for the renovation of the athletic campus.

The processes used to complete the feasibility study are focused on five specific stages and are summarized as follows.

1. To evaluate the Community needs and priorities, program and vision as they relate to the Melrose High School Athletic Complex redevelopment.

2. To rigorously assess the prevailing site and facility conditions at the Melrose High School Athletic Complex so that planning is completed with few assumptions.

3. To determine how the existing parcel may be reconfigured and redeveloped to best meet the athletic facility needs of the City.

4. To devise a phasing scenario that respects the fiscal realities of the City and its on-going need for field space throughout the master plan implementation.

5. To compile realistic by-phase cost estimates, based on current and projected future athletic facility construction costs, to serve as the City's redevelopment budget.

This report documents the deficiencies of the Melrose High School Athletic Complex and details the recommendations and steps that the City of Melrose can take to make better use of available resources (i.e. space, time, funding, etc.) to meet their athletic and recreation program needs.

SECTION 2 – BASEPLAN DEVELOPMENT AND ASSESSMENT OF EXISTING FACILITIES

In order to facilitate the planning of the proposed athletic field renovation, Gale prepared an Existing Conditions Base Plan (Enclosure 1). This plan was a compilation of survey and record information received from the City and from an on-the-ground survey performed by Gale. This existing conditions plan provides sufficient detail for planning purposes and is also suitable for the next stages of design development.

Similarly, Gale completed a partial geotechnical investigation to establish water table height and soil infiltration rates for determination of the design parameters associated with the drainage improvements for both the stadium field and the baseball field. Future geotechnical studies will be required in locations of the new bleachers, buildings and light poles to determine the design parameters for the asphalt paving design and design of building and bleacher foundations.

In addition, Gale completed multiple site visits to the athletic complex to evaluate the existing facilities. Facilities were assessed respective of serviceability, code compliance, handicap access, compliance with MIAA standards, NFHS standards, safety, and remaining useful life. The following is a summary of Gale's findings.

2.1 Site Description. The Melrose High School Athletic Complex is located on the corner of Lynn Fells Parkway and Tremont Street. The site is bordered by Lynn Fells Parkway to the south, Tremont Street to the west, the Middle/High School and a detention pond to the east and commercial and residential properties to the north. The site location and existing conditions plan is provided in Enclosure 1.

2.1.1 Soils. Historically, the Melrose High School Athletic Complex site was a marshland that had been filled over the years. This is documented by various site investigations that had been performed at the site and is confirmed by the United States Soil Conservation Service soil mappings for the site that identify the soils for the site as "Udorthents, wet substratum" (UD). UD soils consist of areas where soil has been excavated or deposited. The depth of fill in these areas typically ranges from 2 to 20 feet. The characteristics and properties of UD soils are variable, and on-site investigations are required to determine the limitations and suitability of the on-site soils.

Soil Exploration Corporation (SEC) conducted five soil test borings (B-1 through B-5) at the site on July 9, 2007, for a previous base line geotechnical study. Gale Associates, Inc. also logged test pits excavated at the site on August 8, 2010. SEC generally advanced the borings through fill and buried organic soils into natural granular soils to depths between about 4-feet and 32-feet below grade. SEC terminated boring B-4 on a refusal and boring B-5 within fill soils at about 4-feet below grade. Test pits completed for Gale's feasibility study were excavated to depths between about 4-feet and 7-feet below grade. Each of the tests pits were terminated within fill.

The general subsurface conditions encountered in the above referenced explorations performed at the site consist of 0.5± foot of surficial loam fill underlain in succession by about 3.5 to 6-feet of fill, intermittent organic deposits and then natural granular soils. The majority of the test pits and boring B-5 were terminated in fill. The organic soils, a compressible peat deposit, were encountered in borings B-1 and B-2, which were performed in the approximate middle of the property, but not to the depths explored in the remaining explorations. The organic soil was not indicated on the log of boring B-3, where natural granular soil was encountered directly below fill. The fill thickness and presence of underlying organic soils was not determined at test pit locations and boring B-5. SEC encountered a refusal after advancing boring B-4 into fill at 4-feet. The cause of the refusal (i.e. obstruction in fill, boulder or bedrock) was not indicated on the log of that boring.

Groundwater, where encountered, was recorded at depths between about 4 and 5± feet below grade at the time of the subsurface explorations. Groundwater levels at the site will likely fluctuate with changes in weather and other conditions and will be different than those encountered at the time of the subject explorations. The implications of these geotechnical findings are discussed in more detail in Section 5.10.

2.1.2 Wetlands Resource Areas. The project site is in close proximity to Ell Pond, which sees routine flooding in large storm events. The athletic fields are also located in flood zone AE, according to the Flood Insurance Rate Map (FIRM) for the site. Areas classified as AE are areas that are inundated by 100-year flooding for which base flood elevations have been determined. The flood plain delineation is provided in Enclosure 3.

The site does have some limitations related to the Massachusetts Wetlands Protection Act due to the on-site detention basin. This detention basin is classified as a bordering vegetate wetland, which has a 100-ft buffer, per the Massachusetts Wetlands Protection Act. Work will be required within the 100-ft buffer zone to this wetland resource area and consultation with the Melrose Conservation Commission will be required for the proposed improvements. Work is generally allowed, within this buffer-zone with an "Order of Conditions", and this effort will not likely affect the project layout (as proposed) or the project schedule.

2.2 Entrance and General Accessibility. The existing main entrance into the stadium is located off of Tremont Street, through a double gate within the perimeter chain link fence. This gated entrance is serviced with a ticket booth with limited queuing space. The entrance is on the same level as the parking lot and is without any curbs to create barriers. The slopes in this area range from 1.1% to 3.0%. This area appears suitable with respect to ADA accessibility. However, as you enter the site, there are no accessible walking paths that provide access to the on-site seating.

There are secondary entrance gates located along Tremont Street that service the baseball facility (Morelli Stadium). The gates are accessible off of a concrete sidewalk along Tremont Street. However, they provide access only to the bleachers accommodating Morelli Stadium, which are not ADA accessible.

The final access point is through Union Street, on the north side of the property. However, there are no dedicated ticket booths in this area and no ADA accessible walkway and/or paths to any of the on-site spectator seating.

In general, site accessibility is limited and, once within the site, there are no accessible routes to any of the site amenities. At the same time, the complex suffers from a lack of a central control point and frequently spectators gain access to the field events without purchasing a ticket. In addition, there is limited control over protecting the fields from use during events (i.e. kids on the baseball outfield). This places more wear on the playing surfaces that is necessary.

2.3 Natural Turf Multi-purpose Field. The natural turf multi-purpose field geometry is limited by the adjacent bituminous concrete track and a light pole structure located within the limits of the track. The radius of the track and the limiting structures within the track edge affords a soccer field width of approximately 170-feet, with the appropriate 10-foot wide safety zones on either side of the field. The 170-foot field width is just above the NFHS minimum width for a soccer field (55-yards; 165-feet), and significantly less than the NFHS optimal width of 70-yards (210-feet). Increasing the size of the existing field can only be achieved by relocating the track program or replacing the existing track with a larger radius track. The field itself is an irrigated natural turf surface of fair quality and with adequate cross-slopes. However, it is sustained only by aggressive maintenance and severely limiting the use of this field for games and practices. The existing irrigation system, which runs off of City water, is in failure and constantly requires repair to just operate at a sub-par standard.

2.4 Natural Turf Baseball Field. The natural turf baseball field is limited by the nearby track and multi-purpose field, as they share outfield space. This presents a safety hazard to left and center fielders who have to worry about the track as they attempt to pursue and catch flyballs. In addition, the right field area is also used as practice space for fall sports, which eliminates the potential to rest this area for proper maintenance of the turf.

The existing dugouts on site have received several upgrades are in fair condition. However, the roof is extremely flat and constructed with standard shingles, which is not recommended. At a minimum, this roof should be change to an EPDM roof to avoid long-term leaks. This field is also irrigated but is similar to the multi-purpose field in that the irrigation system is in constant disrepair.

2.5 Track. The existing 6-lane track is approximately 400 meters in length, with a radius of approximately 125-feet. The longitudinal and cross slopes of the track are inconsistent and the track contains several depressions where puddling occurs and the track surface is deteriorating. There are several areas where there are obstructions less than 30-inches from the outside lane line. A minimum of 1-meter (3.28-ft) of clearance is required for safety purposes.

Currently, there are three access points onto the track and field from the surrounding area. Each of these has a small paved area in the grass extending out from the fence. Due to the deficiencies noted, the existing track is unsuitable to host MIAA sanctioned events.

2.6 Track Field Events. The stadium currently has one long jump/triple jump runway, one shot put circle, one high jump pad, and a concrete discus circle.

2.6.1 Long Jump/Triple Jump. The long jump/triple jump runway is located on the inside edge of the track straightaway and is in poor condition. The run-up surfacing is in poor condition. The sand pit is at the easterly end of the runway and is poorly delineated and without formal edging. The sand pit does not have sand catchers or covers.

2.6.2 Shot Put. The shot put circle is located adjacent to the straightaway chute extension and consists of a rectangular concrete pad that is equipped with a ring or toe boards. There is a formal landing area delineated. However, it does not meet the slope requirements of NFHS.

2.6.3 Discus. The discus circle is located within the limits of the high jump pad. It was not apparent if there was a protective cage, which is a requirement of MIAA and NFHS.

2.6.4 High Jump. The high jump area is a paved rectangle located within the East D-area of the track. The paved surface is in poor condition and the track surfacing is delaminating in multiple areas.

2.7 Stadium Seating. The stadium has two sets of clear span bleachers, an approximately 3,500-person bleacher on the home side and a set of two bleachers totaling approximately 500-seats for the baseball field. Neither of the bleachers is handicap accessible. None of the bleachers accommodate the required number of wheelchair accessible seats mandated by ADA, nor does either bleacher system have an accessible access route from the site entrances for getting to the bleachers. In addition, the current bleachers do not meet the current building code requirements for fall protection in relation to the risers near the seats. The existing concrete foundations that support the steel bleacher structure have received multiple repairs in recent years due to failure of the concrete. The bleachers are un-safe and must be replaced in any redevelopment scenario.

2.8 Athletic Complex Lighting. The existing lighting system consists of seven wood light towers; two of which are located immediately behind each of the bleacher structures. The existing system is a combination of multiple light fixtures, all of which are not easily accessible to repair when needed. In addition, the existing system does not provide adequate light coverage on the playing surface to make it suitable for safe high school play. The existing lights are outdated and must be replaced in any redevelopment scenario. The power for the lighting system comes from overhead wires along Tremont Street. The controls for the lighting system are located within the pressbox/concessions building, adjacent to the natural turf baseball field. This power supply will be adequate for the

proposed lighting system. However, if the building is demolished, a new control location will have to be provided.

2.9 Public Facilities

2.9.1 Bathrooms. There are currently two bathroom facilities located within the athletic complex and both single-fixture facilities are located in the baseball concessions building. These are not accessible from the stadium bleachers. During use of the stadium, several public toilets are opened in the Middle School Building (4-men's and 4-women's). Per 521 CMR, Architectural Access Board, Section 30, each public toilet room provided on a site or building must be accessible or provide at least one accessible unisex toilet room at each location. Accessible unisex toilet rooms shall have a minimum dimension of 7'6" x 6'. The existing bathrooms at the baseball concession stand are approximately 5' x 6' and, as such, the existing bathrooms can not be made accessible. The City could demolish the two single bathroom facilities and create one unisex accessible bathroom in their place. It would cost the City approximately $15,000 to modify the bathrooms in the baseball concession stand. Based on the cost to renovate the existing facility and the requirement for additional bathrooms, it is more feasible to include handicap bathrooms as part of a separate building elsewhere on the site.

2.9.2 Baseball Concession/Pressbox Building. The existing baseball concession/pressbox building is a two-story, CMU block structure, in relatively good condition. It has seen updates within the past 10-years, but is not handicap accessible for workers or patrons. The door to the concessions building is located two steps above the surrounding elevation and the existing threshold is greater than 6-inches. ADA requires doorways to have a maximum threshold of one half inch. The surface above the top step consists of loose gravel, which is out of compliance with ADA's requirement of a firm and stable material. The counter heights are located 47-inches above the finished grade where ADA requires a maximum height of service counters to be 38-inches.

The existing foundation exposures range from 12 to 15 inches around the perimeter of the building. The extent of the foundation height may allow site work to be done so that the door and counters meet ADA requirements without any modifications to the structure.

The improvements required/proposed at the Melrose High School Athletic Complex are in excess of $100,000. As current accessibility codes state that if work performed to any facility over a 3-year period exceeds $100,000 or 30% of the assessed value of the building, then the entire building will need to be made accessible, including the pressbox area. Based on this requirement, it is more feasible for the City to construct one centrally located concession bathroom facility for the complex. A new, ADA accessible modular pressbox could be constructed to service baseball.

2.9.3 Stadium Press Box. The existing stadium pressbox is a two-story, stick built structure and is in relatively good condition. As stated above the existing bleachers are not handicap accessible. Because the press box and coach's box are only accessible through the bleachers, the press box is also not ADA accessible. In addition, the doors to

the pressbox are not wide enough for ADA compliance, so even if an accessible route is provided to the pressbox, the entrance doors would have to be replaced.

2.9.4 Stadium Concession Buildings. The existing stadium concessions building is a two-story, stick built structure located near the main entrance to the facility. The second story of the structure is used solely for storage and is accessed via a ship's ladder. The concessions building has no grilling areas. However the Lion's Club (which operates the building), does have a plug-in electric stove where items are heated. The building is in generally good condition, but is in need of some repairs (i.e. asphalt shingles, exterior lighting, etc).

2.9.5 Public Facilities Building. There is an existing public facilities building located on site behind the existing grandstands. This is a one-story, CMU structure that was converted from a restroom/locker room facility. Gale conducted a preliminary inspection of the facility. However, given the cost to renovate this facility to become a locker/team room, a detailed inspection was not completed. The current location of the building presents many conflicts to the potential redevelopment of the parcel for regulation size fields. It was determined early on that the most feasible option for the athletic complex involved demolishing this building and finding a new location for the school maintenance staff. This decision was based on the layout of the proposed fields, as well as the flooding mitigation for the new fields. By demolishing the public facilities building, the site is able to accommodate a regulation, multi-purpose, rectangular field, as a well as a regulation baseball facility, with no combined outfield space. In addition, by allowing the fields to be shifted, the multi-purpose, rectangular field is moved further away from the areas of the site that have a tendency to flood in extreme storm conditions.

2.9.6 Storage Buildings. There are two CMU block storage facilities located underneath the bleachers, neither of which can be reached via accessible walkways. Both of these facilities were locked during Gale's site inspection. However, given their limited size, they would not be adequate for storage of the athletic equipment needs for the existing users of the facility.

2.10 Existing Drainage and Flooding. As noted above, the entire complex lies within the 100-year floodplain of Ell Pond (Elevation 53.0). The current site has two drainage patterns. The first of which is a series of catchbasins that collect surface run-off from the western portion of the site and direct it to the existing drainage system on Tremont Street. These structures are in proximity to the left field foul line of the baseball field. This system outlets to an existing drainage culvert and ultimately to Ell Pond.

The eastern half of the site flows overland and into a series of catchbasins that direct run-off into the existing stormwater detention pond and ultimately across Lynn Fells Parkway via a concrete culvert and into Ell Pond. This existing detention pond also provides stormwater management for the adjacent middle school.

The site currently floods in several areas. However, the natural turf athletic field inside the existing track has not flooded since the City implemented several drainage

improvements in the area, even under severe weather conditions. This was witnessed and documented in the March 2010 storms, during which the area was inundated by over 15-inches of precipitation (11-inches over the normal precipitation for the month of March). One of the particular storm events dumped approximately 7.25-inches of rain on the fields and surrounding areas, which is in excess of a 25-year storm event. All of the rivers in southeast Massachusetts were inundated, as that amount of rain is in excess of design standards associated with Massachusetts Stormwater Management Regulations. Refer to Enclosure 3 for flooding documentation of this storm event. These photos represent the extent of the flooding in the areas of the Melrose High School fields. The proposed multi-purpose, synthetic turf fields, are designed to be approximately 70-ft from north of the limits of this documented flooding.

SECTION 3 – FIELD DEMAND

The natural turf fields at the Melrose High School Athletic complex were generally in good condition during the initial site investigation performed by Gale in summer 2010. However, the field currently requires aggressive maintenance and restricted use to make it through the fall and spring sports seasons in reasonable condition.

During the planning process, Gale met with the High School Field Committee to collect usage data and identify the extent to which the High School athletic complex is used. We also identified that there are several teams that use the Pine Banks facility, in place of the High School Complex, that may otherwise be scheduled at the High School, were the field conditions not an issue.

To analyze the field usage, the calendar year was divided into two seasons, fall and spring, which focus on the High School sports seasons. The complex currently receives heavy use during both of these seasons. The fall season consists primarily of football, while the spring sees use from baseball, men's lacrosse and women's lacrosse.

The total number of team uses (a team use being 20-30 persons using the field for a 2-hour event) was then established for both the multipurpose natural turf field and Morelli Field (baseball). Practices were also taken into account as team uses, due to their repetitive nature over the same areas and the resulting damage to the turf. These results are found in Enclosure 4, within the "Actual Uses" column.

Gale has provided a field use matrix for all high school and middle school teams that use the facility (see Enclosure 4). The matrix does not take into account the City of Melrose Youth Lacrosse program, as well as Babe Ruth Baseball, American Legion Baseball and the Northeast Baseball League, all of which use the facility and only exacerbate the demand. The totals from this matrix provide an accurate reflection of all of High School and Middle School uses of the complex.

3.1 Field Demand Impact – Equivalent Team Uses

While the number of scheduled uses is important to gain an understanding of field space adequacy and turf quality, it can be misleading, as scheduled uses do not always correlate to damage to the turf condition. Obviously, high school football is more deleterious to turf condition than high school baseball, as larger, more competitive athletes cause higher stress loads on the playing surface. Also, different sports cause damage to turf in different areas. For example, football causes turf to wear between the hash marks, while soccer and lacrosse cause wear at the goals, at center field, and along the sidelines. As a result, we must account not only for the number of uses, but for the type of use and age of the participants as well, by applying an impact factor to the raw scheduled use data. These results are found in Enclosure 4, within the "Modified Uses" column.

We have assigned an impact factor of 1.0 to women's lacrosse as the average activity in terms of field impact and deterioration. We assume that adult football is twice as damaging to the turf and assign it a 2.0 impact factor accordingly. Similarly, baseball has less impact on turf condition and is assigned an impact factor of 0.75. Other impact factors for various sports were assigned accordingly, and multiplied by the number of scheduled uses for each type of activity to yield the equivalent team uses in terms of turf damage and impact.

The equivalent scheduled team use data for impact on fields which routinely sustain use for adult sports, such as men's lacrosse or football, tend obviously to be higher than actual scheduled uses, while those for fields which are routinely used for baseball tend to be less.

While this approach is arguably somewhat imprecise, it is a definite improvement over the consideration of raw scheduled use data alone, as it does account for differences in the impact on turf condition.

3.2 Field Use Schedule

How a field is scheduled is an important consideration in its ability to sustain heavy use with an acceptable decrement in turf condition. Obviously a field with 250 scheduled uses stretched out over the year (May through October) behaves differently than if this use was broken up with rest period(s) provided. Ideally, a natural turf field should have a 30-day minimum rest period during the active growing season (spring or fall) in order to repair the root zone damage it has sustained and to propagate new crown growth. Alternatively, this rest period can be in the summer time. However, this is less effective as the turf grass is somewhat dormant.

It should be particularly noted that it only takes playing once on a very wet field to destroy the turf root zone for that season. An effort must be made not to play games or even practice on fields that are excessively wet. The enforcement of a restrictive inclement weather policy by field managers is the singular best management practice available.

3.3 Field Demand Conclusions

An aggressively maintained and irrigated natural turf field that is rested for up to one-third (1/3) of the growing season can theoretically sustain up to 250 team uses per year and provide a high quality and safe athletic turf. However, for most municipal fields that are less well maintained, seldom rested, and often poorly watered; like the Melrose High School fields, a more realistic level of use is 200 scheduled team uses per year.

The High School multipurpose natural turf field's current scheduled team uses total is 255, while Morelli Field sees 567 scheduled team uses annually. As noted, this is only the High School and Middle School uses of the field and these numbers do not account for all of the City programs that may make use of the facility when it is available. In addition, virtually none of the fields have a spring or fall rest period and only sustain any length of rest in the summer, which is a non-ideal growing season.

Gale's findings are that, given optimal maintenance efforts and growing conditions, the current demands on the High School playing fields currently in use exceed the level at which it is possible to sustain safe, high quality athletic facilities. This is the reason behind the current condition of the fields following the fall or spring playing seasons. The only options for mitigating the field demand problems with the facility is to purchase and develop additional athletic field venues, or construct an all weather, synthetic turf playing surface that can be aggressively scheduled with zero detriment to the turf condition.

SECTION 4 – SCHEMATIC PLANNING PROGRAM

Gale conducted several planning design program development meetings with the Melrose Field Committee through August and September 2010. Based on these meetings and multiple site visits, we compiled the following outline of the planning program elements:

4.1 Multi-Purpose Athletic Field

- The field should be a filled-synthetic turf, installed by an industry leader, with an effective under-drainage system.

- The field should be de-conflicted from the baseball field, allowing for full concurrent use of each facility.

- The field should afford a minimum 65-yard wide soccer field. It should be striped for three events - American football, soccer, and men's lacrosse - with permanent tufted lines. Guide marking will also be tufted into the turf to facilitate the painting of woman's lacrosse and field hockey lines by City personnel.

4.2 Track and Field Facilities

- Due to the site limitations, the City determined that the best solution is to relocate the track and field facilities to Pine Banks Park, where there is adequate space for a regulation size track and associated field events. The Committee did direct Gale to evaluate the feasibility of a walking path around the perimeter of the new fields in the preliminary design.

- The ability to locate an MIAA compliant running track on-site presented a challenge. It was determined that keeping and MIAA compliant track on-site would not allow for separate facilities for a regulation sized baseball and rectangular field. In addition, a track and field facility on this site would not be able to be shifted outside of the area of the site that currently floods, impacting the long-term sustainability of a track.

4.3 Baseball Stadium

- Provision of an improved regulation sized baseball field (natural or synthetic), to include an improved drainage system with dugouts, batting cages, bullpens, etc.

4.4 Spectator Seating and Pressboxes

- New spectator seating for both the stadium field and the baseball facility that is fully ADA accessible should be installed. The seating capacity should be consistent with those of the teams within the Middlesex League. The breakdown of approximate seating counts at each facility within the Middlesex League is as follows:

Large School Division
Belmont HS (1,500 seats); Lexington HS (1,500 seats); Reading HS (2,800 seats); Winchester HS (812 seats); Woburn HS (2,600 seats) – Avg. 1,840 seats

Small School Division
Burlington HS (1,440 seats); Stoneham HS (2,100 seats); Wakefield HS (1,800 seats); Watertown HS (2,600 seats); Arlington HS (3,500 seats); Wilmington HS (1,000 seats) – Avg. 2,070 seats

- An accessible path should be carried to each bleacher system, outside the crowd control fencing from both entrances, to connect to each bleacher system.

- The Pressboxes should be replaced at both the stadium and baseball field and designed to be ADA accessible.

4.5 Bathroom Facilities

- A new permanent bathroom building shall be constructed to meet local building, Board of Health, and ADA requirements.

- The building shall be configured to allow public access from inside the stadium so that the restrooms can be used during other community events.

4.6 Other Site Features

- The stadium entrance should be generally strengthened by plantings, architectural features, signage, etc.

- Existing field lighting should be modified, as required, to provide at least 50-foot candles of illumination for both the stadium field and the baseball field

- A team room should be provided for visiting teams to eliminate the use of the existing Middle School facilities.

- A walking path should be created to mitigate the loss of the track used by the residents of the City.

- Perimeter and interior site fencing should be installed to minimize vandalism and secure certain portions of the site, both for daily use and also event management.

- Concessions facilities should be provided/maintained on-site for both Baseball and Stadium facilities.

- Storage facilities should be provided for the site.

SECTION 5 – SCHEMATIC DESIGN

Gale prepared several layouts for the proposed facilities improvements that were discussed and evaluated during the planning meetings with the High School Field Committee. At each meeting, pros and cons were presented by Gale for each alternative. The final layout of the parcel, which best meets the needs and demands of the High School, Middle School and the City of Melrose is presented in the attached plans (Enclosure 5).

5.1 Multi-Purpose Athletic Field Layout. The proposed layout provides for a filled synthetic turf area of approximately 245' x 384'. This turf area allows for a soccer field of 210' x 360', versus the NFHS "optimal" of 225' x 360' and minimum of 165' x 300'. This also allows for a NFHS standard boy's lacrosse field, woman's lacrosse field, a standard football field, which requires 300' x 160', and field hockey, which requires 180' x 300'. NFHS recommends that soccer include a safety zone of 10-feet, and that both football and field hockey include a 12-foot safety zone, which has been incorporated into the final site layout.

5.2 Baseball Stadium Layout. The proposed baseball field provides for a baseball field with a left field foul pole distance of 321-ft, 386-ft to center field, and right field foul pole distance of 310-ft. In addition, this revised layout results in a fully enclosed baseball field, which will protect the field during the fall season.

The renovation includes an 8-ft high black vinyl-coated, chain link outfield fence and 4-ft high, black vinyl-coated, chain link fence along the foul lines for easier spectator viewing. The dugouts will be reconstructed with modular dugouts, with each having its own storage area. In addition, two new bullpens will be constructed beyond the right field outfield fence and a new batting tunnel in center field.

The baseball field will remain a natural turf field and have a gravel drainage layer and underdrain system to help mitigate current drainage issues and allow for more use in the wet spring season. Finally, a new backstop will be constructed along the face of the bleachers, with a height of 30', to minimize foul balls out onto Tremont Street.

5.3 Stadium Grandstands and Pressbox. The proposed grandstand for the stadium field has been designed to accommodate 2,000 spectators and, although this is a decrease in the existing seating capacity, the average capacity of similar High Schools within the Middlesex League is 1,500 spectators. The bleacher system is designed as a clear span system, which provides spectator access via a walkway underneath the bleacher system. In addition, this design provides two enclosed (chain link fence) storage bays below the grandstands that will provide storage space for the users of the facility. The bleachers will be fully ADA accessible. The proposed design has been based on a Dant Clayton system, which includes a fully welded deck and provides a 5-year manufacturer's warranty on the bleacher system.

The new pressbox will be a modular pressbox that will be divided into three rooms (2-coaches areas and 1-press area). In addition, there will be a filming platform on the top of

the pressbox that will be accessible via a ship's ladder. The pressbox, in accordance with Massachusetts ADA accessibility guidelines, will be accessible via a hydraulic lift.

5.4 Baseball Stadium Grandstands and Pressbox. The proposed grandstand for the baseball field has been designed to accommodate 250 spectators. This will be a mitered system directly behind the homeplate area. The system has been designed implementing an angled aluminum understructure, which reduces costs and will be constructed on a concrete slab.

The new pressbox will be a modular pressbox that will match the aesthetics of the stadium pressbox to bring uniformity to the site. In addition, there will be a filming platform on the top of the pressbox that will be accessible via a ship's ladder. The pressbox, in accordance with Massachusetts ADA accessibility guidelines, will be accessible via a hydraulic lift.

5.5 Athletic Surfacing. The schematic plans and cost estimates have been prepared based on an assumption that the project calls for the installation of high-quality synthetic athletic surfaces. The synthetic turf field will be constructed with a filled-synthetic turf field consisting of a 2 ½" high monofilament fiber, with a sand and rubber infill.

The design for a 2 ½" pile height is related directly to the uses that the facility will see. Due to the fact that this field will be used by football, men's and woman's soccer, men's and woman's lacrosse and field hockey, the 2 ½" pile height will provide a more sufficient base for impact levels required for these sports. A shorter pile height may require a resilient pad system, which would be a cost inclusion that Gale does not feel is necessary.

When it comes to a field's infill, specifically given the site's potential for flooding, Gale recommends cryogenic rubber be implemented into the design. Cryogenic rubber is the highest and rarest grade of rubber granule. When you grind up a rubber tire approximately only 4% of that tire is suitable for cryogenic rubber processing while the remaining 96% is set aside for ambient processing or ambient rubber.

During the grinding phase, ambient rubber is simply processed through a high powered rubber cracker mill. The result of this process is a jagged inconsistent rubber granule, which has the tendency to degrade rapidly over time. When used as an infill component, ambient rubber has the propensity to float and scatter as the air bubbles located within the rubber facilitate simple infill migration. The process of grinding the rubber is referred to as ambient because all size reduction steps take place at or near ambient temperatures, (i.e. no cooling is applied to make the rubber brittle before grinding).

The process of creating a cryogenic rubber granule requires a substantial amount of time and technical manipulation. First, a rubber tire is grinded through a mill. Then the smooth clean particles are separated from the dirty, jagged ambient particles. Once separated, the rubber is then frozen to a temperature of below negative eighty (-80) degrees Celsius (-112 degrees Fahrenheit). Cryogenically freezing the rubber allows for a cleaner more glass-like partition of the rubber. While the rubber is still frozen it is placed through a specialized mill which then carefully and cleanly cuts the frozen rubber into small,

smooth and rounded particles. The cryogenic freezing process also helps to prevent the formation of any loose or stray rubber strands which reduce the overall quality of the rubber.

When it comes to the topic of drainage, Cryogenic rubber works to promote effective and consistent drainage by eliminating the potential for migration caused by water. The cryogenic rubber's smooth and rounded shape facilitates a consistent flow of water through the infill without raising and displacing any rubber. The loose and jagged rubber strands found in ambient rubber make it highly vulnerable to migration and floatation caused by the air bubbles in water. Even though the specific gravity of ground rubber is about 1.14 (slightly heavier than water), if there are enough air bubbles attached to the rubber, it will float. As the ambient system drains, the rubber has potential to migrate and can be easily dispersed. As a result, empty pockets in the infill of the field may form, which can be extremely hazardous to the athletes. Both of the fields that Gale has designed in flooding conditions have included the incorporation of cryogenic rubber in the infill and we can state, based on field conditions, the cryogenic rubber will not migrate in flooding conditions.

The filled synthetic turf carried in the estimate is a top tier product in the industry. The system will be among the best in terms of durability, performance, and appearance. In addition, the synthetic turf field will come with an 8-year manufacturer and third-party insured warranty.

The natural turf baseball field, as proposes, will be constructed with an engineered, sand-based root-zone, constructed on a gravel drainage layer that would be free draining and provide more use during the wet spring months. The final design incorporates the use of an athletic field sod to make sure the field is on-line as soon as possible. In addition, new irrigation would be provided that will result in better coverage and easier maintenance in the summer months.

5.6 Bathroom/Concessions Facilities. A new bathroom/concessions/team room facility, containing ten fixtures each for men and women, will be constructed in proximity to the new Middle School building. The building will be constructed as two separate structures, with one roof, creating an entrance tunnel to the facility with a ticket booth.

In addition to the bathrooms, there will be two team rooms that can be used by visiting teams, as well as City teams using the facilities. There will also be a concessions facility that will include a storage room and office for administrative items (i.e. counting concessions, ticketing, etc).

The final design elements of the new bathroom/concession building will be well integrated with the Architecture of the newer Middle School building to have continuous aesthetic flow throughout the site.

A screened area, including concrete pads for portable toilets will be placed in proximity to the baseball field bleachers. In addition, the City will procure or rent a portable concessions trailer that will service the baseball field during use of this facility.

5.7 Schematic Entrance Design. The concept for the entrance to the athletic complex is to provide two access points that are both functional and attractive. The main site access will be adjacent to the access road, near the Middle School, with the second access, primarily for the baseball field, coming at the corner of Tremont Street and Lynn Fells Parkway. The concept utilizes the general appearance of the Middle School architecture to create a consistent and attractive theme for the main entrance from the parking lot. Brick veneer entrance columns and decorative aluminized steel gates will be installed at both entrances, creating a gateway into the facility while maintaining site security when the facility is not in use.

A new flagpole and planting area with select landscaping and possible signage will greet spectators as they enter into the stadium. This area will be shared by both the baseball and stadium facilities. The landscaping within the planting area and around the perimeter of the site will include low maintenance evergreen shrubs and perennial flowers. In addition to the interior landscaping, perimeter landscaping improvements are proposed to enhance the viewscape along Tremont Street and Lynn Fells Parkway.

5.8 Athletic Field Lighting Design. The proposed site lighting system calls for the complete overhaul of the existing lighting system. The stadium athletic field lighting will consist of a five (5) pole system, while the baseball field will be constructed with an eight (8) pole system, two of which will be shared with the stadium field. The result is a total of eleven new 70-ft steel poles, with energy efficient fixtures. The system is designed to provide a 50-footcandle illumination on the playing surface of the synthetic turf multi-purpose field and a 50/30 footcandle illumination for the baseball field. Both of these designs are compliant with MIAA and NFHS illumination standards for night competition.

The system proposed (MUSCO Athletic Field Lighting – Light Structure Green) provides a 25-year, no maintenance warranty reducing maintenance and operation costs. In addition, the dramatic improvement of photometric efficiency requires fewer fixtures to achieve desired light levels, reducing energy costs. Finally, the lighting system has an automatic controlling mechanism that allows the lighting to be scheduled weeks in advance through on-line scheduling software.

5.9 Drainage Improvements. The proposed stormwater Best Management Practices (BMPs) will attenuate, as well as treat stormwater runoff and promote groundwater infiltration. The project will be designed to incorporate BMPs to meet the requirements of the Massachusetts Department of Environmental Protection's (MassDEP) Stormwater Management Policy 2008 standards.

The proposed stormwater management system will collect stormwater runoff from all proposed paved areas. The stormwater runoff will then be routed via piping from deep sump, hooded catch basins to water quality treatment systems before entering the existing stormwater management basin. The deep sump, hooded catch basins and water quality treatment systems will aid in Total Suspended Solids (TSS) removal by settling out sediment and preventing oils and floatables from continuing downstream. Finally, treated

runoff from the proposed system will be discharged towards the existing stormwater management basin. As a result, the basin will likely have to be expanded and the basin's outlet control structure modified in order to provide additional storage, treatment and attenuation to stormwater runoff.

In general, synthetic turf fields drain stormwater runoff vertically, as opposed to natural turf fields, which tend to sheet flow runoff. The proposed synthetic turf field will be designed with an engineered stone base (8-inch min. depth with 30% min. voids) and be drained via flat panel drains that are part of the underdrain system. The time required for stormwater to travel through the stone base and fill the voids, before reaching the underdrain system, will enable the synthetic turf field to release stormwater at a controlled rate, provide storage to attenuate flows, and promote additional treatment and recharge opportunities.

The proposed baseball field will consist of natural turf with an engineered, sand-based root zone (6-inch min. depth) on top of a free-draining sand base (4-inch min. depth with 30% min. voids). The proposed baseball field will be drained via a flat panel drain system, similar to the underdrain system for the proposed synthetic turf field.

As mentioned above, the current design proposes to recharge the stormwater runoff through the proposed synthetic turf field's engineered stone base and through the baseball field's sand base drainage layer. The extent of recharge provided may be limited due to the site's high seasonal water table and the permeability of the underlying soil, as determined in the exploratory test pits completed within the field limits.

The current design proposes to re-grade the site slightly in order to improve the collection of stormwater runoff. Due to the site being within the 100-year flood plane, efforts will be made to keep the site balanced. The proposed grades will be within 1-ft of existing grades and the site will retain its northwest to southeast grade slope. If the proposed re-grading of the site results in sections of net fill, compensatory storage will be provided within the expansion area of the stormwater management basin and within the void space of both the proposed synthetic turf field's engineered stone base and the proposed baseball field's sand base.

5.10 Geotechnical Considerations for Design. As noted above, the project site is underlain by an unsuitable organic layer, consisting of a fibrous peat material above a granular substratum. This peat material is subject to long-term settlement due to potential loading and partial organic decomposition of this material. The depths of the layer vary throughout the site and the limits of this material will have to be documented with additional borings during the design development stages. There are several ways to address this peat layer to sustain the long-term planarity of the field and to reduce the adverse settlement of site structures. The design of the facility elements may include the following:

- The proposed bleachers will be designed to use individual sonotube (circular) foundations, augured and installed into the underlying gravel layer below the peat layer. This will place the footings' zone of influence in the structurally stabile soil sub-strata.

- This same technique will be used for the proposed light pole foundations. The proposed lightpole foundations will be designed to use pre-cast sonotube foundations, varying in depth, determined by the required embedment to the underlying gravel soil sub-strata in each pole location. These will be augured into the ground, set and backfilled with concrete.

- The proposed building foundations have two options for foundation design, which will be more specifically defined during the design development stages. Option "A", which may be more cost effective, would include over excavation to remove unsuitable soil materials and backfill with a compacted structural fill. Option "B" would include a helical pier sub-foundation to support a steel reinforced, cast-in-place concrete foundation system. Option "A" has been carried in the schematic construction cost estimate for the building and Option "B" would still fall within the contingency amounts carried in the schematic construction cost estimate

- The synthetic turf fields would be designed with a woven, geotextile tensile fabric underlying the gravel drainage base. This tensile fabric will distribute the potential loads incorporated onto the substratum. The unsuitable materials will have to be over excavated and replaced with compacted suitable material in areas where found. This has been included in the schematic construction cost estimate.

- The natural turf baseball field will not require any special excavation requirements for construction. The baseball field may experience some minor areas of settlement. However, given the natural turf construction, these areas can be remedied by filling and over-seeding, if they should arise. Given the current conditions and historical performance of the natural turf field areas, this phenomenon is not anticipated.

All of these design elements are consistent with many other sites in the northeast, as many school facilities have been built in urban areas where prior "wet" areas were filled for purposes of providing athletic and recreation space. Although these site conditions present challenges in design, they are effectively resolved with proper engineering practice.

5.11 Flooding Mitigation. One concern emphasized by the City was the feasibility of installing a synthetic turf field within a flood zone area. Gale has completed the design of two facilities, both in proximity to the City of Melrose. The first was designed and constructed under similar constraints at Framingham State College, in 2005, and the second at Manchester Field, in Winchester, MA, in 2009. The Framingham field floods on an annual basis, as it is located within 50-feet of a perennial stream. The Winchester field is in a 100-year floodplain, adjacent to the Aberjona River, and flooded during the March 2010 storm noted previously in the report. After flooding occurs in these fields, the levels of mitigation are directly related to the level of sedimentation that migrates from the flood

waters. In both Framingham State and Winchester, the fields were only groomed to mitigate any silt migration and were immediately available for use. Fields that received more sedimentation can be aerated to mitigate the extra sedimentation. Given that the flooding of the Melrose High School Athletic Complex fields typically occurs from the City's drainage system overflowing, the sediment should settle out of the flow and should be limited. Also included in Enclosure 3, is a memo from the Director of Facilities and Planning at Washington & Jefferson College, who documented their field flooding and the limited mitigation necessary to address this.

One concern at the Melrose High School Complex is the potential for overflow of the adjacent sewer line, which historically has backed-up onto the existing natural turf field. The City is currently working on a renovation to this existing line that will mitigate the issue by re-routing the sewer line to be down gradient of the synthetic turf field. The field designed in Winchester, MA, had the same concern, as it was adjacent to a MWRA sewer trunk line. If a sewer overflow occurs, the field would be tested for organics following the flooding. If organics are found, the infill can be cleaned by using an environmentally friendly disinfectant and then re-groomed. The price of this can vary depending on the level of contamination. However, it would not exceed $25,000 for the entire field. Again, an overflow event is not anticipated, given the proposed location of the synthetic turf multipurpose field and the revised location of the sewer line.

5.12 Environmental and Safety Concerns Related to Synthetic Turf. While there have been some concerns expressed in the media regarding synthetic turf, those that have been substantiated had to do with the earlier knitted nylon systems, e.g., "Astroturf", which had elevated lead content. There have been no studies completed under field conditions that conclude that there is an environmental or health and safety risk associated with the current generation of infilled synthetic turf systems like that to be installed at the Melrose High School Athletic Complex. The use (and environmental safety) of these systems has been extensively studied and substantiated by the US Consumer Safety Division, the United States Environmental Protection Agency, the Massachusetts Department of Environmental Protection, and dozens of other regulating bodies. All of these studies can be found at www.syntheticturfcouncil.org. No authoritative governmental body that has studied the health or environmental impacts of systems like that to be installed at the Melrose High School Athletic Complex, under field conditions, has concluded that they pose risk or health hazard.

Gale itself has completed independent testing of these materials. We commissioned a synthetic precipitation leaching procedure (SPLP) lab testing (the ASTM standard procedure) of the raw materials to assess leachate potential under field conditions with no risks identified. We have conducted water quality monitoring of three facilities at Wayland High School, five fields at the Mass Youth Soccer Complex in Lancaster, MA and two fields at Middlebury College in Middlebury, ME (adjacent surface water, groundwater, and water from the under-drainage system), which included testing for organic and inorganic chemistry and metals, and comparing it to pre-determined base levels, with no changes noted. Again, we can provide the details of these studies upon request.

Health and Sports Injuries. There have been numerous studies completed by sports medicine experts, the NCAA, the NFL and by the international soccer federation, (FIFA) assessing the incidence of sports injuries related to turf type. These reports examined both head / impact injuries, as well as joint (knee, ankle and hip) injuries. The most definitive studies were completed by a Dr. Barnhill at the University of Texas and can be found on line also at www.syntheticturfcouncil.org.

All of these studies have concluded that infilled synthetic turf is far safer than previous forms of synthetic turf and is as safe as high quality, well-maintained natural turf. They further conclude that infilled synthetic turf is safer than natural turf field in average to poor condition, as is often the case at the Melrose High School Athletic Complex toward the end of each playing season. We are not aware of a single substantive, objective, independent study that concludes that there is heightened sports injury risk associated with infilled synthetic turf fields.

The ASTM standard for shock attenuation of fields is ASTM 355 which generally measures the hardness of the field by dropping a standard weight from a standard height and measuring the rebound acceleration and deceleration. An index of shock attenuation called Gmax is determined based on the results of this procedure. The federal government has determined that a Gmax in excess of 200 is unsafe. A high quality stand of well maintained natural turf has a typical Gmax value of approximately 90-140. The Melrose High School field will be designed to have an initial Gmax value of about 130 and independent testing will be completed, prior to use, to demonstrate compliance with that specification. Additionally, the contractor will pay for annual retesting of the field to ensure the field's long term performance.

The potential for joint injuries is a function of two field conditions, planarity and foot-lock. Clearly, the synthetic turf field will have more consistent planarity, particularly over the long term, than any natural turf field. In a natural turf field there can be rutting, differential settling, and large divots that compromise planarity, particularly in the area of soccer, lacrosse, and field hockey goal mouths. The athletes (particularly young women) are running full out and misstep due to unanticipated bumps or depressions, which puts them at risk to sustain a joint injury. This type of loss of planarity has never occurred in any of the over 90 infilled synthetic turf fields designed by Gale.

Foot-lock related joint injuries (i.e. ACL tears) occur when the athlete's turf shoe is engaged in the turf and fails to release when the athlete is bumped. This was a chronic problem with the old Astroturf type knitted nylon synthetic turf fields, as the athletic shoe would get hung up in the tightly knitted carpet fibers. It can also be an issue in natural turf fields in which the thatch zone of the turf grass can be tight and dense. The infilled system proposed at the Melrose High School Athletic Complex has 2-inches of resilient sand and rubber infill loosely laid on top of the carpet, which affords the footing for the athlete. The polyethylene fibers will be spaced in rows ¾" apart which afford little opportunity to limit the foot's range of rotational motion.

There are, again, actual ASTM testing standards for coefficient of friction and rotational resistance which substantiate that the infilled synthetic turf systems are as safe as well managed natural turf fields as it relates to foot-lock joint injuries.

Another health related issue has been allegations of increased risk for staph-type infections related to synthetic turf. This heightened risk is well substantiated for indoor installations; particularly those in which the more abrasive Astroturf type knitted nylon carpets are involved. These installations need to be disinfected periodically, as do wrestling and gymnastic mats, locker room floors, etc. Alternatively, there have been no studies which suggest a heightened risk for staph-type infections related to outdoor infilled synthetic turf installations like the one proposed in Melrose. On the contrary, all such studies have concluded that there is no difference in the incidence of such infections between infilled synthetic turf and natural turf in outdoor applications subject to the effects of weathering and UV exposure. The best of these studies has been performed by the agronomy department at Penn State University and can be found on line at www.syntheticturfcouncil.org.

SECTION 6 – CONCLUSIONS AND RECOMMENDATIONS

As detailed herein, the existing athletic facilities and overall condition for the High School Athletic Complex are obsolete, non-accessible, over-used and require intensive maintenance and severely limited use to maintain a reasonably healthy and safe stand of natural turf.

The complex requires general redevelopment/re-organization to gain compliance with regulatory requirements and better meet the needs of the City. The renovations proposed by Gale address all of these issues. The resultant synthetic turf multipurpose field stadium and natural turf baseball stadium will be safer and extremely durable. They will provide an all-weather surface that will allow for significantly more use and will take the burden off other fields within the City. The synthetic turf field will drain freely and require virtually no maintenance (water, fertilizer, pesticides, lime, aeration, top dressing, stripping, plowing, etc.), allowing for the diversion of maintenance resources to other fields.

The renovated natural turf baseball field will provide a better playing surface and, although flooding of this area is still anticipated, the field will drain better and perform better than the existing field and will be available sooner due to the improved drainage.

6.1 Project Schedule and Phasing. The goal of the High School Field Committee is to start construction of the new Melrose High School Athletic Complex in the spring of 2011, with project completion prior to the end of the 2011 fall sport season. To achieve this goal there will have to be much coordination between the City, the Engineer and the Architect for the new bathroom/concessions building. To achieve this goal, the general schedule of each item will go as follows:

- The new sewer line project is in design and the City intends to break ground in early winter 2010 and have this project complete prior to the start of the athletic complex construction.

- The final site design and project permitting for the Athletic Complex will be completed by early winter 2011. This project will be bid under Massachusetts General Law (M.G.L.) Chapter 30, §39M which governs all contracts for construction, reconstruction, alteration, remodeling, or repair that do not include work on a building. Construction plans and specifications will be completed by January 30, 2011, with a public bid period from February 1 to March 1, 2011. Construction contract award, mobilization, and submittal review would be completed between April 1 and May 1, 2011. This schedule will allow construction to begin on May 15, 2011, and, given this schedule, the project will be complete by the first week of October 2011. The permitting for this project would be completed in conjunction with the final site design process. The project will require a notice of intent filing with the City of Melrose Conservation Commission, due to work within the buffer zone of the detention pond. Gale intends to complete this submission in early December 2010 and anticipates a 30-day period to obtain the necessary permits. Final comments will be integrated into the bid documents scheduled for January 30th delivery. The athletic field renovations will include review by the Building Commissioner for any potential need for zoning relief. However, given that

the project results in no change in use and is a renovation in-kind, Gale does not anticipate the requirement for a full Site Plan Review submission.

- The proposed concessions/bathroom facility will be designed and bid under a different schedule, as this requires a more detailed designer selection and bid process under M.G.L. Chapter 149. The building project would be designed continuously with the athletic field complex. The building, as proposed, will require a waiver from the State Building Code for fixture counts. This will be applied for in the early design stages and, historically, projects that resulted in a reduction of total seat count have been granted a waiver. Irrespective of the fixture waiver, the bid period will be slightly longer. This is due to the requirement of filed sub-bids for sub-trade contractors (i.e. electrical, masonry, roofing, etc) and the requirement of Division of Capitol Asset Management (DCAM) certification of the contractors. This project would bid in early spring, and slated for a construction start date in June. The project would be a 3 to 4 month process, depending on final finishes (i.e. toilets, flooring, wall finishes, etc.) determined in the final detailed design, and have project completion by September 2011. The site contractor and building contractor will have to work simultaneously on the site.

Although this design and construction schedule is aggressive, the majority of comparable projects completed by Gale have essentially completed in similar timelines. Many in fact have actually been restricted to smaller construction timelines with construction beginning after graduation ceremonies (early June) and construction ending at the start of football season (September 1). The Melrose High School Athletic Facilities Improvement project is more complex than your average athletic facility renovation given some of the site constraints and design elements noted in this feasibility study, however the proposed timeline is achievable with limited concerns.

6.2 Estimated Project Costs. The preliminary project cost estimate for the Proposed Layout is presented in Enclosure 6. This estimate is based upon schematic quantities and, while suitable for project budget development, is subject to change during the design development. This estimate is consistent with recent bid results for analogous public projects at prevailing wage rates, all of which Gale has bid within the past 18-months. The estimate includes a contingency of 10%, as well as "soft" costs for geotechnical investigation, design, permitting, and construction administration. The overall cost to construct the project as shown on the attached schematic drawings is approximately $4,000,000.