

PART IV: GENERAL REQUIREMENTS AND TECHNICAL SPECIFICATIONS

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**SECTION 01000
SUMMARY OF WORK**

PART 1: GENERAL

1.1 WORK COVERED UNDER THIS CONTRACT

A. Description

The work covered under this Contract shall consist of the installation of site amenities and equipment as called for on the plans and proper location of other site amenities, walkways and other site elements, park concrete walks, concrete curbing around the play area (s) and picnic shelter slab, various concrete footings and pads for shelter and site amenities, 30x40 picnic shelter including permit/inspection, park benches, picnic tables, trash receptacles, top soiling, sod lawn work, and other miscellaneous park work as shown on the Plans and as called for in these Specifications.

B. Alternates

The Alternate work is described under Section 01100, "Alternates".

C. Incidental Work

The Contractor shall be responsible for any and all incidental work which may be deemed necessary for proper and complete performance and installation of the specified work items.

1.2 DIVISION OF CONTRACT DOCUMENTS

- A. The work is described by the Contract Documents in three parts:
 - Part I: Contract Forms
 - Part II: Form of Proposals
 - Part III: Scope of Work(s)
 - Part IV: General Requirements and Technical Specifications
 - Part V: Standard Detail Drawings
- B. Contract Forms includes other information relative to the preparation and submission of a bid, bonds and general conditions, EEO Requirements.
- C. The Proposal Forms to be used in the submission of a Bid for the Project.
- D. Part IV consists of separate specifications for the Construction Contract. For the contract, Part IV is divided into two divisions per the CSI format.
 - 1. Division 1: General Requirements

The General Requirements cover matters generally applicable to more than one phase of the work, i.e. meetings, submittals, temporary facilities project close out and the General Specifications.

2. Division 2: Technical Specifications

- a) The technical specifications are subdivided into sections corresponding to a particular aspect of work. It is not the intent nor shall it be so construed that work included in any one Section be performed by a particular trade or subcontract. Likewise, the work to be performed by a particular trade is not necessarily restricted to that of any one Section. Any item mentioned under any heading must be supplied though it is not called for again under the heading for that respective work.
- b) Specific requirements stated in the various sections as though applicable to a single item or one unit of work shall also apply to all additional like items or units of work required by the Contract Documents, and shall not be interpreted as designating that only a single item or unit is required.
- c) Where reference is made in the Technical Specifications to Publications, such as specifications or standards of a technical society, trade association, governmental agency, and the like, it is understood and agreed that such publications are a part of the Technical Specifications, to the extent indicated by the specific references thereto, as though fully repeated therein.
- d) A copy of each referenced publication at file in the City Engineering Department is available for inspection by the Contractor. However, it is assumed that a Contractor experienced in the type of work involved will have his own source of access to the referenced publications.
- e) The Contractor shall comply with all rules, regulations, orders, etc. of any governmental agencies applicable to the work under this Contract. The Contractor shall cooperate with the City in promptly furnishing any information required by such agencies. It shall be an obligation of the Contractor to keep himself informed of governmental rules, regulations, orders, etc., which are applicable to his work. The Contractor shall make the requirements of this article a part of any subcontract he may enter into.

1.3 CONTRACT

- A. Contract Award, if made, is for a complete project in accordance with the plans and specifications under a single lump sum bid. Award will be made to the lowest responsible bidder, proposed in the best interest of the City of Detroit. There will be a pre-award meeting to assist in the review process prior to award.

1.4 FIELD ENGINEERING

- A. All necessary surveying points and grade stakes are to be provided by the Contractor. The grades and staking maintenance is the responsibility of the Contractor.

1.5 PERMITS

- A. The general building permit will be obtained and paid for by the Contractor. The Contractor is also responsible for obtaining and paying for all trade or other special permits and related inspection and any other costs under the permits for the work. Final permit clearances/acceptances is a condition of final payment.

1.6 PREPARATION OF SITE

- A. Providing and maintaining all security fencing around the area, barricades, warning signs, lights, danger signals, for the protection of life, work and adjacent property and so as not to affect adjacent property owners is the sole responsibility of the Contractor.
- B. Protecting and maintaining all conduits, wires, pipes, sewers and other utilities and structures that are to remain on the property is the sole responsibility of the Contractor.
- C. Removing all protection and guards when the work is completed or when directed by the City Representative is the sole responsibility of the Contractor.

1.7 EXISTING UTILITIES

- A. Contractor shall contract "MISS DIG" prior to construction in order to accurately locate all public utilities present on the site.
- B. Contractor shall notify all public utilities owning conduits, wires, cables, pipes, poles or lights running through the property and arranging for the removal of such utilities that must be temporarily or permanently moved or abandoned and paying all costs, if any are required, for such work.

END OF SUMMARY OF WORK SECTION

SECTION 01240
COORDINATION

PART 1: GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 GENERAL

- A. This Section includes requirements for coordinating construction operations including, but not necessarily limited to, the following:
 - 1. Coordination drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Cleaning and protection.

1.3 COORDINATION

- A. Coordinate construction to assure efficient and orderly installation of each part of the Work. Coordinate operations that depend on each other for proper installation, connection, and operation.
 - 1. Schedule operations in the sequence required to obtain the best results where installation of one part depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
 - 3. Make provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
 - 1. Prepare similar memoranda for the Owner and separate contractors where coordination of their work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required procedures with other activities to avoid conflicts and assure orderly progress. Such activities include, but are not limited to, the following:
 - 1. Preparation of schedules.
 - 2. Delivery and processing of submittals.
 - 3. Progress meetings.
 - 4. Project closeout activities.
- D. Conservation: Coordinate construction to assure that operations are carried out with consideration for conservation of energy, water, and materials.
 - 1. Salvage materials and equipment involved in performance of, but not incorporated in, the Work.

- E. Coordination Drawings: Prepare coordination drawings if needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space necessitates maximum utilization of space for efficient installation of different components.
 - 1. Show the relationship of components shown on separate shop drawings.
 - 2. Indicate required installation sequences.
 - 3. Comply with requirements contained in Section "Submittals."

- F. Staff Names: Within 15 days of commencement of construction, submit a list of the Contractor's staff assignments, including the superintendent and other personnel at the Project Site.

PART 2 : PRODUCTS -- NOT APPLICABLE TO THIS SECTION

PART 3: EXECUTION

3.1 EXECUTION

- A. Inspection of Conditions: Require Installers of major components to inspect substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.

- B. Coordinate temporary enclosures with inspections and tests to minimize the need to uncover completed construction.

- C. Clean and protect construction in progress and adjoining materials, during handling and installation. Apply protective covering to assure protection from damage.

- D. Clean and maintain completed construction as necessary through the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

- E. Limiting Exposures: Supervise construction to assure that no part is subject to harmful, dangerous, or damaging exposure. Such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading.
 - 2. Excessive internal or external pressures.
 - 3. Excessively high or low temperatures.
 - 4. Water or ice.
 - 5. Solvents and chemicals.
 - 6. Abrasion.
 - 7. Soiling, staining, and corrosion.
 - 8. Combustion.

*** END OF SECTION ***

SECTION 01400
CONSTRUCTION STAKING

PART 1: GENERAL

1.1 RESPONSIBILITY FOR STAKING

- A. The Contractor shall establish the property lines and a benchmark on the site, as required by the extent of the work to be performed as indicated on the Drawings. The Contractor shall make and pay all costs associated with the setting of stakes for the grades and layout of the complete work including but not limited to all measurements and establish such points, lines, and elevations necessary for construction. The Contractor shall set all required stakes and markers showing the survey locations and grades for the complete layout of the various parts of the Work.
- B. The Contractor shall utilize the proper lasers, or other surveying instruments, run by qualified competent personnel to control the construction installation Work. If the method being used by the Contractor fails to give proper alignment and grade control to the Work, the City shall be empowered to order the Contractor to use such other method(s) as will provide adequate control.
- C. The City may require the Contractor, at the Contractor's expense, to provide such masts, scaffolds, batter-boards, straightedges, templates, or other devices as may be necessary to facilitate laying out the work, and for observing and constructing the Work.
- D. The City Representative shall have the right at any time to determine, in accordance with the Drawings or orders, the correctness and completeness of the measurements taken, or points, lines, and grades established by the Contractor, and any imperfect or incorrect construction resulting from errors in such measurements, points, lines, or grades made or established by the Contractor shall be corrected or replaced by construction which is strictly in accordance with the Contract requirements and at the Contractor's expense. While the City Representative may draw the Contractor's attention to errors or incompleteness in the Contractor's measurements, points, lines, or grades, there is no admission on the part of the City Representative to point out such errors or incompleteness, which would give the Contractor any right to make any claim against the City for additional costs or shall in any way relieve the Contractor of his obligations according to the terms of this Contract.

1.2 STAKING SCHEDULE

- A. The Contractor shall submit a completed staking schedule on a form acceptable to the City Representative showing the order in which the Contractor proposes to conduct the construction operation prior to the starting of any Work. The schedule shall be submitted to the City Representative a minimum of three (3) working days prior to the start of construction.

1.3 LINE AND GRADE

- A. The Contractor shall be responsible for any additional line and grade stakes that need replacement regardless of the reason or need. The Contractor shall provide proper protection and preserve all established lines and grade stakes, including any permanent benchmarks.

1.4 RELOCATION AND RE-ESTABLISHMENT

- A. Construction Stakes - Where change of location of stakes has been requested by the Contractor, or where the Contractor fails to properly preserve the original construction survey stakes, such resetting or relocations of stakes shall be promptly done by the Contractor and at his expense.
- B. Survey Control Points - The Contractor shall bear all expense involved in re-establishing and/or resetting any survey control point, land survey point or monument lost or disturbed during his construction operation. Such Work shall be done under the direct supervision of a licensed land surveyor.

1.5 STAKING PIPELINES

- A. Provide sufficient staking at all pipelines to properly install the piping to required slope and grades. Line and grade points shall be established at each structure and at not less than 100-foot intervals, with benchmarks at maximum 1/4-mile intervals.

1.6 STAKING EXISTING DRAINAGE

- A. Unless otherwise indicated on the Plans or specified herein, the Contractor shall bear all expenses including the staking of lines and grades required to restore proper grading of all surface drainage, including swales and ditches disturbed during the construction operation.

1.7 STAKING EARTH WORK

- A. Parks, Parking Lots, Or Other Site Improvements -First staking: Line points at 100-foot intervals for clearing and grubbing. Subsequent staking: Final grade points on 50-foot grid or less as necessary for all grade changes and as necessary to layout and construct the complete Work.
- B. Site Improvement Paving - First staking: Line points at 100-foot intervals for clearing and grubbing. Subsequent staking: Final grade points at 50-foot intervals or less on centerline and proper offsets, and at grade changes.

1.8 STAKING ROADWAY & PATHWAYS

- A. Line and grade points for walking trail centerline finish surface at 50-foot intervals and at grade changes, points of curve and at 25-foot intervals or less on curves.

1.9 STAKING OF BUILDINGS AND STRUCTURES

- A. Initial staking of two (2) intersecting base lines and a minimum of two bench marks on the site. Thereafter as required to establish and construct the work.

PART 2 NOT USED

PART 3: EXECUTION

3.1 STAKING GENERAL INSTRUCTIONS AND INTENT

A. Walking Trail and Football Field Area

1. The general intent for the walking trail is to be not more than 1-inch above finish lawn grades. Minor surface irregularities are to be smoothed out with the walking trail finish grade generally following the existing grade with smooth vertical and horizontal alignment contiguous to the activities that will be taking place upon the surface, namely walking, jogging, and roller blading if installed in asphalt. The areas immediately adjacent shall be smoothed out to allow for easy mowing and maintenance activities when the lawn fine grading is completed.
2. The walking trail shall be first staked for alignment down the centerline and the City Representative's approval called for as to alignment. Any adjustments in the alignment shall be done promptly and at no additional costs to the City, until alignment approval is obtained.
3. Once the alignment has been approved, the walking trail have grade stakes established along with necessary off set staking in preparation for the excavation of the walking trail. Once the grade stakes have been set, final approval shall be called for.
4. The football field shall be layed out by staking at the four corners of the field and as called for on the drawings. Once the layout stakes have been set, approval shall be called for.
5. Following the field layout approval permanent irons shall be set at each corner, and all additional staking shall occur for the setting of the football fields goal line pylons, posts and the field stripping for the Football Field game. The surveyor shall check the layout work of the stripping prior to the actual stripping to insure that the fields are properly marked, whenever that activity is scheduled to take place.

B. Play Areas

1. The Play Areas shall have all play equipment appropriately staked to allow for the proper protective zones that are required around each piece of the play equipment. The Contractor shall coordinate this portion of the work with the vendor manufacturer representatives to insure that the layout between the various equipment pieces is correct. The Contractor, at his expense, is responsible for any final revisions to the AutoCAD drawings based upon the various equipment manufacturers used for the project. It is anticipated that there could be more than one company's equipment being used on the site. Coordination between the

various suppliers is at the sole expense of the Contractor.

2. No additional costs of any kind will be allowed because the selected equipment might require additional space and thus require additional excavation and protective surfacing underneath the equipment.

C. Other Park Survey Work

1. Various site amenities will need to be located and staked per the drawings.
2. If the contract includes trees, the City Representative will work with the Contractor in the staking of all locations for the trees. The Contractor shall provide the stakes and labor to place them.

END OF CONSTRUCTION STAKING SECTION

SECTION 02100
CLEARING AND DEMOLITION

PART 1: GENERAL

1.1 DESCRIPTION

- A. In general, the work under this Section includes all clearing, removals and grubbing work indicated on the Plans and as required, complete with cutting and removal of trees, shrubs, other vegetation, stumps, logs, brush, roots and undergrowth, removals of sidewalks, curbing, rocks, boulders, metals and other types of debris, footings and foundations, old wood structures, old posts and signs, and any other items called for on the drawings. All items of clearing, removals and demolition shall be legally disposed of offsite.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurement & Payment, Section 01025
- C. Alternates, Section 01100
- D. Earthwork, Section 02200
- E. Hot-Mix Asphalt Paving, Section 02740
- F. Play Area Site Improvements, Section 02800
- G. Landscape Work, Section 02900
- H. Lawn Hydro-Seeding & Landscape Maintenance Work, Section 02931
- I. Concrete Work, Section 03300

PART 2: PRODUCTS

- 2.1 Provide all necessary permits, equipment, tools, labor, supervision and disposal necessary.

PART 3: EXECUTION

3.1 EXECUTION

- A. Contract "Miss Dig" prior to beginning any work in order to locate any underground utilities.
- B. Unless otherwise noted, demolition shall include the removal of all items as shown on the drawings and indicated above or in other Sections of these specifications.
- C. Demolition Material: All materials removed during the construction as, indicated on the Drawings shall be removed from the site and legally disposed of at an approved dumping site within two days time. No burning of rubbish or debris will be permitted. No large quantities of debris shall be allowed to accumulate on the site.

3.2 CONCRETE SIDEWALK & MISC. DEMOLITION

- A. The Contractor shall remove and dispose of damaged existing concrete sidewalks and any small foundations or footings that may be encountered in the site prep and installation work and/or as indicated on the plans for the construction of all work as shown on the Drawings. Once removed the Contractor shall erect appropriate barricades and maintained them until sidewalk flag replacement work is completed.

3.3 TREE, STUMP AND VEGETATION REMOVAL

- A. Remove and dispose of all vegetation, and stumps growing within the existing fence lines, necessary for the construction of all work, unless otherwise directed by the City Representative. This includes the clearing of any trees or shrubbery roots that are in and along the fence lines. All existing stumps shall also be removed by grinding or other approved means.
- B. Protect existing trees, which are to remain. Contractor shall protect all trees to remain by the erection of protective fencing as indicated in the Demolition and Tree Protection Plan, or as further directed by the City Representative.

3.4 MISCELLANEOUS

- A. The work shall include all protection, clearing, demolition and disposal as necessary for the complete implementation of the work as shown on the Drawings, and as recommended by the City Representative without any additional cost to the Owner.

END OF CLEARING, DEMOLITION AND RELOCATION SECTION

SECTION 02200
EARTHWORK

PART 1: GENERAL

1.1 RELATED DOCUMENTS

- A. The Drawings and general provisions of this Contract, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following general earthwork complete with: preserving topsoil, suitable stone sub base and sand materials, protection of all existing utility's both above and below ground, contacting Miss Dig to mark all site utilities, site improvements and structures to remain on the site, protection of trees and other types of landscape vegetation to remain, excavation for all pavements, parking areas, walking trails, sidewalks, driveways, curbing, fence line maintenance strips and drive approaches, restoration and compaction of backfill along sidewalks, and all other paved elements, grading of the site, construction of berms and other landscape topographic features, miscellaneous excavation for all play areas which includes all areas of protective surfacing and curbing around play areas in which new equipment will be placed by others, all site elements and amenities, soil erosion and sedimentation control permit from the DRD, and removal, transportation, and legal disposal of excess excavation materials from the site, supply and installation of all materials of fill, including submittals and any required testing, topsoiling and spreading of topsoil to depths called for, fine-grading, removal of all sticks, stones and other deleterious materials from the surface ready for the finish surfaces or lawn as specified elsewhere.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurement & Payments, Section 01025
- C. Alternates, Section 01100
- D. Clearing & Demolition, Section 02100
- E. Protective Surfacing - Rubber, Section 02730
- F. Play Area Site Improvements, Section 02800
- G. Site Amenities, Section 02830
- H. Lawn Hydro-Seeding & Landscape Maintenance Work, Section 02931
- I. Concrete, Section 03300

1.4 DEFINITIONS

- A. Excavation consists of removal of material encountered to subgrade elevations either required or indicated and subsequent disposal off-site.
- B. Unauthorized excavation consists of removal of materials beyond required subgrade elevations or dimensions without specific direction of City Representative. Unauthorized excavation, as well as remedial work directed by City Representative, shall be at Contractor's expense.

- C. **Additional Excavation:** When excavation has reached required subgrade elevations, notify City Representative, who will make an inspection of conditions. If City Representative determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by City Representative. The Contract Sum may only be adjusted by an approved appropriate Contract Modification. Do not proceed with extra work or incur additional costs without written authorization by the City.
 - 1. Removal of unsuitable material and its replacement as directed will be paid on basis of Conditions of the Contract, as and if stated in the Proposal Unit Prices relative to changes in work.
- D. **Subgrade:** The undisturbed earth or the compacted soil layer immediately below granular subbase, drainage fill, or topsoil materials.
- E. **Structure:** Buildings, foundations, slabs, curbs, or other man-made stationary features occurring below ground surface.

1.5 SUBMITTALS

- A. **Test Reports:** Submit the following reports directly to the City Representative from the testing services agency, with a copy to the Contractor:
 - 1. Test reports on all stone or other backfill material proposed to be used, clearly indicating what each is to be used for. Supply small sample of each material, if so requested.
- B. **Plan for Soil Erosion & Sedimentation Control** measures to be implemented throughout the construction Period. The Permit is to be obtained from the Detroit Recreation Department.

1.6 QUALITY ASSURANCE

- A. **Codes and Standards:** Perform excavation work in compliance with applicable requirements of the standard Detroit Building Codes.
- B. **Testing and Inspection Service:** The Contractor shall employ and pay for a qualified independent geotechnical testing and inspection laboratory, acceptable to the City, to perform soil testing and inspection service during earthwork operations.
 - 1. **Testing Laboratory Qualifications:** To qualify for acceptance, the geotechnical testing laboratory must demonstrate to City's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geo-technical testing without delaying the progress of the Work.

1.7 PROJECT CONDITIONS

- A. **Soil test borings and other exploratory operations** may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such exploration.
- B. **Existing Utilities:** Call MISS DIG prior to any excavation. Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide

adequate means of support and protection during earthwork operations.

1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with City and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 2. Do not interrupt existing utilities serving facilities occupied by the City or others, during occupied hours, except when permitted in writing by the City and then only after acceptable temporary utility services have been provided.
 - a. Provide minimum of 48-hour notice to City, and receive written notice to proceed before interrupting any utility.
 3. Coordinate with utility companies for shutoff of services if lines are active.
- C. Use of Explosives: Use of explosives is not permitted.
- D. Protection of Persons and Property: The Contractor shall install proper and substantial OSHA compliant barricades, fencing, planks and or other protective measures over open excavations occurring as part of this work and post with warning lights and appropriate warning signage.
1. Operate warning lights as recommended by authorities having jurisdiction.
 2. Protect existing or newly installed work, structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
 3. Prior to excavation in and around existing trees the contractor shall install protective fencing around the tree as indicated on the Demolition and Tree Protection Plan.
 4. The contractor and all sub-contractors shall not park personal vehicles or company trucks on the site, but at the curb on the street.
 6. The contractor shall take every precaution possible to disturb the least amount of the existing park lawn as possible during the excavation and backfilling operations. All disturbed lawns shall be repaired to the satisfaction of the City, as specified under the Landscape Section of these specifications.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP.
- B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- C. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.
- D. Topsoil shall be as specified under Section 02931, Part II paragraph 2.1.
- E. Play Area Stone shall be as specified under Section 02730, Part II paragraph 2.1.

- F. Asphalt walking trail shall have a minimum base course of six inches of MDOT 21AA stone product with fines, as indicated on the Drawings. Blast furnace slag is not allowed.
- G. Aggregate Walking Trail shall have a minimum base course of six inches of MDOT 21AA and minimum top surface course of not less than 1 1/2" of 3/8" down natural crushed stone aggregate with fines, or equal product to the chart below, and as indicated on the Drawings. The total surface area of the aggregate walking trail must meet all ADA and State of Michigan codes and requirements for handicapped accessibility, and have a tight finish surface.

Top Course Aggregate Gradation Analysis Chart:

MATERIAL:	Fine Aggregate	SPEC: Chip Sand		
	RETAINED FRACTION		PERCENT CUMULATIVE	
SIEVE:	WEIGHT	PERCENT	RETAINED	PASSING
5/8"	0	0	0	0
1/2"	3.7	0.3	0.3	99.7
3/8"	16	1.1	1.3	98.7
1/4"				
#4	314.1	21.3	22.6	77.4
#8	352.7	23.9	46.6	53.4
#15	233.5	15.8	62.4	37.6
#30	139.5	9.5	71.9	28.1
#50	82.1	5.6	77.4	22.6
#100	44.1	3	80.4	19.6
#200	22.3	1.5	81.9	18.1
PAN	3.7	0.3	82.2	17.8
LBW	262.8	17.8	100	0
TOTAL	1474.5			

INITIAL WEIGHT:	1572.6 g
DRY WEIGHT:	1474.5 g
WASH WEIGHT:	1211.7 g
LBW:	262.8 g 17.80%

FINESS MODULES:	11.82
MOISTURE CONTENT:	6.65%

SOFT	g	0.00%
CHERT		
g		0.00%
SOFT + CHERT	0	0.00%
g		

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Excavation Classifications: The following classifications of excavation will be made when rock is encountered:
 1. Earth excavation includes the excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.
 2. Excavation for concrete maintenance strips includes removal and disposal of materials and any obstructions encountered to allow for the installation of the design elements as called for on the Drawings.
 3. Typical of materials classified as hidden or a latent condition would be old building foundations, rock that are boulders 1/2 cu. yd. or more in volume, solid

rock, rock in ledges, and rock consisting of a hard cementitious aggregate deposit. If any of these conditions are encountered the Contractor shall immediately contact the City. Old fence footings shall be removed when and wherever they may be encountered at no additional costs to the City.

- C. Do not perform rock excavation or old foundation removal work until material to be excavated has been cross-sectioned and classified by the City. Such excavation will be paid on basis of Contract Conditions relative to changes in work.
- D. Hidden foundation or other material payment lines are limited to the following:
 - 1. Two feet outside of concrete work for which forms are required, except footings.
 - 2. One foot outside perimeter of footings.
 - 3. In pipe trenches, 6 inches below invert elevation of pipe and 2 feet wider than inside diameter of pipe, but not less than 3 feet minimum trench width.
 - 4. Outside dimensions of concrete work where no forms are required.
 - 5. Under slabs on grade, 6 inches below bottom of concrete slab.

3.2 DEWATERING

- A. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.
 - 1. Do not allow water to accumulate in excavations. Promptly remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of sub grades and footings. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations, which are considered an incidental cost to completion of the work of this section and no additional cost will be considered due to unforeseen amounts of rain, which may flood previously excavated work. All dewatering costs to remove the water and if necessary adjust or remove saturated soils, or previously placed fill materials are at the sole cost of the contractors, regardless of amounts, extent or other causes and remedies needed.
 - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.
 - 3. Dewatering shall continue as long as necessary to install the work, regardless of the duration, or extent, or impact of water to the intended work of the project at the Contractors sole expense. Acts of God are not grounds for additional costs to the City for dewatering the work, nor are the frequency or duration.

3.3 STORAGE OF EXCAVATED MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill in the “Berm” areas indicated on the drawings or as otherwise directed by the City Representative. Place, rough and fine grade, and shape stockpiles into “Berms” or dispose off-site as directed.
 - 1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees.
 - 2. Dispose of any unsuitable rocks, brickbat and the like off-site.

3.4 EXCAVATION FOR STRUCTURES – Not used

3.5 EXCAVATION FOR PAVED AREAS

- A. Cut surface under areas to receive new pavement or concrete pads to comply with cross-sections, elevations and grades as required or indicated. Finish grades for paved surfaces shall in general be flush with the finish lawn grades immediately adjacent to the work. Any required fence concrete maintenance strips shall be located per drawings.

- B. If Concrete Maintenance Strips are called for, the Contractor shall excavate as required for the installation of the concrete maintenance strips. Once installed and any form work has been removed the concrete shall be carefully backfill and soils compacted to finish required grade to receive the lawn installation or other adjacent work as maybe called for on the drawings.

3.6 TRENCH EXCAVATION FOR PIPES

- A. Comply with all common safety practices and codes in trench excavation for utilities.

3.7 COLD WEATHER PROTECTION

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F., if such temperatures are encountered.

3.8 BACKFILL AND FILL

- A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.
 - 1. Under grassed areas, use only approved clean satisfactory excavated material as approved by the City.
 - 2. Under sidewalks and pavements, use only new subbase borrow material per the "Standard City of Detroit Specifications for Paving and Related Work" issued by the City Engineering Division of DPW, which has been brought to the site by the contractor.

- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance of construction below finish grade including, where applicable, by the Buildings and Safety Engineering Dept, under the requirements of the City Permit.
 - 2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
 - 3. Removal of concrete formwork.
 - 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
 - 5. Removal of trash and debris from excavation.

3.9 PLACEMENT AND COMPACTION

- A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
 - 1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

- B. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

- C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

- D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

- E. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by the City Representative if soil density tests indicate inadequate compaction.
 - 1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557:
 - a. Under structures, shelter slabs and pavements, compact top 12 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.
 - b. Under lawn or unpaved areas, compact top 6 inches of subgrade and each layer of backfill or fill material at 90 percent maximum density.
 - c. Under walkways, compact top 6 inches of subgrade and each layer of backfill or fill material at 95 percent maximum density.

 - 2. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
 - a. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
 - b. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.10 GRADING

- A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades. The contractor shall set and establish all required grades in general that will meet existing grades in a smooth transition that will be easily mowed. The contractor shall use a qualified survey engineer for purposes of layout and setting all grades.

- B. Finish surfaces free from irregular surface changes and as follows:
 - 1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
 - 2. Walks and fence concrete maintenance strips: Shape surface of areas under walks and fencing scheduled to receive concrete maintenance strips to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation and so as to smoothly tie into adjacent surface grades. Along fence lines a smooth line parallel to adjacent surfaces shall be established.
 - 3. Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 1/2 inch above or below required subgrade elevation.

- C. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.11 PAVEMENT SUBBASE COURSE

- A. General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surfaces to support paving, protective play area surface base course materials and other work as indicated elsewhere and as and where specified.
 - 1. Refer to other specification Sections indicated above under PART 1, paragraph 1.3 Related Work Specified Elsewhere.

- B. Grade Control: In General grading shall be as follows:
 - 1. The fencing concrete maintenance strips as may be called for elsewhere and as depicted on the drawings shall be installed to match existing adjacent grades (adjacent to walks at the elevations of the existing or newly placed sidewalks, and lawn grades of existing fencing where it shall abut any residential properties. The maintenance strip shall slope 1/4" per foot towards the sidewalks and if necessary the grades inside the park shall be adjusted back away from the fence to create a smooth even slope with the completed work to be flush to the new work.
 - 2. The contractor shall have walked the site to determine the full extent of all cut and fill needed to complete the installation of all design elements (prior to the Bid Proposal). No additional costs for claims to the City will be considered for failure to take into account the conditions under which the work is to take place, degree of difficulty, or other existing conditions of the project work site.

3. All disturbed lawns shall have new lawn turf installed as called for under the appropriate specifications Section of work.
- C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneous with the compaction and rolling of each layer of subbase course.
- D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
 1. When a compacted subbase course is indicated to be 6 inches thick or less, place material in a single layer. When indicated to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.12 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed. Testing is required for concrete sidewalks & for the asphalt walkway The Contractor shall pay for all Testing costs.
 1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.
 - a. Field density tests may also be performed by the nuclear method in accordance with ASTM D 2922, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D 3017.
 - b. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the City.
 2. If in opinion of the City based on testing service reports and inspection, any work sub grades or fills that have been placed that are below the specified density, shall be corrected and the Contractor shall perform additional compaction and testing until specified density is obtained all at no additional costs to the City.

3.13 EROSION CONTROL

- A. Provide, install, maintain and remove when appropriate all needed or required erosion control methods in accordance with requirements of the Soil Erosion & Sedimentation Control Procedures of the Detroit General Services Department, who is an Approved Public Agency (APA) by the Michigan Department of Environmental Quality (MDEQ). If a plan is not required, the contractor is still required to properly protect existing drainage structures from dirt or other debris from washing into them or any other

construction materials. No excavated materials of any kind will be allowed to erode from the site, and the contractor shall allow for in his bid all necessary protection, means and methods to prevent runoff from occurring. The Contractor shall indicate on a site plan and if necessary other documentation his intended measures to be installed per the requirements of the Soil Erosion & Sedimentation Control Procedures of the Detroit General Services Department. Following review, comment and requested changes the General Services Department may have, the erosion control plan will be approved. The contractor can contact Tim Karl at tkarl@detroitmi.gov for a copy of the Soil Erosion & Sedimentation Control Procedures of the Detroit General Services Department. Any violations of Soil Erosion & Sedimentation Control measures by Wayne County or MDEQ will be the responsibility of the contractor to correct to the satisfaction of the MDEQ, Wayne County, and GSD. The contractor is also responsible to pay any fines or penalties relating to Soil Erosion & Sedimentation Control. There is no cost for the GSD Plan Review & Inspections.

3.14 MAINTENANCE

- A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades if any settling, eroding, or rutting occurs in prepared areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, aerate lawn areas as needed, reshape, and compact to required density prior to further construction, and at no additional costs of any nature to the City.
- D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible, which shall be done at the Contractors complete cost and expense to the full satisfaction to the City.

3.15 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Stockpile soil and ultimately spread as indicated on the Drawings and as further maybe directed by the City Representative. NOTE: Any materials authorized to be stored or spread on the site, must have those disturbed areas re-established into lawn as a part of the costs of the Project and at no further additional costs to the City other than that indicated in the bid Proposal.
 - 1. Immediately transport all excess spoils, waste, debris scrap materials and trash from City Park property and legally dispose of.
 - 2. If called for on the drawings clean materials are to be re-used on the site as designated.

END OF EARTHWORK SECTION

SECTION 02210
BALL DIAMOND CONSTRUCTION

PART 1: GENERAL

1.1 DESCRIPTION

- A. In general, the work under this Section includes all work indicated on the Plans and as required for the redevelopment of an existing or construction of a new ball diamond, the ball diamond benches & dugout area, game foul posts and all other game elements and accessories as maybe called for a complete operational ball field, and any other specific items called for on the drawings.
- B. Provide all excavation necessary to achieve proper grades and slopes for the ball diamond infield areas, which includes providing and installing stone, gravel and sand subgrade foundation materials at all bases and home plate batters boxes area for each diamond if so called for.
- C. Work includes complete layout of each ballfield, including foul lines and poles, outfield, home plate, pitchers mound, base lines, bases, fencing, backstop, warning track, infield, players' benches and dugout areas and all other features called for on the Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurement & Payment, Section 01025
- C. Alternates, Section 01100
- D. Construction Staking & Layout, Section 01140
- E. Earthwork, Section 02200
- F. Drainage & Utilities, Section 02710
- G. Irrigation, Section 02720
- H. Site Amenities, Section 02830
- I. Fencing, Sections 02822 & /or 02820
- J. Turf Restoration Blanket, Section 02920
- K. Concrete Work, Section 03300

1.3 SUBMITTALS

- A. All materials used in constructing the diamonds requires a submittal, samples in gallon re-sealable manufacturer's bags, and manufactures literature to the City Representative.

1.4 QUALITY ASSURANCE

- A. The contractor that performs the ball diamond construction shall have a minimum of 5-years experience in the field of ball diamond construction.

- B. The ball diamond shall be warranted for materials and workmanship against defects for at least one full year following final acceptance. The contractor shall remedy any unsatisfactory condition that may arise during the guarantee period at no additional costs to the City within 30-days of receipt of written notice of such defect.

PART 2: PRODUCTS

- 2.1 Provide all necessary materials, equipment, tools, labor, supervision, clean up and disposal necessary to complete all work indicated on the drawings or as required to complete the work.
- 2.2 Types of work products required, some of which are specified in other sections of these specifications include:
 - A. Infield and outfield construction
 - B. Fencing & backstop work
 - C. Drainage tile installation, if called for
 - D. Miscellaneous equipment and players benches specified under Site Amenities.

2.3 BALL DIAMOND MATERIALS

- A. Infield Base Material:

The contractor shall provide a natural clay or natural aggregate product or approved equal to the following materials:

A natural clay product equal to "Diamond Dust" - a mixture of 15% clay (brown or yellow), 53% sand and 32% silt produced by Mid-America Sales Associates of Jasper, IN; or

A natural aggregate product known as Athletic Meal Mix sometimes known as "Ath-Meal"- a washed dolomite limestone fines mix from local limestone quarries equal to - 97% passing through a #8 screen (no slag allowed), produced by the Sibley Quarry or equal, to the complete approval and selection of the City.

- B. Warning Track & Infield Top Dressing Materials:

A field conditioner of calcined montmorillinite clay used to provide color and better water absorption equal to: products such as "Turface" or "Sports Clay" or "Soil Master" to the complete approval and selection of the City. Products known sources include Profile Products (937) 290-0303 or Phoenix Stone Company of Mt Clemens, MI. phone (586) 465-6255

- C. Lining of the field:

Two (2) Applications, two (2) weeks apart with a standard ball diamond lining material with optiwhite, equal to #1 Athletic Field Marker, a 'bright white' chalking material locally available from Phoenix Stone Company of Mt Clemens, MI. Phone (586) 465-6255.

2.4 EQUIPMENT

A. Bases:

Shall be as manufactured by or approved equal:

Adams USA (formerly Bolco), 610 S. Jefferson Avenue,
Cookeville, TN 38501, Phone: (931) 526-2106.

Model: 175 MLB with 225 BAS base anchors, 250 SF stake forms and
230 SP stake plug; 1-set of three (3) three bases per diamond.

B. Home Plate and Pitcher Rubber:

The same manufacturer shall be used as the bases.

Home Plate: # 380-HP, one home plate base per diamond, and

Pitchers Rubber: # 450-C1; one pitchers rubber per diamond.

C. Extra materials to be provided: 1 complete set (5 items) per site if called for on the drawings.

2.5 OTHER MATERIALS

A. Refer to the Site Amenities Section of these specifications for other items that maybe called for on the drawings such as player's benches, foul poles, fencing and backstops, trash receptacles and bleacher units.

PART 3: EXECUTION

3.1 EXECUTION

- A. Contact "Miss Dig" prior to beginning any work in order to locate any underground utilities.
- B. Unless otherwise noted, excavation of new ball diamonds shall include the removal of all items as shown on the drawings and indicated above or in other Sections of these specifications.
- C. Demolition Material: All materials removed during the construction as, indicated on the drawings shall be removed from the site and legally disposed of. No burning of rubbish or debris will be permitted. No large quantities of debris shall be allowed to accumulate on the site.
- D. All equipment called for on the drawings shall be installed in accordance with the manufactures recommendation requirements and details indicated within the drawings.

3.2 INFIELD CONSTRUCTION:

A. Infield base: (Diamond Dust)

The base area of the infield shall be staked and otherwise laid out to the lines and dimensions as called for on the drawings to provide a regulation diamond infield.

The infield-skinned area shall be excavated to a minimum depth of 6-inches below the finish grades, as required by field conditions, and any grades indicated on the drawings. The contractor shall shape for positive drainage and compact the sub grade as required to provide for the finish grade slopes. If called for any perforated drainage tile shall be installed and tied into designated drainage structure.

Prior to the installation of the base material the contractor shall call for a subgrade inspection by the City Representative to approve the subgrade work.

Upon approval the work shall proceed with the installation of the approved infield base material equal to "Diamond Dust" in a 4-inch lift course. Roll with a rubber tire vehicle to form a lightly compacted but firm base surface.

Next a 50/50 mixed material consisting of "Diamond Dust" and "Soil Master" shall be installed in a 2-inch layer and compacted. Note: It is mandatory that the 50/50 two (2) - material mixture be delivered to the site pre-mixed.

The foundation at the home plate batters boxes shall be excavated to 20-inches below finish grade. Install a 10-inch depth stone bottom layer, 6-inch pea gravel middle layer and a 4-inch course sand top layer.

Hard clay surface at pitchers mound and home plate batters boxes: These areas of the infield shall have installed 4 to 6-inches of clay product. Add water as required and compact to form a smooth, hard, shiny surface.

B. Infield base: (Crushed Limestone)

The base area of the infield shall be staked and otherwise laid out to the lines and dimensions as called for on the drawings to provide a regulation diamond infield.

The infield-skinned area shall be excavated to a minimum depth of 6-inches below the finish grades, as required by field conditions, and any grades indicated on the drawings. The contractor shall shape for positive drainage and compact the sub grade as required to provide for the finish grade slopes. If called for any perforated drainage tile shall be installed and tied into designated drainage structure.

Prior to the installation of the base material the contractor shall call for a subgrade inspection by the City Representative to approve the subgrade work.

Upon approval the work shall proceed with the installation of crushed limestone in a 4-inch lift course. Roll with a rubber tire vehicle to form a lightly compacted but firm base surface.

Next a 50/50 mix of crushed limestone and calcined clay, shall be installed in a 2 -inch layer and compacted. Note: It is mandatory that the 50/50 two (2) - material mixture be delivered to the site pre-mixed.

Apply an additional ¼ inch layer of calcined clay on top of the 50/50 mix.

C. Skinned infield top dressing:

Apply an additional ¼ to ½ inch layer of the above specified approved infield base materials (2.3 B above) material to the infield-skinned areas. Following the

installation of this top course of material the playing surface shall be fine contoured rolled, fine graded to a smooth playing surface, water sprayed onto the skinned areas, rerolled and final fine graded using all equipment and tools normally used for this type of fine grading work. Spray water and continue to fine grade until the final playing surface is ready for inspection and acceptance by the City. Once approved and accepted the field shall be lined as called for.

- D. On existing diamonds – that are called to be reconditioned, the existing top layer of skinned infield material to a 2-inch depth shall be roto-tilled or disked up, reshaped and refloated to proper grades for positive drainage. The contractor shall call for an infield grade inspection before proceeding with the installation of the new $\frac{1}{4}$ to $\frac{1}{2}$ inch skinned-infield material is to be applied to the surface.

- E. Warning Track – if called for, and as called for on the drawings, shall consist of a 6-inch minimum lift of a either the infield mix or a 30A slag sand product or approved equal (color to match the skinned infield area) installed on a compacted subgrade with positive drainage to the dimensions called for on the drawings.

END OF BALL DIAMOND CONSTRUCTION SECTION

SECTION 02235
CU-STRUCTURAL SOIL

PART 1: DESCRIPTION AND SPECIFICATION

1.1 GENERAL

A. The work of this section consists of all Structural Soil work and related items as indicated on the drawings or as specified herein and includes, but is not limited to, the following:

1. CU Soil™ is a proprietary material patented by Cornell University (US Patent # 5,849,069). Only licensed producers are allowed to supply this material, meeting the specifications described in this text. For a list of licensed CU Soil™ producers, call AMEREQ, INC. at 1-800-832-8788.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Measurement & Payment, Section 01025
- B. Alternates, Section 01100
- C. Construction Staking, Section 01400
- D. Clearing & Demolition, Section 02100
- E. Earthwork, Section 02200
- F. Hot-Mix Asphalt Paving, Section 02740

1.3 REFERENCES AND STANDARDS

A. The following references are used herein and shall mean:

1. ASTM: American Society of Testing Materials
2. USDA: United States Department of Agriculture
3. AASHTO: American Association of State Highway and Transportation Officials
4. Standard Specifications: Regional or Municipal Standard Specifications Documentation for the location of proposed usage
5. AOAC: Association of Official Agricultural Chemists

1.4 SAMPLES AND SUBMITTALS

A. At least 30 days prior to ordering materials, the Contractor shall submit to the City Representative samples, certificates, manufacturers literature and certified tests for materials specified below. No materials shall be ordered until the required samples, certificates, manufacturers literature and test results have been reviewed and approved by the City Representative. Delivered materials shall closely match the approved samples. Approval

shall not constitute final acceptance. The City Representative reserves the right to reject, on or after delivery, any material that does not meet these specifications.

- B. Submit two, one-half cubic foot representative samples of Clay Loam and one, one cubic foot representative samples Structural Soil mixes in this section for testing, analysis and approval. Submit one set of samples for every 500 CY of material to be delivered. In the event of multiple source fields for Clay Loam, submit a minimum of one set of samples per source field or stockpile. Samples shall be taken randomly throughout the field or stockpile at locations as directed by the City Representative and packaged in the presences of the City Representative. Samples shall be labeled to include the location of the source of the material, the date of the sample and the Contractor's name. One of the two samples is to be used by testing laboratory for testing purposes. The second sample of all Clay Loam and Structural Soil shall be submitted to the City Representative at the same time as test analysis as a record of the soil color and texture.
1. Submit the locations of all source fields for Clay Loam.
 2. Submit a list of all chemicals and herbicides applied to the Clay Loam for the last five years and a list of all crops grown in the Clay Loam source fields for the last three years.
- C. Submit soil test analysis reports for each sample of Clay Loam and Structural Soil from an approved soil-testing laboratory. The test results shall report the following:
1. The soil testing laboratory shall be approved by the City Representative. The testing laboratory for particle size and chemical analysis may be a public agricultural extension service agency or agricultural experiment station.
 2. Submit a bulk density of the sample and particle size analysis including the following gradient of mineral content:

USDA Designation	Size in mm.
Gravel	+2 mm
Sand	0.05 – 2 mm
Silt	0.002-0.05 mm
Clay	minus 0.002 mm
 3. Sieve analysis shall be performed and compared to USDA Soil Classification System. Sieve analysis shall be done by a combined hydrometer and wet sieving using sodium hexametaphosphate as a dispersant in compliance with ASTM D422 after destruction of organic matter by hydrogen peroxide.

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4. Submit a chemical analysis, performed in accordance with current AOAC Standards, including the following:
 - a. pH and Buffer pH.
 - b. Percent organic matter as determined by the loss of ignition of oven dried samples. Test samples shall be oven dried to a constant weight at a temperature of 230 degrees F, plus or minus 9 degrees.
 - c. Analysis for nutrient levels by parts per million including nitrate nitrogen, ammonium nitrogen, phosphorus, potassium, magnesium, manganese, iron, zinc, calcium and extractable aluminum. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil as calculated by the amount of material to be added per volume of soil for the type of plants to be grown in the soil.
 - d. Analysis for levels of toxic elements and compounds including arsenic, boron, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, zinc and PCB. Test results shall be cited in milligrams per kilogram.
 - e. Soluble salt by electrical conductivity of a 1:2 soil/water sample measured in Millimho per cm.
 - f. Cation Exchange Capacity (CEC).
 - g. Carbon/Nitrogen Ratio.
 5. Submit 5-point minimum moisture density curve AASHTO T 99 test results for each Structural Soil sample without removing oversized aggregate.
 6. Submit California Bearing Ratio test results for each Structural Soil sample compacted to peak standard density. The soaked CBR shall equal or exceed a value of 50.
 7. Submit measured dry-weight percentage of stone in the mixture.
 8. The approved Structural Soil samples shall be the standard for each lot of 500 cubic yards of material.
 9. All testing and analysis shall be at the expense of the Contractor.
- D. Maintenance Instructions: Prior to the time of Final Acceptance of the Work, submit maintenance instructions for the use, removal and replacement of Structural Soil for the licenser's (Amereq Corp.) use. The instructions shall be reviewed by the City Representative as a pre-condition for Final Acceptance of the Work.
- E. Submit to the City Representative for review a proposed plan and vertical section layout of all Structural Soil.
- F. Submit one cubic foot sample per each 500 cubic yards of required material, and for each sample, the following analysis for all Crushed Stone. The soil testing laboratory shall be approved by the City Representative.

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1. Provide a particle size analysis including the following gradient of mineral content:

USDA Designation	Size in mm.
3@	+76 mm
2-1/2@	63-76 mm
2@	50-63 mm
1-1/2@	37-50 mm
1@	25-37 mm
3/4@	19-25 mm
Fine gravel	2-19 mm
Sand	0.05-2 mm
Silt	0.002-0.05 mm
Clay	minus 0.002 mm

2. Provide the manufacturers analysis of the following:
 - a. Loose and rodded unit weight.
 - b. Bulk specific gravity and absorbency.
 - c. Stone dimension and surface texture description.
 - d. Documentation of acceptance for use as DOT approved aggregate by the appropriate regional DOT.
 3. Provide a percent pore space analysis defined as follows:
 - a. Rodded Unit Weight divided by the Bulk Specific Gravity X 100
- G. Submit one pound sample of each type of fertilizer and three certificates showing composition and analysis. Submit the purchasing receipt for each fertilizer showing the total quantity purchased for the project prior to installation.
- H. Submit the Landscape or Pavement Material Contractor's qualifications outlining projects of similar quality, schedule requirements and construction detailing over the last five years. Qualifications shall include: the names of all similar projects, year completed, location, description of the scope of work including the types and quantities of planting mix/pavement material installed and the name, address and telephone number of the owner or the owner's representative.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver or place soils in frozen, wet, or muddy conditions. Material shall be delivered at or near optimum compaction moisture content as determined by AASHTO T99 (ASTM D 698). Do not deliver or place materials in an excessively moist condition (Beyond two percent above optimum compaction moisture content as determined by AASHTO T 99 (ASTM D 698).

- B. Protect soils and mixes from absorbing excess water and from erosion at all times. Do not store materials unprotected from large rainfall events. Do not allow excess water to enter site prior to compaction. If water is introduced into the material after grading, allow material to drain or aerate to optimum compaction moisture content.

1.6 EXAMINATION OF CONDITIONS

- A. All areas to receive Structural Soil shall be inspected by the Contractor before starting work and all defects such as incorrect grading, compaction and inadequate drainage etc. shall be reported to the City Representative prior to beginning this work.
- B. The Contractor shall be responsible for judging the full extent of work requirements involved, including but not limited to the potential need for temporary storage and staging of soils, including moving soil stock piles at the site to accommodate scheduling of other work and the need to protect installed soils from compaction, erosion and contamination.

1.7 QUALITY ASSURANCE

- A. Qualifications of Landscape or Pavement material Contractor: The work of this section shall be performed by a Landscape Contracting firm which has a minimum of five years experience successfully installing planting mix of a similar quality, schedule requirement and construction detailing to this project. Proof of this experience shall be submitted as per paragraph, SAMPLES and SUBMITTALS, of this Section.

PART 2 - MATERIALS

2.1 CLAY LOAM

- A. Clay Loam shall be a "loam" based on the "USDA classification system" as determined by mechanical analysis (ASTM D-422) and it shall be of uniform composition, without admixture of subsoil. It shall be free of stones greater than one-half inch, lumps, plants and their roots, debris and other extraneous matter over one inch in diameter or excess of smaller pieces of the same materials as determined by the City Representative. It shall not contain toxic substances harmful to plant growth. It shall be obtained from naturally well-drained areas, which have never been stripped of topsoil before and have a history of satisfactory vegetative growth. Clay loam shall contain not less than 2% nor more than 5% organic matter as determined by the loss on ignition of over-dried samples. Test samples shall be oven-dried

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to a constant weight at a temperature of 230 degrees F., plus or minus 9 degrees.

B. Mechanical analysis for a Loam/Clay Loam shall be as follows:

Textural Class	% of Total Weight
Gravel	less than 5%
Sand	20-45%
Silt	20-50%
Clay	20-40%

C. Chemical analysis: Meet or be amended to meet the following criteria:

1. pH between 5.5 to 6.5.
2. Percent organic matter 2-5% by dry weight.
3. Nutrient levels as required by the testing laboratory recommendations for the type of plants to be grown in the soil.
4. Toxic elements and compounds below the United States Environmental Protection Agency Standards for Exceptional Quality sludge or local standard; whichever is more stringent.
5. Soluble salt less than 1.0 Millimho per cm.
6. Cation Exchange Capacity (CEC) greater than 10.
7. Carbon/Nitrogen Ratio less than 33:1.

D. Loam/Clay Loam shall be the product of a commercial processing facility specializing in production of stripped natural topsoil. No topsoil shall come from USDA - classified prime farmland.

2.2 FERTILIZER

- A. Commercial fertilizer complying with State and United States fertilizer laws. Deliver fertilizer in original unopened containers, which shall bear the manufacturer's certificate of compliance covering analysis, which shall be furnished to the City Representative. Fertilizer shall be formulated for mixing into the soil and be certified by the manufacturer to provide controlled release of nitrogen continuously for a period of no less than nine months and no more than 12 months.
- B. Fertilizer percentages of weight of ingredients and application rates shall be as recommended by the soil testing results.

2.3 SULFUR (if needed)

- A. Sulfur shall be commercial granular, 96% pure sulfur, delivered in containers with the name of the manufacturer, material and analysis appearing on the container.

- B. Sulfur used to lower soil pH above 6.5 shall be ferrous sulfate formulation.

2.4 LIME (if needed)

- A. Agricultural limestone containing a minimum of 85% carbonates. Minimum gradation: 100% passing 10 mesh sieve; 98% passing 20 mesh sieve; 55% passing 60 mesh sieve and 40% passing 100 mesh sieve.

2.5 CRUSHED STONE

- A. Crushed Stone shall be a DOT certified crushed stone. Granite and limestone have been successfully used in this application. 90-100% of the stone should pass the 1.5 inch sieve, 20- 55% should pass the 1.0 inch sieve and 10% should pass the 0.75 inch sieve. A ratio of nominal maximum to nominal minimum particle size of 2 is required.
- B. Acceptable aggregate dimensions will not exceed 2.5:1.0 for any two dimensions chosen.
- C. Minimum 90% with one fractured face, minimum 75% with two or more fractured faces.
- D. Results of Aggregate Soundness Loss test shall not exceed 18%.
- E. Losses from LA Abrasion tests shall not exceed 40%.

2.6 HYDROGEL

- A. Hydrogel shall be a potassium propenoate-propenamide copolymer Hydrogel (Gelscape® Hydrogel Tackifier) as manufactured by Amereq Corp. (800) 832-8788.

2.7 WATER

- A. The Contractor shall be responsible to furnish his own supply of water to the site at no extra cost. All work inured or damaged due to the lack of water, or the use of too much water, shall be the Contractor's responsibility to correct. Water shall be free from impurities injurious to vegetation.

2.8 STRUCTURAL SOIL

- A. A uniformly blended mixture of crushed Stone, Clay Loam and Hydrogel, mixed to the following proportion:

Material	Unit of Weight
Crushed Stone	100 units dry weight
Loam	as determined by the test of the mix (approx. 20 units)
Hydrogel	0.03 units dry weight
Total moisture	AASHTO T-99 optimum moisture

- B. The initial mix design for testing shall be determined by adjusting the ratio between the Crushed Stone and the clay loam. Adjust final mix dry weight mixing proportion to decrease soil in mixture if CBR test results fail to meet acceptance (CBR #50).

PART 3: CONSTRUCTION METHODS

3.1 MIX DESIGN

- A. Prepare sample Structural Soil mixes to determine the ratio of mix components. Submit for approval.
1. Submit samples and the test results of each mix component for approval. Based on samples and the analysis of the mix components, the City Representative and the Contractor will jointly determine a mix ratio to be tested for conformance with the requirements of the specifications. For Structural Soil quantities greater than 500 cubic yards, test the mix ratio for each Clay Loam or Crushed Stone where the testing indicates a significant difference in physical analysis of the Clay Loam or Crushed Stone as determined by the City Representative.
 2. The Contractor shall prepare the samples of the proposed mix ratio options and obtain soil test as described in paragraph 1.3 C. Submit the samples of each of the mixes with the test results.
 3. The City Representative may request additional Structural Soil mix ratio samples to be tested in the event that further refinement of the mix is necessary.
 4. Submit to the City Representative proposed fertility amendment recommendations including amounts and types of fertilizers and pH adjustments for each mix ratio. Fertility adjustments shall be included as part of the mixing process.

3.2 SOIL MIXING AND QUALITY CONTROL TESTING

- A. All Structural Soil mixing shall be performed at the Producer's yard using appropriate soil measuring, mixing and shredding equipment of sufficient capacity and capability to assure proper quality control and consistent mix ratios. No mixing of Structural Soil at the project site shall be permitted. Portable pugging may be used.

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1. Maintain adequate moisture content during the mixing process. Soils and mix components shall easily shred and break down without clumping. Soil clods shall easily break down into a fine crumbly texture. Soils shall not be overly wet or dry. The contractor shall measure and monitor the amount of soil moisture at the mixing site periodically during the mixing process.
 2. A mixing procedure for front-end loader shall be as follows:
 - a. On a flat asphalt or concrete paved surface, spread an 8 inch to 12 inch layer of crushed stone.
 - b. Spread evenly over the stone the specified amount of dry hydrogel.
 - c. Spread over the dry hydrogel and crushed stone a proportional amount of clay loam according to the mix design.
 - d. Blend the entire amount by turning, using a front-end loader or other suitable equipment until a consistent blend is produced.
 - e. Add moisture gradually and evenly during the blending and turning operation as required to achieve the required moisture content. Delay applications of moisture for 10 minutes prior to successive applications. Once established, mixing should produce a material within 1% of the optimum moisture level for compaction.
 3. A pugging operation mixing procedure may be as follows:
 - a. Feed a know weight of crushed stone into the mixing trough.
 - b. Add hydrogel as a slurry into trough and mix slurry and stone into a uniform blend.
 - c. Meter in soil in proper proportion of Clay loam soil. While stone-slurry mixture is in motion.
 - d. Add water to bring mixture to target moisture content after factoring in water from the slurry and the Clay-loam moistures.
 - e. Auger out to stockpile or transport vehicle (or into pit if using portable pugging operation).
 4. Add soil amendments to alter soil fertility including fertilizers and pH adjustment at the time of mixing at the rates recommended by the soil test.
 - a. Soil pH shall be adjusted to fall within a value of 5.5 and 6.5 two months after mixing if the material is stored, unless mixing with a high pH stone. Once pavement is laid, no adjustment should be imposed.
 - b. Soil component carbon/nitrogen ratio shall be adjusted to be less than 33:1 within two months after mixing.
- B. The Producer shall mix sufficient material in advance of the time needed at the job site to allow adequate time for final quality control testing as required by the progress of the work. Structural Soil shall be stored in piles of

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approximately 500 cubic yards and each pile shall be numbered for identification and quality control purposes. Storage piles shall be protected from rain and erosion by covering with plastic sheeting.

- C. During the mixing process, the Contractor obtains two, one cubic foot quality control samples per 500 cubic yards of production from the final Structural Soil. The samples shall be taken from random locations in the numbered stockpiles as required by paragraph 1.3.B of this specification. Each sample shall be tested for particle size analysis and chemical analysis as described in Paragraph 1.3.C.2 and 3 above. Submit the results directly to the City Representative for review and approval.
- D. The quality control sample Clay Loam-Crushed Stone ratios shall be no greater or less than 2% of the approved test sample as determined by splitting a known weight of oven dried material on a #4 sieve. In the event that the quality control samples vary significantly from the approved Structural Soil sample, as determined by the City Representative, remix and retest any lot of soil that fails to meet the correct analysis making adjustments to the mixing ratios and procedures to achieve the approved consistency.

3.3 UNDERGROUND UTILITIES AND SUBSURFACE CONDITONS

- A. Notify the City Representative of any subsurface conditions which will effect the Contractor's ability to complete the work.
- B. Locate and confirm the location of all underground utility lines and structures prior to the start of any excavation.
- C. Repair any underground utilities or foundations damaged by the Contractor during the progress of this work. The cost of all repairs shall be at the Contractor's expense.

3.4 SITE PREPARATION

- A. Do not proceed with the installation of the Structural Soil material until all walls, curb footings and utility work in the area have been installed. For site elements dependent on Structural Soil for foundation support, postpone installation until immediately after the installation of Structural Soil.
- B. Excavate and compact the proposed subgrade to depths as shown on the Drawings.
- C. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade.

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- D. Clear the excavation of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout silts or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.
- E. Do not proceed with the installation of Structural Soil until all utility work in the area has been installed..
- F. Protect adjacent walls, walks and utilities from damage or staining by the soil. Use ½” plywood and or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.
 - 1. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each working day.
 - 2. Any damage to the paving or architectural work caused by the soils installation Contractor shall be repaired by the general contractor at the soils installation contractor’s expense.
- G. Maintain all silt and sediment control devices required by applicable regulations. Provide adequate methods to assure that trucks and other equipment do no track soil from the site onto adjacent property and the public right of way.

3.5 INSTALLATION OF STRUCTURAL SOIL MATERIAL

- A. Install Structural Soil in 6 inch lifts and compact each lift.
- B. Compact all materials to peak dry density from a standard AASHTO compaction curve (AASHTO T 99). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction 24 hours if moisture content exceeds maximum allowable and protect Structural Soil during delays in compaction with plastic or plywood as directed by the City Representative.
- C. Bring Structural Soils to finished grades as shown on the Drawings. Immediately protect the Structural Soil material from contamination by toxic materials, trash, debris, water containing cement, clay, silt or materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the City Representative.
- D. The City Representative may periodically check the material being delivered and installed at the site for color and texture consistency with the approved sample provided by the Contractor as part of the submittal for Structural Soil. In the event that the installed material varies significantly from the approved

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sample, the City Representative may request that the Contactor test the installed Structural Soil. Any soil which varies significantly from the approved testing results, as determined by the City Representative, shall be removed and new Structural Soil installed that meets these specifications.

3.6 FINE GRADING

- A. After the initial placement and rough grading of the Structural Soil but prior to the start of fine grading, the Contractor shall request review of the rough grading by the City Representative. The Contractor shall set sufficient grade stakes for checking the finished grades.
- B. Adjust the finish grades to meet field conditions as directed.
 - 1. Provide smooth transitions between slopes of different gradients and direction.
 - 2. Fill all dips with CU Soil™ and remove any bumps in the overall plane of the slope.
 - a. The tolerance for dips and bumps in Structural Soil areas shall be a 3” deviation from the plane in 10’.
 - 3. All fine grading shall be inspected and approved by the City Representative prior to the installation of other items to be placed on the Structural Soil.
- C. The City Representative will inspect the work upon the request of the Contractor. Request for inspection shall be received by the City Representative at least 10 days before the anticipated date of inspection.

3.7 ACCEPTANCE STANDARDS

- A. The City Representative will inspect the work upon the request of the Contractor. Request for inspection shall be received by the City Representative at least 10 days before the anticipated date of inspection.

3.8 CLEAN-UP

- A. Upon completion of the Structural Soil installation operations, clean areas within the contract limits. Remove all excess fills, soils and mix stockpiles and legally dispose of all waste materials, trash and debris. Remove all tools and equipment and provide a clean, clear site. Sweep, do not wash, all paving and other exposed surfaces of dirt and mud until the paving has been installed over the Structural Soil material. Do no washing until finished materials covering Structural Soil material are in place.

END OF CU-STRUCTURAL SOIL SECTION

SECTION 02700
SITE DRAINAGE & UTILITIES

PART 1: GENERAL

1.1 DESCRIPTION

- A. In general, the work under this Section includes the following items:
 - 1. Installation of all required, sewer lines, drainage structures, and perforated PVC drain pipe (with wrap/sock) as maybe called for on the drawings.
 - 2. Making any required sewer tap (s) into existing structures in strict accordance with utility department having jurisdiction of said utility.
 - 3. All trenching, permits and inspection fees, backfilling and backfill materials, compaction, sub-grading and related work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurements & Payments, Section 01025
- C. Clearing & Demolition, Section 02100
- D. Earthwork, Section 02200

1.3 REFERENCE SPECIFICATIONS

- A. The work under this Section shall be as required in the following City of Detroit standard reference documents, as Amended to date, and in accordance with all Building Codes as they apply to the work to be preformed:
 - 1. Department of Public Works Standard Specifications for Paving and Related Construction, and the
 - 2. Water & Sewerage Department:
 - a. Rules and Regulations for Water Service Installation & Maintenance. Of the Water & Sewerage Dept., and the
 - b. DW&SD Standard Specifications for Water Service Installation and Maintenance.

1.4 SUBMITTALS

- A. Shop Drawings, catalog cuts and numbers, and manufacturer's literature are required for.
 - 1. All pipe (submit letter confirming materials, manufacturers, and sources).
 - 2. All new drainage structures including drainage structure rims, grates, frames and other related items.
 - 3. If no grades are provided on the drawings the contractor shall in advance of excavating for the new drainage lines, field verify the invert elevations of the existing drainage structure (s) to be tapped into and shall submit a shop drawing for approval of the tap invert and

gradient slope for the sewer piping to be installed, all inverts at drainage structures and rim grades to achieve the proper drainage to them, for all structures to be constructed for the complete drainage system as depicted upon the drawings.

1.5 EXISTING UTILITIES

- A. Maintain in operating condition all active utilities encountered in the course of the construction work. **Contact "Miss Dig" prior to any excavation.**
- B. Public utilities of all types have been shown on the Drawings, to the extent known. The locations of these utilities are shown using the best information available. No guarantee is given that the locations are absolutely accurate or that other utilities than those shown are not present. Before starting construction, the Contractor shall check the City departments and public service organizations to ascertain for himself the locations of all utilities which might interfere with the work and shall give due notice to all organizations whose utilities will be affected by his operations.
- C. All public utilities, whether or not indicated on the Drawings which are adjacent to the construction but which, in the judgement of the City may be left in place, shall be maintained in such a manner as to secure the safety of the public and of adjacent structures or utilities. Such maintenance shall be by the Contractor at his expense.
- D. When the Contractor deems it unsafe, impractical, or impossible to construct the work without moving a utility, he shall immediately so notify the Recreation Department. Should the City representative concur with the Contractor's opinion, the City representative shall notify the utility concerned to have said utility moved accordingly. The work of moving said utility shall be done without expense to the Contractor.
- E. The City shall not be responsible for any delay, which the Contractor may encounter, due to the failure on the part of the utility involved to promptly maintain or move any interfering utility.
- F. Should damage to any existing utility result from the operations of the Contractor, he shall be liable for the entire cost of restoration.
- G. Disposition of Utilities:
 - 1. City codes, rules and regulations governing the respective utilities shall be observed in executing all work under this Section.
 - 2. Active utilities shown on the Drawings shall be adequately protected from damage and removed or relocated only as indicated or specified.
 - 3. Active utilities not shown on the Drawings shall be protected or relocated in accordance with instruction from the Recreation Department and the contract price may be adjusted for such work at the sole discretion of the Recreation Department.

1.6 PERMITS

- A. The Contractor is responsible for obtaining and paying all costs for permits and inspections necessary to install and complete the work. The Contractor Drawings (and any additional Contractor prepared sketch (s)) shall be used in obtaining the necessary permits.
 - 1 The General Building Permit, if required, will be obtained and paid for by the Contractor.
 - 2. The trade Sewer tap and sewer line work permit shall be obtained by a licensed plumber as required at Room 412 Coleman A. Young Municipal Center Building, Detroit, Michigan 48226, and at the Detroit Water and Sewerage Department, 735 Randolph, 14th floor offices.
 - 4. R.O.W. Permit as maybe required from DPW.
- B. Prior to making any sewer or manhole taps, the Contractor shall obtain the necessary permit and give sufficient notification to the Detroit Buildings and Safety plumbing Department and DW&SD, as required, to enable an Inspector (s) to be present at the time of the tap.
- C. Copies of all Permits shall be provided to the DRD Project Manager within two business days of being received by the contractor, and a Certificate of Acceptance for each upon completion of that portion of the work.

1.7 DRAWINGS

- A. The Drawings indicate the arrangement, general design, and extent of the drainage system. The connections are shown, more or less, in diagram and in their general locations, except where in certain cases the Drawings may include details giving the exact location and arrangement. Due to the small scale of the Drawings, it is not possible to indicate all fittings, offsets, accessories that are required. The Contractor shall carefully investigate the conditions affecting all the work, and shall arrange his work accordingly, furnishing and installing such items of materials as may be required to meet such conditions, and that will allow for the proper installation of the playground equipment or other site items of work without interference. Any adjustments in layout to allow for future work shall be at the contractor's sole expense.
- B. The Contractor or their Licensed Plumber, as maybe required, shall prepare any additional drawings depicting the work to be preformed as maybe required to obtain the needed City of Detroit Permit (s) and shall include any costs associated with the preparation of such drawings and obtaining of the required Permit (s) as part of the bids costs. All cost of whatever nature for ROW connections, any additional permits and inspection costs shall be included in the cost of performing the work as called for on the drawings and these specifications so as to provide for a complete operational system at no additional costs to the City. No additional costs will be allowed for time spent obtaining Permits or for time spent waiting for City Inspection or their needed work to complete the work as required.

PART 2: PRODUCTS

2.1 SEWER DRAINAGE PIPE

- A. The sewer piping for in the play areas shall be standard drainage 4-inch corrugated, perforated, pipe with a protective geofabric sock around the perforated pipe. The pipe trench in the play area shall be covered with the specified stone carefully placed so as not to damage the pipe.
- B. Drainage pipe between the play area and the existing drainage structure to be tapped into shall be standard PVC sewer pipe conforming to City standards, codes and requirements in the sizes called for on the drawings.

2.2 BACKFILL MATERIALS

- A. Backfill for Trenches
 - 1. Backfill for perforated tile line required in the play area shall be clean washed. Pea stone, which shall be installed along the drainage lines.
 - 2. Sewer pipe bedding shall be granular Class II bedding material conforming to the City DPW Standard specifications previously referenced and to all City of Detroit codes and requirements.
- B. Backfill for Drainage Structures and Lines
 - 1. Backfill in the space adjacent to drainage structures with Grade A fill and or Grade C concrete.
 - 2. Water line backfill shall be in accordance with the Standard Specifications of the DW&SD.
- C. Excavation Materials used as Backfill
 - 1. Excavation material judged suitable for backfill may, when specifically so approved by the City Representative, be used.

PART 3: EXECUTION

3.1 EXCAVATION

- A. Excavation for manholes, catch basin(s) and sewer lines shall be by the open-cut method and shall be of sufficient size and depth to allow free working space for the construction of the sewer lines and drainage structures. True to line and at the required grades and dimensions shown on the Drawings and or as required by field conditions. Trenching shall be in strict accordance with the City Specifications referenced under Article 1.3 A of this Division. Proper over night protection MUST be installed and maintained daily, at no additional cost to the City, and shall be maintained until inspected and

approved by the City Inspector. If the contractor deems it necessary to employ security guard services, it shall be done so at the Contractor's sole expense.

- B. Excavation material judged suitable for backfill may, when specifically so approved by the City Representative shall be temporarily stored in such locations, manner, and amount as authorized by the City representative. All excavated material shall be placed in berms on the Park property. All costs to grade the berms out, apply topsoil, fine grade and install lawn shall be at the contractor's expense.
- C. If no grades are provided on the drawings the contractor shall in advance of excavating for the new drainage lines, field verify the invert elevations of the existing drainage structure (s) to be tapped into and shall submit a shop drawing for approval of the tap invert and gradient, inverts at drainage structures to be constructed for the drainage system as depicted upon the drawings.

3.2 PVC FLEXIBLE DRAINAGE & SEWER PIPE

- A. Plastic drainpipe shall be laid within the play area and other areas as called for and detailed on the drawings.
- B. Plastic drainpipe shall connect directly into either a new MHCBS or into an existing MHCBS as indicated on the drawings.
- C. Sewer lines and new manhole catch basins shall be installed in strict conformance to accepted City of Detroit standards and to code. Once installed they shall be inspected as required under the Permit and a copy of the sign off shall be forwarded to the City Representative. All sewer line trenches shall be filled with approved fill materials, in layers of no more than 12 to 18 inches and thoroughly compacted as the backfilling operation progresses. Any future settlement for FIVE YEARS (5) shall be corrected at the contractor's full expense to the satisfaction of the City Representative.

END OF SITE DRAINAGE AND UTILITIES SECTION

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SECTION 02710

DRINKING FOUNTAIN

PART 1: GENERAL

1.1 DESCRIPTION

- A. The work covered by these specifications consists of the provisions of labor, material, equipment, and services required for all work as described herein. In general, the work includes: Hooking into existing water lines, installing new drinking fountains with foundation and shut off valves, etc. obtaining City permits, the inspection and other items as required to complete the drinking fountain installation.
- B. Layout of equipment and accessories under this Section of the Specifications is generally diagrammed unless specifically dimensioned on the Drawings. The Contractor shall verify all measurements on the site and be responsible for the correctness of it. No charge for any differences between actual and indicated dimensions will be allowed.
- C. The right is reserved to make any reasonable change in location of underground piping and accessories prior to trenching without involving additional expense and after trenching if not properly located. The Contractor shall be responsible for all costs involved of whatever nature to purchase, handle, transport, and install the drinking fountains.
- D. Unless otherwise specified, the plans and Specifications are intended to include everything obviously requisite and necessary for the proper installation and completion of the work to make each drinking fountain fully operational whether each necessary item is mentioned or not per code.
- E. The Plans and Specifications are intended to be cooperative and any item called for in one and not the other shall be as binding as if called for in both.
- F. All work herein specified or called for on the Drawings will be executed in accordance with all governing ordinances, laws and regulations that meet all local conditions. Additionally, any changes and/or additions in the work necessary to meet these ordinances, laws, regulations and/or conditions will be made without additional cost to the City.
- G. The Contractor shall take out all required plumbing permits, arrange for all necessary inspections, and shall pay all fees and expenses in connection with the same as part of the work under this Contract.

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1.2 SUBMITTALS

- A. Submit complete shop drawings for the drinking fountain installation based on the utility Drawings and actual field conditions. Coordinate exact requirements with Landscape Architect.
- B. Submit manufacturer's catalog cuts on all major component parts such as valves, pipe, etc.
- C. Submit samples of each type of valve, pipe and any other materials requested for review and approval by the Landscape Architect.

1.3 DESCRIPTION OF THE SYSTEM

- A. Layout of the system is shown on the Drawings.

1.4 EXAMINATION OF THE SITE

- A. The Contractor acknowledges that he has examined the site, and the submission of his proposal shall be considered evidence that examination has been made.

1.5 MATERIAL STORAGE

- A. Materials shall be stored to ensure the preservation of their quality.
- B. Materials can be stored on site providing the storage area is approved by the City Representative, Landscape Design Unit.
- C. Security of the storage materials is the responsibility of the Contractor.

PART 2: PRODUCTS

2.1 MATERIAL SELECTION

- A. The materials chosen for reestablishing and installation of the drinking fountain shall be specifically referred to by the manufacturer so as to enable the City to establish the level of quality and performance required. Equipment by other manufacturers may be used only if approved by the City to allow them to evaluate the proposed substitution to assure that it is equal to the specified equipment.

2.2 PIPES

- A. Drain line shall be 6" virgin, high impact, polyvinyl chloride (PVC) pipe, having a minimum 160-psi working pressure rating.

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- B. All PVC pipe shall be continuously and permanently marked with manufacturer's name, material, size and schedule or type. Pipe shall conform to U.S. Department of Commerce Commercial Standard CS-207-60, or latest revision.
- C. Material shall conform to all requirements of Commercial Standard (CS-256-63), or latest revision.

2.3 PVC PIPE FITTINGS

- A. PVC solvent weld fittings---saddles prohibited.

2.4 DRAINS

- A. Drinking fountain drainage pipe shall be laid such that it drains completely by gravity.

2.5 DRINKING FOUNTAINS

- A. The drinking fountain shall be Most Dependable Pedestal Drinking Fountain, Model Number XXXX, surface mounted in a standard black color, with carrier and optional hose bib accessory.
- B. Copper pipe for drinking fountain: Type "K" or as otherwise approved by City for drinking water, and shall be installed as per City of Detroit DWSD standards.

2.6 SUBSTITUTION

- A. No substitutes shall be allowed unless the proposed substitution has been examined and approved by the Landscape Architect prior to the bid. Written authorization shall be required from the City for any substitution.

PART 3: EXECUTION

3.1 EXCAVATING AND BACKFILLING

- A. The Contractor shall do all necessary excavating and backfilling required for the proper installation of the work.
- B. All backfill material shall be clean sand to prevent damage to the pipe. Backfilling of trenches containing copper pipe shall be done when the pipe is cool to avoid excessive contraction in cold weather. All backfill material will

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be compacted in 6" layers to finish grade so as to insure that no settling results.

- C. Contractor shall provide any all demolition, construction anchoring, etc. to install new water and arrange connection and foundation, as shown and specified, required for the proper installation of the work.
- D. All work shall be done in accordance with all applicable city, state and federal codes and guidelines.

3.2 DRINKING FOUNTAIN

- A. Install drinking fountain complete with water service and drainage line connections as indicated on Drawings.
- B. Water piping shall be installed to provide for expansion and contraction.
- C. Contractor is responsible to verify positions of piping and test to verify piping as operable for each replacement or new fountain.
 - 1. Contractor held responsible for any damage to existing site elements.
- D. Existing water line shall be flushed prior to connection to prevent new fountain from being clogged with debris.

3.3 CLEANING

- A. Perform cleaning during installation of the work and upon completion of work. Remove from site all debris and equipment. Repair all damages resulting from drinking fountain installation.

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3.4 TESTING THE SYSTEM

- A. The entire piping system shall be tested at 1.5 times the normal operating pressure.
- B. Duration- One hour and until completion of inspection.
- C. Sanitize drinking water piping per state and local code requirements.
- D. Inspection - Examine line and appurtenances for leaks and movement.
- E. Correction- Repair defects, visible leaks, and repeat test until acceptable.
- F. Water - Available from municipal system.
- G. Conditions -
 - 1. Air or air water methods of applying pressure prohibited.
 - 2. Complete test only after backfill has been completed.

3.5 AS-BUILT DRAWING

- A. After completion of the piping and drinking fountain installation, the Contractor shall furnish an "as-built" drawing showing drinking fountain, drains, and pipelines to scale with dimensions where required. Instruction sheets and parts lists covering all operating equipment will be bound in a folder and furnished to the OWNER in duplicate.

3.6 INSTRUCTION

- A. After completion and testing of the system, the Contractor will instruct the Owner's personnel in the proper operation and maintenance of the system.

3.7 GUARANTEE

- A. For a period of one year from the date of final acceptance of the work performed under this Contract, the Contractor shall fully maintain the system in a first class working order. Any and all parts which prove defective in material or workmanship shall be promptly furnished without cost to the City. In the fall following the installation, the Contractor shall drain the system for the winter and the following spring shall put the system back into operation.
- D. The Contractor shall perform all required winterization and start-up operation during the maintenance guarantee period.

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- E. Adjustment during the guarantee maintenance period shall be made by the Contractor for a period of one year from the date of final acceptance of work, as required.
- F. Within ten (10) days of the Contractor's notification that the installation is complete, the Landscape Architect will inspect the installation and, if acceptance is not given, the Landscape Architect will prepare a punch list which upon completion by the Contractor will signify acceptance by the Landscape Architect. A final inspection will be held at the end of the guarantee period at which time the Landscape Architect will grant final acceptance.

3.8 PROTECTION

- A. Contractor shall provide and maintain an approved method of protecting his work and will be held responsible for any injury to same until final completion and acceptance of same.
- B. Covers for protecting work shall be heavy tarred paper, plastic, or other approved material, depending on location.
- C. No rubbish or debris resulting from operations under this Section will be allowed to accumulate on the site.
- D. Upon completion of work, Contractor shall leave premises clear and free of rubbish.
- E. Contractor will be held responsible for any damage done to existing trees, structures, underground lines, etc., during the installation of work shown on the Drawings.

***END OF DRINKING FOUNTAIN SECTION**

SECTION 02715
WATER SUPPLY

PART 1: GENERAL

1.1 DESCRIPTION

- A. In general, the work under this Section includes the following items:
1. Identification of all site utility locations.
 2. Protection of all utilities.
 3. Installation of a complete water service at the Floral Clock area for irrigation.
 4. Modifications to the existing water supply lines under the Scott Fountain to provide for irrigation water service.
 5. All trenching, permits and inspection fees, backfilling and backfill materials, sub-grading and related work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurement & Payments, Section 01025
- C. Clearing & Demolition, Section 02100
- D. Earthwork, Section 02200
- E. Underground Irrigation System, Section 02810

1.3 REFERENCE SPECIFICATIONS

- A. The work under this Section shall be as required in the following City of Detroit standard reference documents, as amended to date, and in accordance with all Building Codes as they apply to the work to be preformed:
1. Department of Public Works Standard Specifications for Paving and Related Construction, and the
 2. Water & Sewerage Department:
 - a. Standard Specifications, Rules and Regulations for Water Service Installation & Maintenance of the Water & Sewerage Dept. (DWSD).

1.4 SUBMITTALS

- A. Shop Drawings, catalog cuts and numbers, and manufacturer's literature are required for:

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1. Wabash Box, water meter, shut off gate valve, box and corporation stop, gate valve and threaded cap for winterization, and other related materials for the Floral Clock system.
2. New water line, water shut off valve, water service design including connections and methods of penetration of wall(s), and winterization blow-off fittings if necessary, and other related materials for the Scott Fountain System.

1.5 EXISTING UTILITIES

- A. Maintain in operating condition all active utilities encountered in the course of the construction work. **Contact "Miss Dig" prior to any excavation.**
- B. Public utilities of all types have been shown on the drawings, to the extent known. The locations of these utilities are shown using the best information available. No guarantee is given that the locations are absolutely accurate or that other utilities than those shown are not present. Before starting construction, the contractor shall check the City departments and public service organizations to ascertain for themselves the locations of all utilities which might interfere with the work and shall give due notice to all organizations whose utilities will be affected by their operations.
- C. All public utilities, whether or not indicated on the drawings, which are adjacent to the construction but, which in the judgement of the City may be left in place, shall be maintained in such a manner as to protect & the secure the safety of the public and of adjacent structures or utilities. Such maintenance shall be by the contractor at his expense.
- D. When the contractor deems it unsafe, impractical, or impossible to construct the work without moving a utility, he shall so notify the Utility and City Representative. Should the City Representative concur with the contractor's opinion, the City Representative shall notify the utility concerned to have said utility moved accordingly. The work of moving said utility shall be done without expense to the contractor.
- E. The contractor shall promptly notify the City should a delay occur from any utility, but the City shall not be responsible for their delay, which the contractor may encounter, due to the failure on the part of the utility involved to promptly maintain or move any interfering utility.
- F. Should damage to any existing utility result from the operations of the contractor, he shall be liable for the entire cost of restoration. This includes but not limited to Scott Fountain plumbing and security lighting wiring and Floral Clock wiring and security lighting camera infrastructure.

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- G. While working near a water main that is considered a hazard, it is advisable to cut off the pressure in such main. Wherever it is possible to do so, the DWSD will cooperate by temporarily taking such water lines or mains out of service while construction is progressing in their vicinity. Such removal from service may be done only at the request of the City. **Under no circumstances shall the contractor operate water main valves.**
- H. Disposition of Utilities:
1. City codes, rules and regulations governing the respective utilities shall be observed in executing all work under this Section.
 2. Active utilities shown on the drawings shall be adequately protected from damage and removed or relocated only as indicated or specified.
 3. Active utilities not shown on the drawings shall be protected or relocated in accordance with instruction from the General Services Department and the contract price may be adjusted for such work at the sole discretion of the General Services Department.

1.6 PERMITS

- A. The contractor is responsible for obtaining and paying all costs for permits and inspections necessary to install and complete the work. The contractor drawings (and any additional contractor prepared sketch (s)) shall be used in obtaining the necessary permits.
- 1 The General Building Permit, if required, will be obtained and paid for by the contractor.
 2. The trade sewer and water line work permits shall be obtained by a licensed plumber as required at B&SED Room 412, Coleman A. Young Municipal Center Building, Detroit, Michigan 48226, and at the DWSD offices located at, 1420 Washington Boulevard, 1st floor offices.
- B. Prior to making any water main, sewer or manhole taps, the contractor shall obtain the necessary permit and give sufficient notification to the Detroit Buildings and Safety Engineering Department – Plumbing Division and DWSD, as required, to enable an Inspector (s) to be present at the time of the tap.
- C. Copies of all Permits shall be provided to the City Representative within two business days of being received by the contractor, and a Certificate of Acceptance for each Permit, upon completion of that portion of the work.

1.7 DRAWINGS

- A. The drawings indicate the arrangement, general design, and extent of the water service system. The connections are shown, more or less, in

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diagram and in their general locations, except where in certain cases the drawings may include details giving the exact location and arrangement. Due to the small scale of the drawings, it is not possible to indicate all fittings, offsets, accessories that are required. The contractor shall carefully investigate the conditions affecting all the work, and shall arrange his work accordingly, furnishing and installing such items of materials as may be required to meet such conditions and that will allow for the proper installation of the irrigation equipment or other site items of work without interference. Any adjustments in layout to allow for future work shall be at the contractor's sole expense.

- B. The contractor or their Licensed Plumber shall prepare any additional drawings depicting the work to be performed as maybe required to obtain the needed City of Detroit Permit (s) and shall include any costs associated with the preparation of such drawings and obtaining of the required Permit(s) as part of the bid amount.

PART 2: PRODUCTS

2.1 METER EQUIPMENT

- A. The Wabash Box, water meter, shut off gate valve, box and corporation stop, copper pipe, back flow preventer, and gate valve must be standard DWSD and approved by DWSD.
- B. The contractor must purchase from DWSD the Wabash Box and Cover, Meter Yoke for 1" meter, and 1" Meter.

2.2 BACKFILL MATERIALS

- A. Waterline and Meter Box Backfill
 - 1. Backfill for the waterline, meter box, and associated equipment and materials shall be in accordance with the Standard Specifications of the DWSD.

PART 3: EXECUTION

3.1 EXCAVATION

- A. Excavation for the meter installation shall be by the open-cut method and shall be of sufficient size and depth to allow free working space for the construction of the equipment and structures. Lines shall be straight and at the required grades and dimensions shown on the drawings. Trenching shall be in strict accordance with the City Specifications referenced under Article 1.3 A of this Division.

- B. **Proper over night protection MUST be installed & maintained daily.**
- C. Excavation material judged suitable for backfill may, when specifically so approved by the City Representative, be temporarily stored in such locations, manner, and amount as authorized by the City representative. Should the amount so authorized to be stored be more than that which is needed for the later backfill needs, the excess amount shall be removed promptly from the site. No excavated material shall be disposed of on City Park property, unless otherwise directed by the City Representative or called to remain on the drawings.

3.2 Water Tap

- A. The contractor can only tap the water main following permit approval from DWSD.

3.3 Waterlines

- A. All waterline work must be in accordance with DWSD requirements.

3.4 Meter Box

- A. All meter box work must be in accordance with DWSD requirements.

END OF WATER SUPPLY SECTION

SECTION 02730
PROTECTIVE SURFACING: RUBBER POURED-IN-PLACE

PART 1: GENERAL

1.1 DESCRIPTION

All work included under this Section provides all necessary materials, labor, tools, equipment, testing and supervision required for the work related to the installation of the poured-in place rubber protective surfacing.

- A. All poured-in-place rubber protective surfacing shall be installed in strict accordance with the manufacturer's technical specifications and as called for on drawings. The fall heights shall be the tops of all horizontal elements; specifically the tops of rails and barriers, the tops of climbers, the top of the support beams for swings, and for other rocking or stationary equipment the fall height shall be the top of the structure element being tested, but not less than a minimum 5 feet height.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurement and Payment, Section 01025
- C. Alternates, Section 01100
- D. Construction Staking, Section 01400
- E. Earthwork, Section 02200
- F. Site Drainage, Utilities, Section 02700
- G. Site Improvements - Play Area, Section 2800
- H. Concrete, Section 03300

1.3 SUBMITTALS

- A. Manufacturer's technical specifications and color & material samples are required for this portion of the work for review and approval by the City Representative prior to installation.
- B. The protective surfacing manufacturer/installer must submit a drawing (s) indicating the shape/thicknesses of the stone sub base and the rubber protective surfacing that is to be installed based upon the drop heights of the playground equipment to be installed within the play area. The thickness is expected to vary based on the specified drop heights that must be attained, however the minimum thickness of the rubber materials shall not be less than 2" inches. The submitted drawings will be used as the basis for insuring that the poured-in-place protective surfacing will meet all applicable codes and other requirements at the time of placement, including the patterns within the surface top coat, based upon the drawings and equipment that is to be installed. The drawings shall also indicate all locations (at a minimum) that testing shall be conducted. The City can, at no additional cost to the City, add other testing locations if it so feels they would be desirable or necessary. The protective surfacing manufacturer/installer must coordinate the drawing work with the work of the firm carrying out the work of Section 01400, Construction Staking.
- C. The name and recent past history, in conducting the exact types of testing of this specification section of work, of an Independent Testing Firm that is being proposed to conduct the specialized testing required in Parts 2 & 3 for the stone and rubber protective

surfacing required by this specification section, which shall be submitted to the City Representative for approval. Submittal shall include only the proposed company's experience in conducting the types of tests required and an example from a recent project of the testing report. If the City rejects the company, the contractor shall resubmit as required until a satisfactory company is approved at no increase to the contract price.

- D. Submittal packages shall include, but not be limited to the following:
- (1) Reference list per all of the requirements of contractor qualifications and testing firm as stated above,
 - (2) Two rubber samples measuring approximately 1' X 1' in 2" thickness with tapered edges, and a small re-sealable bags of the rubber materials per mix designs
 - (3) A written 5-year guarantee from the installer (as outlined under 1.4.5 and the testing in 1.4.3a of this section) of the proposed product against all defects in material and/or workmanship,
 - (4) Submit cold joint detail to be used and MSDS and product data sheets,
 - (5) Submit high traffic area treatment to be used,
 - (6) Game shop drawings of any called for game inserts,
 - (7) Submit a sample of the stone to be used per 2.1 (E) above,
 - (8) All required test results and location drawing as listed in this specification,
 - (9) Letter from the manufacture/installer indicating the acceptance of the fall heights to be tested from and the results to be attained following the completed installation,
 - (10) All other requirements of this specification section.

1.4 GENERAL

- A. Work Included
This work includes furnishing and installing the rubber protective surface.

B. Description of System and General Conditions

The rubber protective surfacing materials shall be poured in place and spread to provide for a resilient, seamless rubber surface installed over the specified base. The surfacing manufacturer shall be responsible for all labor, materials, tools, equipment, testing services and applicable taxes to perform all work and services for the installation of the surface. The surface shall be stable and slip resistant to comply with all requirements set forth in the Americans with Disabilities Act and meet the field test requirements of ASTM F1951. All work and handling of materials shall conform to requirements of M-OSHA.

C. Quality Assurance (from Manufacturer)

Lab Test Results – (Submittals required before installation)

1. Attenuation test results shall be provided to the City Representative and contractor with the submittal and after installation. These test results shall be certified and submitted on the letterhead of the approved independent testing lab. Impact attenuation test results will need to exceed the Consumer Product Safety Commission Guidelines for impact attenuation (G-max and Head Injury Criteria "H.I.C"). The Lab test results must be administered and evaluated under the same test and these results must be shown for three drops at each required temperature: 32 degrees, 72 degrees and 120 degrees; yielding less than 175 G-max and less than 825 maximum H.I.C, which are required following installation of the rubber surfacing as well.
2. *Accessibility of Surface Systems* - All playground-surfacing products must pass testing to ensure wheelchair access under and around playground equipment as required by the American Disabilities Act, wheel chair mobility ASTM F1951. Where there is a field test in the ASTM F1951, this will be used or the Rotational Penetrometer will be used to determine firmness and stability with the sum of these two values are not to exceed 1.5.

3. ***Traction F2333-04 Standard Test Method for Traction Characteristics of the Athletic Shoe-Sports Surface:*** The protective surface shall be tested with a leather soled shoe or leather sole patch and the result shall be greater than 0.9. All products must meet a minimum standard for traction. No exception will be made to this requirement in an effort to ensure ample slip-resistant conditions.
4. ***Permeability ASTM F1551-03 Suffix Din 18-035 part 6:*** The flow time shall not exceed 600 seconds (10 minutes). NOTE: From a geotechnical standpoint, the permeability of a material is a measure of the velocity at which water will flow through the void spaces or pores under a given hydraulic gradient. The product shall handle a minimum of 8" of rainfall per hour.
5. ***Flammability of Topping Course- ASTM D2859-04:*** Product shall pass flammability.
6. ***Tensile Strength - ASTM D412-87 test method A and Tear Resistance - ASTM D624-00e1:*** This test indicates a product's ability to stretch, and how far it will stretch before it breaks. Test results must be a minimum of tensile strength = 60 PSI, and % elongation @ break = 40 (140 % of original size).

D. Quality Assurance after the Installation made at the site:

Field Tests Results – (Submittals required following the installation)

1. The impact site (s) must be performed on the "worst case scenario" area locations and as described in sections 16-19 of ASTM F1292-04, from the drop heights specified and as required by the equipment being installed and tested to. The independent testing laboratory must be certified to meet the requirements as specified in ASTM F1292-04.
2. **The test company's report must state the base tested, physical locations tested, including being keyed to the previously approved shop drawing and shall include pictures showing the drop heights of the tests and conforming with the field test report for ASTM F1292-04. The cover letter of the report shall also indicate if all test locations passed the requirements of this specification; and if there were any areas of failure, that they be specifically called out within the letter.**
3. For all installations the contractor shall provide H.I.C. and G-max tests on the finished site installation, which must yield less than 175 G-max and less than 825 maximum H.I.C.
4. The independent testing company shall mail the certified test results directly to City Representative, as well as the contractor and the manufacturer.
5. The final installed surface shall be field tested to ASTM F1292-04, 10 to 35 days following the installation. The drop heights shall be the tops of all horizontal railings, specifically the tops of rails and barriers, the tops of climbers and roof edges, the top of the support beams for swings, and for other rocking or stationary equipment the drop height shall be the top of the structure and a minimum of 5 feet.
6. To assure compliance with all of the above requirements, the installation shall be provided the MANUFACTURER or their authorized agent who SHALL BE THE INSTALLER.

E. Contractor Pre-Qualifications

1. A list of ten (10) surfacing projects completed with a similar product within the last five (5) years. List shall include names of project representatives and respective telephone numbers. At least ten (10) of these projects must be at least five (5) years old. This list shall also contain projects, which require the same level of difficulty, size of project, type of project, e.g. color transitions and special graphics. These ten (10) projects shall have been contracted and installed by the company that is to perform the installation work.
2. If stone is used as a base, a list of five (5) projects where the proposed protective rubber surface has been installed over a compacted stone base. This list shall include names of project representatives and respective telephone numbers. At least two (2) of these projects must have been in excess of 5,000 square feet (could be

made up at multiple site with the same Owner/year) and must be at least five (5) years old.

F. Manufacturers Assurance

The contractor must submit Material Protective Data sheets (MSDS) and Product Data Sheets on all materials, during the submittal process.

G. Color EPDM or Equal Materials (Top Cap/Wearing Surfacing)

SPECIAL NOTE: Underneath all “high traffic areas” (Swings, slide chutes, whirls and other moving toys) the amount of binder material shall be increased to guarantee that the surface will not prematurely wear or cup, or the contractor may install tiles (refer to Submittals 1.3 D above). In any case the contractor shall, during the submittal process, specifically indicate what they intend to do in order to meet the requirements in these area and still provide the required 5-year warranty.

H. Warranty

1. The poured-in-place rubber protective surface shall be warranted by the manufacturer/installer for any defects in material and or workmanship labor for a period of no less than five (5) years.
2. The warranty must include that the maintained surface, when tested to ASTM F1292-04, that the Gmax shall not exceed 200 and the HIC shall not exceed 1000 from the originally stipulated drop heights of the tops of those elements described else where in this specification section.
3. The City will conduct its own testing program, in compliance with ASTM 1292-04, in subsequent years at its own cost, however, if any tests during the 5-year warranty period fail to meet these specifications the installer/manufacturer will be required to return to the site at their sole costs, and make all corrections necessary to have the protective surface again be in compliance with these specifications including a new success compliance test on the repaired surface, for the full warranty period.
4. The written and dated warranty (date shall read the date of final review, positive testing verification and acceptance by the City) must be submitted by the surface manufacturer/installer, prior to final payment. A preliminary copy of this warranty shall be submitted as part of the submittal process.

I. Maintenance

The manufacturer/installer shall supply the procedures to be followed with regards to the maintenance of the finished surface, including specific instructions for the removal of chewing gum from the surface. Any activity that would be considered to void the warranty must be stipulated.

PART 2: MATERIALS

2.1 COMPACTED STONE BASE REQUIREMENTS

A. STONE DEPTH

A four (4") minimum thickness, unless otherwise indicated on the protective surfacing manufacturer drawings.

B. Finish Grade of Stone Base

The final grade of the granular base shall be such as to provide for the final grade of the rubber protective surface to be at 1” above the maximum clearance for slide exits as stipulated in ASTM F1487.

- C. **SLOPE**
Stone elevation shall maintain slope of 1/4" per foot toward low points for under drainage, and proper elevations to achieve the required material depth to meet the requirements of the various drop heights from the installed equipment, once the poured in place rubber protective surfacing has been installed.
- D. **COMPACTION**
Density requirement is 95% compaction with final condition of stone as level and stable so as not to shift when traveled on or during surface installation process. Compaction testing is required and an approved independent testing company, who shall be on site during the placement of the stone sub base.
All test reports must be submitted to the City Representative, the contractor and the poured-in-place rubber manufacturer/installer, prior to installation of the rubber protective surfacing. The report must indicate that the stone sub base was properly placed, in compliance and compacted in strict accordance with this specification, especially in all locations adjacent to play equipment.
- E. **POROSITY**
Stone base course shall maintain porosity for direct drainage. Care must be taken not to choke off porosity. Use only washed stone, and submit sample with porosity and compaction data from approved testing agency.
- F. **CONCRETE EDGE (if used)**
If the drawings call for a concrete retaining curb or concrete walk adjacent to the protective surfacing area the compacted stone base course shall tightly abut the concrete. For the protective surface system area, the top-of-concrete elevation shall be a minimum of 4" above the top-of-compacted stone elevation. **NOTE:** As the protective surface system depth changes due to any particular fall height requirements, so shall the difference between top of concrete and the top of the compacted stone.
- G. **DRAINAGE**
Subsurface drainage shall be installed as called for on the drawings under the stone base. The (4") four inch perforated pipe with protective sock shall be as specified in Section 02700. The entire play area prior to stone placement shall be covered with a layer of MARAFI # 140N geotextile fabric. Over lap joints by a minimum of 8-inches.
- H. **TOLERANCES**
1/4" in any 10-foot direction and 1/8" in any 3-foot direction.
- I. **STONE SELECTION**
It is critical that the use of different stone sizes described below is strictly adhered to. Stone shall be uniformly mixed in an approving pugmill or on a mixing table or by other mechanical means (such as quarry blending operations) prior to placement on the subgrade. Test samples shall be taken after mixing by the testing company, and the material shall be deemed by the testing company to the City Representative to conform to specified requirements prior to being placed on the subgrade. The material shall be wetted during mixing operations if necessary for proper blending. The Testing Company shall confirm in their written report that all sub base course stone materials conformed to these specifications.

J.	<u>STONE GRADATION</u>	<u>U.S. Sieve</u>	<u>Percent Passing</u>
		1"	100
		3/4"	90 - 100
		No. 4	35 - 60
		No. 30	10 - 30
		No. 200	

2.2 PROTECTIVE SURFACING RUBBER PRODUCTS

- A. Polyurethane Primer and Binder - 100% Single Component Polyurethane Binding Agent -- No solvent or plasticizers are to be included in the binder. The selection of the polyurethane binder shall be such as to assure performance to the standards in this specification for a period longer than the warranty period. The materials shall be delivered in good condition in original unopened packages with labels intact. All materials shall be protected from weather and the binder stored in temperatures of 40 degrees or higher.
1. Use aliphatic binder where yellow, blue, lavender, purple, grey, teal and tan color rubber materials that can be anticipated to change the original color which are used in the top course and yellowing effect would be a visual problem. The product used must remain UV stable. This applies to mixed color where one of the afore mentioned colors is used. For all other colors an aromatic binder material may be used.
 2. The amount of binder used in the top course shall be increased so as to provide increased wearability under senior swings, whirls and other circular motion toys, slide chutes and any other high traffic wear may become a problem during the warranty period.
- B. Impact Base Course - SBR select rubber. The impact layer is to be a precise combination of recycled black rubber and the specified binder.
- C. Poured Cap – Can only be an EPDM colored rubber granule material, with a wear course particle size shall be 1-3mm. The cap shall have a minimum thickness of 1/2-inch to 1 1/2". STRAND, SHAVED, CHIPPED OR SHREDDED RUBBER IS NOT ACCEPTABLE IN THE Poured CAP. The colors shall be as selected from the manufacture's standard colors, and shall be as called for on the drawings. Only EPMD that is assured to hold its original color for the 5-year warranty period are to be utilized with aromatic binders. Where there is concern by the installer that the color of the EPMD will change, the manufacturer must utilize an aliphatic binder and any other steps to assure color fastness. Black material can be SBR select rubber. Color may be provided with pigmented binder or 5-year UV stable inorganic pigments such as ferrous or chromium oxide.
- D. High Traffic & Abrasion (Swings, Slide Chutes & Whirl Toy) Areas:
The City has concerns with the heavy, direct traffic at Senior Swings, Slide Chutes, Whirls perimeters and other circular motion toys that will be subject to wear that must be considered by the manufacturer/installer contractor at the time of installation as wear in these areas will be considered a warranty item for the life of the 5-year warranty period. Although the City does not prescribe the solution, strategies that might be employed in these areas could be the use of additional binder material, etc. In any event, compliance to ASTM F1292 must not be compromised. The Contractor shall provide in a submittal an explanation as to how they propose to solve this problem for the entire warranty period, without additional cost of any kind to the City.
- D. No additional costs will be given to any General Contractor, if the company they initially submit to perform this work does not meet the requirements of this section, and they have to use another company other than that indicated in the Bid Proposal.

- E. Rubber materials shall be transported in bags and handled such as to protect from moisture.
- F. The surface shall carry not less than a Class B fire rating.
- G. **Cap Color Selections:**
All colors shall be as called for on the drawings.
- H. Game Inserts or poured equal: (if used)
 - 1. Games may be custom done in the field but shall be equal to that as manufactured by:
 - Dinoflex Manufacturing LTD.
 - Exerflex Fitness Flooring
 - 6801 Lake Plaza, Suite A-105
 - Indianapolis, IN 46220
 - 1 (800) 428-5306
 - 2. Required game inserts if called for like Hop Scotch, shall be as called for on the drawings and shall be 24' x 24" x 1 ½ inch thickness and located outside of the fall zone areas surrounding any play structure or other play elements.
 - 3. Alternate acceptable surfacing for the games may be rubber tiles or poured-in-place rubber surfacing with increased top course binder, at the contractor's option.

PART 3: EXECUTION

3.1 Stone Base Requirements

- A. The stone sub base shall have a specific minimum slope of 2% and shall vary no more than 1/4" when measured in any direction with a 10' foot straight edge. The compacted stone base will be subject to slope and tolerance specifications.
- B. Due care shall be exercised during the placement of the stone course so as not to damage or otherwise disturb the drainage piping.
- C. **TESTING:** Upon completion of the installation of the stone sub base materials, the contractor shall have the sub base stone compaction tested, to assure that proper compaction of the stone sub base has been attained and shall also be checked by the manufacturer/installer of the protective surfacing to assure that the proper grade elevations are present.
 - 1. Copy of the Testing Report shall be forwarded directly to the Installer, General Contractor and the City directly from the Testing Laboratory. The testing lab shall highlight any areas failing to meet the specified requirements. The manufacturer/installer shall immediately (within 5 Business Days) respond to any areas of failure with steps to be taken in the form of a letter to the General Contractor, and City Representative.

3.2 Preparation for Rubber Installation

- A. **Scheduling** – The poured-in-place rubber protective surfacing shall be installed after the playground equipment is installed and after the stone subsurface has been tested and passed the testing required, and is ready to receive the protective surfacing.
- B. The temperature should be 45 degrees and rising during installation of surface, and be in strict conformance to the manufacturer's specifications and instructions. NO EXCEPTION to this will be considered.

- C. Cleaning - The entire stone subsurface shall be clean, dry and free from any foreign and loose material. The installer shall examine final grades and installation conditions.
- D. The surfacing installer shall assure themselves, prior to installation of the surface, that the drop heights are as expected and that there are sufficient materials for the stipulated drop heights. No extras will be allowed for should a lesser thickness or impact absorption result from the final surface not meeting the fall & testing drop heights stated within these specifications. Do not start poured-in-place rubber protective surface installation until unsatisfactory conditions are corrected and met.
- E. Contact the City Representative prior to testing, product installation and other times as called for.

3.3 Installation

- A. Thickness - Total depth of the surface shall be INSTALLED IN STRICT ACCORDANCE AND CONFORMITY TO THE MANUFACTURER'S DRAWING(S) and these specification requirements. Surface thickness will vary in the impact base course according to the fall height(s) of the play equipment called for. The protective surfacing manufacturer/installer must contact the equipment manufacturer to determine exact fall height requirements, and verify those heights in the field, prior to starting the protective surface material installation.
- B. Review protective surfacing and equipment fall height charts for correct total depth of surface. ALL TEST DROP HEIGHTS MUST BE TAKEN FROM THE HIGHEST POINT OF THE PLAY STRUCTURE at the test points (as specified under 1.4.C above). The manufacturer/installer of the poured in place rubber protective surfacing shall be responsible for reviewing the shop drawing indicating the depths of material to be installed prior to starting the protective surfacing installation work, and shall submit to the General Contractor and City on their letterhead acceptance of same.
- C. NOTE: A minimum of 2" of the rubber protective surfacing materials (total depth) is required over the stone base. Also, no rolled rubber products will be acceptable. It is the primary intent of this specification to provide a seamless, porous poured in place rubber protective surface.
- D. Impact Base Course – The manufacturer's minimum depth or greater shall be installed as required by the fall height(s) required by the playground equipment that is or is to be installed and the test results of the finished surface as specifically required within these specifications. The protective surfacing materials shall be free of foreign matter. The impact course will be poured-in-place by means of screeding and hand-troweled to maintain a seamless application including if tiles are also used in the installation. The use of only a paddle type mixer equal to a Stone Model 755PM will be allowed.
- E. Poured Cap - The minimum cap thickness of a half inch (1/2-inch) minimum, to 1 ½" poured cap material shall be composed of EPDM granular rubber only with a non-pigmented binder. The cap will have a minimum weight of 2.2 pounds per square foot. The mix ratio of urethane to rubber shall be the sole responsibility of the manufacturer/installer and such as to ensure continued impact attention and durability. All rubber shall remain consistent with one single gradation and size. Installation method shall be such as to ensure the appropriate thickness and may use a measured screed rod 1/16" thicker than the required depth. A tight, well-compacted, dense top course is required. Any high traffic work areas, as approved, shall be properly located and installed.
- F. The graphic game inserts (if called for on the drawings) and play area designs with black color transitions shall be as depicted on the drawings and in the colors and mixes called for.

They shall be full wear course depth. Color(s) to be as called for with submittal samples required or selected by the City Representative. If the specified graphic 24-inch square tiles are used they have an approximately ¼-inch rod, which passes through each tile to align them properly. Outer game tile edges shall be absolutely flush with surrounding poured in place surfaces. The contractor shall allow for the 1 ½-inch game tile thickness in the placement of the impact base course materials directly underneath the game tile inserts. If poured in place surfacing is utilized for the graphic game inserts, the dimensions will remain the same and installers shall follow manufacturer's specifications.

- G. Edges - Surface edges shall be flush with the grades of adjacent area to provide a safe transition be it a concrete edge or turf lawn. The protective surface shall be sloped to drain and as may be indicated on drawings.
- I. Large Areas - All areas in excess of 3,000 sq. ft. or that require adjacent color pours that will have a cold joint or seam due to the nature of the installation process shall have this work done in strict accordance with the manufacturer's requirements with adjacent surfaces being flush throughout. Although seldom visible, large areas or adjacent colors require the poured in-place protective surface material to be installed on separate days. The manufacturer /installer shall employ the appropriate techniques to ensure that no gaps will occur during the warranty period.

3.4 Protection

- A. The contractor shall be responsible for the protection of rubber poured in place protective surfacing surface throughout the installation process. The contractor shall also be responsible for the protection of the surface during the curing period upon completion of the installation and until the surface has been accepted by the City.
It is the Contractors responsibility to give 48-hours "Notice" to the City, via fax 224-1734, for the Inspection of the completed and cured protective surfacing installation.
- B. **Note: The contractor shall have security personnel on site until the poured in place surface is sufficiently cured and hard enough to walk on without damage to the new surface. Any failure by the contractor's to protect the new surface from any vandalism or other forms of damage shall be at the contractor sole expense. Any damages shall be promptly repaired to the full satisfaction of the City, and at no cost to the City. No additional costs to the City will be entertained for security services and all costs must be included in the bid proposal.**
- C. The contractor shall be responsible for the care and upkeep of the surface until inspected, tested and accepted by the City, and shall include whatever costs to do so in their bid proposal.

3.5 Protective Surface Field-Testing to ASTM F1292-04 and these specification requirements

- A. For all installations the contractor shall provide Independent Test Lab test results for H.I.C. and G-max tests on the finished site installation, which must yield less than 175 G-max and less than 825 maximum H.I.C and as otherwise called for under Part 1, 4C of this specification.
- B. The contractor shall arrange for the field-testing of the completed surface by the independent Testing Company, to the requirements stated within these specifications and ASTM F1292-04 between 10 and 35 days following the installation as indicated above in Part One, 1.4 Paragraph C, and shall provide notification to the City Representative as called for. Repairs or replacement areas of the protective surfacing shall be re-tested within 10 - 35 days of said work and results provided to all parties at no additional cost to the City.

- C. Any delays or additional costs shall be at the contractors' sole expense, regardless of the source, cause or nature of the added costs to provide for the proper installation conditions for the protective surfacing, including any and all additional cost to make corrections, including re-testing, as maybe necessary to fully comply with the requirements of this specification section

3.6 Cleaning

- A. Perform cleaning operations during installation of work and upon completion of work so as to not allow debris to accumulate as the result of the protective surface installation operations. Remove from the site and legally dispose all debris. Provide a kit in a vinyl toolbox to the City, made up of the cleaning instructions and materials in which to clean the rubber protective surface of such things as pop spills, bubble gum and the like.
- B. The contractor shall be responsible to keep the surface clean until the dedication day, if held, and or final acceptance by the City, which ever happens last.

END OF PROTECTIVE SURFACING – RUBBER POURED-IN-PLACE SECTION

SECTION 02731
PROTECTIVE SURFACING: ENGINEERED WOOD FIBER

PART I: GENERAL

1.1 DESCRIPTION

- A. In general, the work under this section includes the verification of the excavation to the required depths and distances required for the play equipment fall zone lines as indicated on the drawings to meet code requirements for distance away from them and curbs or edges of the protective surfacing to be installed. Installation of geo textile fabric on a prepared sub base, installation of a stone sub base materials, installation of geo textile fabric on the prepared compacted stone sub base material, installation of rubber wear mats, installation of the engineered wood fiber protective surfacing product materials in the entire play area protective surface to proper elevations in all areas.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
B. Measurement & Payment, Section 01025
C. Alternates, Section 01100
D. Earthwork, Section 02200
E. Site Drainage and Utilities, Section 02700
F. Play Area Site Improvements, Section 02800
G. Landscaping Work, Section 02900

1.3 DEFINITIONS

- A. HDPE: High Density Polyethylene
B. IPEMA: International Play Equipment Manufacturer's Association
C. Use Zone: According to ASTM 1487, this means "the area beneath and immediately adjacent to a play structure that is designated for unrestricted circulation around the equipment and on whose surface it is predicated that a user would land when falling from or exiting the equipment"

1.4 PERFORMANCE REQUIREMENTS FOR SURFACING

- A. Impact Attenuation: ASTM F1292 and meet the guidelines for fall height as set forth by the Consumer Product Safety Commission for use of wood products for protective surfacing and the more stringent requirements set forth by this specification. The fall heights shall be the tops of all horizontal railings, specifically the tops of rails and barriers, the tops of climbers and roof edges, the top of the support beams for swings, and for other rocking or stationary equipment the fall height shall be the top of the structure at a minimum of 5 feet. The Engineered Wood Fiber manufacturer must provide proof of certification to the conformance to ASTM F1292-99, as a submittal.

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- B. Accessibility of Surface Systems: The finish surface must meet ASTM F1951-99 & ASTM F1292-96 requirements in the determination of accessibility and impact attenuation of surface systems under and around playground equipment. The surface must meet the requirements of ADA for the areas that are in the ground level accessible route.
- C. Minimum characteristics for Organic Loose-Fill Surfaces: ASTM F2075-01 sieve analysis of fine and course aggregates, containing a 10-20 percent amount of fines.
- D. Flammability – The wood fiber material must pass the ASTM D2859 flammability test.
- E. Geotextile fabric thickness and water permeability must conform to a minimum thickness of 28 mil and the water permeability rate of a minimum of 26-gallons/sq ft./minute.
- F. Impact Attenuation: When product is installed to a compacted depth the surfacing material shall comply with ASTM F1299-99 and have a G-max less than 175 and less than a range of 780 to 800 maximum H.I.C.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include: Construction details, material descriptions and a small sample of each material that is required with the requirements, installation details, manufacturer's warranty and independent laboratory results for tests required for each of the materials as specified herein.
- B. Provide a submittal letter from the engineered wood fiber manufacturer that the product is in compliance with the above 1.4 A, B & C standards of performance as set forth by ASTM requirements for protective surface systems under and around playground equipment.

1.6 WARRANTIES

- A. The protective surfacing wood fiber material shall be warranted for 10 years for ASTM F1292 shock attenuation and against defects at time of delivery. Provide manufacturer's warranty. The protective surfacing wood fiber material shall be warranted against deterioration and decay (list timeframe) at the time of delivery, per manufacturer's warranty.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver manufactured products in manufacturer's original, unopened, and undamaged protective packaging with labels intact and legible.
- B. Store and handle manufactured products in such a manner so as to prevent damage and deterioration.

1.8 JOB CONDITIONS

- A. Contractor is responsible for receiving and securing all shipments of materials and equipment.

PART 2: PRODUCTS

2.1 PLAY AREA SURFACING

A. Wood Fiber System:

1. The protective manufacturer of hardwood fiber systems shall comply with ASTM 1951 and ASTM F1292-93 conforming to shock attenuation values of less than 175 G-max and less than a range of 780 to 800 maximum H.I.C. for fall height of installed equipment. Confirm in a submittal letter.
2. Testing is not required under this contract of the installed surface.
3. Provide maintenance requirements to the City Representative.
4. Engineered wood fiber, a wood product manufactured from virgin hardwood or softwood, free of any bark, twigs, leaf debris and other organic material at a minimum. Fibers maybe up to 1.5 inches in length and contain a 20 percent, maximum amount of fines to pass through a No. 16 sieve (ASTM C136-96A.)

B. Geotextile Fabric:

1. In accordance with the performance requirements stated in paragraph 1.4F above submit a small sample of the geotextile fabric along with the manufacturer's literature indicating compliance with those stated above requirements.

PART 3: EXECUTION

3.1 EXAMINATION

- A. The contractor, the City Representative and the installer shall examine areas and conditions in which the protective material is to be placed for compliance with the above requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance and requirements for the installation to meet the code requirements at the time of installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Wood Fiber System
1. Install per drawings, details and specifications.
 2. Wood fiber systems shall be complete with a minimum 12-inch depth of the patented hardwood fiber after compaction, or appropriate depth for equipment height. The installation shall be carefully placed in and around all equipment and along edging curbs so as to be tightly compacted upon completion of the installation of materials. The material shall be installed in a maximum of 4" lifts, compacted after each lift.
 3. Premature settlement will require the contractor to return to the site to add additional material in areas of settlement at no additional costs to the City for a period of one year. The contractor shall take all necessary steps to properly compact the newly placed materials to assure to the extent possible that no settlement will take place.
 4. The finish surface will be left in a smooth finish. The contractor shall return to the site to fine tune any areas that are in need to attention for a period of 60 days following final acceptance from the time that the installation work has been completed, adding manually and additional material that may become necessary.
 5. Areas below slides and swings shall have minimum 18 inches of fiber after compaction.
 6. Specified wear mats shall be placed as indicated on the drawings.
 7. The running slope shall not exceed 1:16 and the cross slope shall not exceed 1:48.
- B. Drainage Stone: Install as may be called for in excavated areas below wood fiber at a minimum of 6 inches or greater if required per manufacturer's specifications.
- C. Geotextile Fabric: Install on the prepared sub grade and also on the compacted stone drainage base prior to placement of the engineered wood protective material surfacing. Allow for an 8 to 12-inch overlap at material joint

3.3 MAINTENANCE

- A. The installer shall inspect and adjust the protective surfacing materials for a period of 60 days from final acceptance, with review not less than one per month. Adjustment shall include the addition of additional material manually as required to meet the original design and installation requirements at no cost to the City.

3.4 CLEANING

- A. After completing the installation of the protective surfacing materials any debris accidentally sprayed onto the existing playground equipment installation shall be cleaned and removed from all surfaces; inspect components. Remove spots, dirt, and debris.

END OF PROTECTIVE SURFACING - ENGINEERED WOOD FIBER SECTION

SECTION 02740

HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 DESCRIPTIONS

- A. Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hot-mix asphalt paving.
- B. Related Sections include the following:
 - 1. Division 2 Section "Earthwork" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.3 DEFINITIONS

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM-D-8 for definitions of terms.
- B. MDOT: Michigan Department of Transportation.
- C. DPW: City of Detroit Dept. of Public Works, City Engineering – Standard Specifications for Paving and Related Work as amended to date.
- D. General Specification for definitions of terms and organization agencies.

1.4 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of state or local DOT.
 - 1. Standard Specification: City of Detroit Standard Specifications and the Michigan Department of Transportation (MDOT) current edition.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

- B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- C. Job-Mix Designs: For each job mix proposed for the Work.
- D. Qualification Data: For manufacturer.
- E. Material Test Reports: For each paving material.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
 - 1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of the state in which Project is located.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated, as documented according to ASTM E 548.
- C. Regulatory Requirements: Comply with City of Detroit and MDOT Standard Specifications for Construction for asphalt paving work.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - 1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - 2. Review condition of subgrade and preparatory work.
 - 3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - 4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:
 - 1. Asphalt Base Course: Minimum surface temperature of 40 deg F (4 deg C) and rising at time of placement.
 - 2. Asphalt Surface Course: Minimum surface temperature of 60 deg F (15.5 deg C) at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or properly cured, crushed blast-furnace slag.
- C. Fine Aggregate: AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, properly cured blast-furnace slag, or combinations thereof.
 - 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO MP 1, PG 58-28.
- B. Asphalt Cement: ASTM D 946 for penetration-graded material.
- C. Prime Coat: Asphalt emulsion prime complying with City of Detroit and MDOT Standard Specifications for Construction.
- D. Water: Potable.

2.3 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
 - 1. Base Course: MDOT Aggregate Base, Bituminous, 21AA (CIP)
 - 2. Leveling Course: MDOT Bituminous Mixture No. 1100L, 20AA
 - 3. Wearing Course: MDOT Bituminous Mixture No. 1100T, 20AA

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll sub-base using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 - 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

3.3 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - 2. Place hot-mix asphalt surface course in single lift.
 - 3. Spread mix at minimum temperature of 250 deg F (121 deg C).
 - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 - 5. Regulate paving machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).
 - 4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.5 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct lay down and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
 - 2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch (13 mm).
 - 2. Leveling Course: Plus 1/4 inch (6 mm), no minus.
 - 3. Wearing Course: Plus 1/4 inch (6 mm), no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch (6 mm).
 - 2. Surface Course: 1/8 inch (3 mm).
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T 168.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.

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2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

*** END OF HOT-MIX ASPHALT PAVING SECTION ***

SECTION 02741
COURT COLOR SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTIONS

- A. In general, the work under this section includes the installation of an acrylic color coating system for marking game lines and color coating on various recreational areas, including tennis and basketball courts, on asphalt or concrete paved surfaces as indicated on the drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurement & Payment, Section 01025
- C. Hot Mix Asphalt Paving, Section 02741
- D. Concrete, Section 03300

1.3 DEFINITIONS

- A. See General Specification section for definitions of terms.

1.4 SUBMITTALS

- A. Product Data: For the type of color coat system product(s) specified. Include technical data and tested physical and performance properties of system and striping for lines and any color selections available from the manufacturer for selection.
- B. Qualification Data: For manufacturer and certification of installer if different.
- C. Material Test Reports: For each color coating system material.
- D. Means and methods for treating of any existing cracks, including any plant growth killing and removal, power washing and or acid wash of existing surface, low area leveling materials, etc. prior to installation of the new color coating system and striping.

1.5 QUALITY ASSURANCE

- A. Manufacturer shall be an approved color coat system manufacturer, as approved by the City.

- B. Pre-installation Conference: Conduct with the City Representative a pre construction conference at project site to comply with this specification requirement. Review methods and procedures related to the installation of the color court system, treatment and work for the existing surface, possible cracks if present, low areas, special other existing surface prep work, and striping of new court lines including, but not limited to, the following:
1. Review proposed sources of court color materials, including capabilities and location of plant that will manufacture all materials.
 2. Review condition of existing paved surface and preparatory work required, methods to be employed and time table for each step of the process.
 3. Review requirements for protecting finished court color system work, including restriction of pedestrian foot traffic during installation period and for remainder of construction period until dedication and or acceptance by City.
 4. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver color surface system materials to project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture and directions for storage.
- B. Store color surface system materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight and keep product from freezing.

1.7 PROJECT CONDITIONS

- A. No work shall be attempted when ambient temperature is below 50 degrees Fahrenheit or when surface temperature is above 140 degrees Fahrenheit. Do not apply when rain is imminent.
- B. All surfaces to be coated shall be properly prepared to receive the court coating color system, free of all fine debris, which would cause surface blemishes.
- C. The contractor is responsible for SECURITY to keep all public, pedestrian or other foot traffic off of the various coatings until the City accepts the completed surface.

PART 2 - PRODUCTS

2.1 SURFACING MATERIAL

- A. All coatings shall be a non-fading, weatherproof, pure 100% acrylic coating, for the type of surface material (asphalt or concrete) being coated. The materials shall not contain any asphaltic or tar emulsions, vinyl, and alkyd or non-acrylic resins. The color system made from acrylic resins, mineral fillers and colorfast pigments shall be factory-mixed compounds requiring only the addition of water at the jobsite except for the addition of sand to the acrylic resurfacer. All materials shall be delivered to the jobsite in sealed containers with the manufacturer's label affixed.
- B. Mix Design: The color system product shall be mixed in strict accordance with the manufacturer's requirements, to a uniform consistency. Mix design to be adjusted as required to account for humidity, ambient temperatures and the surface porosity.
- C. Coverage: First & second filler coats = .05 gallons per square yard per coat; finish third coat = .04 gallons per square yard. Total coverage shall be approximately .14 gallons per square yard of material for the three applications. If a resurfacer is used the rate shall be approximately .06 gallon per square yard, depending upon the surface porosity. Basketball courts shall receive four applications in key areas.
- D. Application of materials shall only be when the ambient temperature has reached at least 50 degrees F and is rising or when the surface temperature is above 140 degrees F. Do not apply when rain is imminent.
- E. Acrylic Patch Material shall be a mixture of silica sand, Portland cement and the manufactures acrylic patch material. Mix design required.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Paved surfaces shall be cleaned using a stiff bristle broom and gas powered blower or water based pressure spray unit capable of generating 2500 psi at the nozzle tip or manufacturer's instructions, to remove all dirt, debris, old color coatings, acrylic or otherwise, and any existing game line markings.
- B. Existing paved surfaces shall be free of any pre-existing living plant and vegetation growth, color coating, acrylic or otherwise, and any line marking. All surface cracks shall be properly prepared and filled and surface made smooth as required for all existing surfaces to be coated.
 - 1. Remove all existing vegetation in any surface cracks prior to commencement of work in accordance with approved submitted means and methods for vegetation removal. If a large amount of plant growth is present, the contractor shall apply a total weed killer sufficiently in advance of future steps to allow for the weed killer to kill any vegetation growing. This shall be done prior to preparing the cracks for application of any crack filler and/or other materials.

3.2 APPLICATION

- A. New asphalt or concrete surface pavement shall have cured for not less than 14 days prior to application of any surfacing materials, or per manufacturer specs.
- B. The contractor must notify the City Representative of all applications 48 hours prior to commencement of any installation work.
- C. The surface to be coated shall be inspected and made sure to be free of grease, oil, dust, dirt and other foreign matter before starting work.
- D. Each coat in the color court system must be allowed to dry completely before the next application can start. Between each coat inspect the entire surface. Any defects should be repaired. Scrape surface to remove any lumps, and broom or blow off all loose matter.
- E. Using a neoprene rubber squeegee, apply one (1) coat of acrylic resurfacer, diluted with one (1) part clean water to two (2) parts acrylic resurfacer, in strict accordance with manufacturer requirements. Clean, bagged sand shall be incorporated into the diluted acrylic resurfacer at the rate of five (5) to ten (10) Lbs. per gallon and sand gradation shall be in strict accordance with manufacturer rates and mesh requirements.
- F. Using a neoprene rubber squeegee, apply two (2) coats of acrylic color coat, as per the selection (s) made during the submittal process, diluted two (2) parts concentrated material to one (1) part clean water. Allow each application to dry thoroughly. Apply an additional two (2) coats to basketball key areas. The quantity of water used in diluting these coatings may exceed the quantity specified by only a small amount and only if coatings are drying too rapidly. Verbal permission of the City Representative shall be obtained before adding additional water.

3.3 LINE MARKINGS

- A. Upon completion and acceptance of the tennis and or basketball court surface, the contractor shall prepare and paint lines as indicated on drawings. All lines shall be as indicated on the drawings.
- B. All lines are to be applied by painting between masking tape with a paintbrush or roller.
- C. Prime masked lines with masking tape edge sealer. Allow application to dry.
- D. Paint lines with textured line paint. Allow application to dry.
- E. Remove masking tape immediately after lines are dry.
- F. Protect adjacent areas and structures (fences, posts, sidewalks, buildings, etc.), which are not to be coated. In the event that coatings are accidentally applied to above, they are to be removed immediately before drying is complete.

3.4 COMPLETION

- A. Upon completion, the contractor shall insure proper removal of all construction debris, surplus materials, empty containers and wash water, and shall leave the site in a condition acceptable to the City Representative. The court is to be left properly secure so as to prevent vandalism.

3.5 FIELD QUALITY CONTROL

- A. Contractor shall take all necessary security means and methods steps to allow for the finished work product to be allowed to cure a minimum of 24-hours before paved surface is first accepted by the City and then and only then made available for use by the public.
- B. In the event that vandalism or other damage is sustained before the City has accepted the court work it shall be repaired at the Contractor's sole expense, regardless of the cause. The Contractor shall call the City Representative for inspection and acceptance as soon as the work is complete and cured for the minimum 24-hour period.

3.6 WARRANTY

- A. The contractor shall submit during the submittal process a typical copy of the Warranty, and prior to request of final payment submit the project warranty letter.
- B. Warranty shall certify that the installation meets or exceeds all specification and manufacturer requirements for the project installation and shall run for a period of at least 1-year from date of City final acceptance of the court work.
- C. The contractor shall upon written notification by the City DRD return to the site to correct any surface problem of any nature, other than vandalism, throughout the warranty period, at no cost to the City.

END OF COURT COLOR SYSTEM SECTION

SECTION 02742

HOT-MIX ASPHALT PAVING WALKWAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes all work required for the review and checking of the work to be installed if laid out and or excavated by others, sub base final proof compaction, providing and placement of hot-mix asphalt paving, complete with furnishing, preparation, installation, testing, surface treatments like color coatings, seal coating and stripping, protection of surfaces, cleaning of surfaces, adjustments, removal and clean up from paving operations.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurement and Payment, Section 01025
- C. Alternates, Section 01100
- D. Construction Staking, Section 01400
- E. Clearing & Demolition, Section 02100
- F. Earthwork, Section 02200

1.4 DEFINITIONS

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM-D-8 for definitions of terms.
- B. MDOT: Michigan Department of Transportation.
- C. DPW City of Detroit Dept. of Public Works, City Engineering – Standard Specifications for Paving and Related Work as amended to date.

PART 2 - MATERIALS

2.1 DEFINITIONS

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM-D-8 for definitions of terms.

- B. MDOT: Michigan Department of Transportation.
- C. DPW City of Detroit Dept. of Public Works, City Engineering – Standard Specifications for Paving and Related Work as amended to date.

2.2 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications and designations for State of Michigan MDOT or City of Detroit City Engineering Department standard specifications.
 - 1. Standard Specifications: City of Detroit Standard Specifications and the Michigan Department of Transportation (MDOT) current edition.

2.3 SUBMITTALS

- B. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
- C. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- D. Qualification Data: For manufacturer.
- E. Material Test Reports: For each paving material, sealer coating and color marking materials.
- F. Material Certificates: For each paving material, signed by manufacturers.

2.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
 - 1. Manufacturer shall be a paving-mix manufacturer registered with and approved by authorities having jurisdiction or the MDOT of the State of Michigan.
- B. Testing Agency Qualifications: Qualified according to ASTM D-3666 for testing indicated, as documented according to ASTM E-548, and as indicated below.
- C. Regulatory Requirements: Comply with City of Detroit and MDOT Standard Specifications for Construction for asphalt paving work.
- D. Pre-installation Conference: Conduct a pre construction conference at Project site to review methods and procedures related to hot-mix asphalt paving installation, staking of the proposed paving work, and also including, but not limited to, the following:
 - 1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.

2. Review condition of subgrade and preparatory work, Earthwork Section 02200.
3. Review requirements for protecting paving work, including restriction of construction traffic during installation period and for remainder of construction period.
4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
5. Distance markings and seal coats

2.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver asphalt sealer coating and color surface distance marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Keep asphalt sealer and color surface system materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

2.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply the asphalt Wearing Course materials if subgrade is wet or excessively damp or if the following conditions are not met:
 1. Asphalt lift single Course per detail: Minimum surface temperature of 55 deg F and rising at time of placement.

PART 3 - PRODUCTS

3.1 AGGREGATES

- A. General: Use 6" stone (see insert under Earthwork Section of these specifications 02200) a limestone gradation of materials (CIP), which are satisfactorily for this type of installation. Material must compact well to provide a solid sub base.
- B. Also refer to Earthwork specification Section 02200 for excavation requirements. Submittal of a small sample in a zip lock bag, labeled with test analysis is required. The stone aggregate: shall conform to the standard ASTM designation for this material, and be of composed of sound; angular crushed stone, or equal in crushed gravel.
- C. Blast-furnace slag, or combinations thereof shall not be used.
 1. For hot-mix asphalt, limit natural sand to a maximum of 10 percent by weight of the total aggregate mass.

3.2 ASPHALT MATERIALS

- A. Asphalt Materials shall all conform to MDOT 1100T specification requirements: Submittal required.
- B. Sealer Coat: The Asphalt Seal coat shall comply with MDOT Standard Specifications for Construction and Federal Spec RP-355 d or e, as applicable for requirements. Submittal required.

3.3 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes complying with MDOT 1100T specifications:
 - 1. 3" Wearing Course: MDOT Bituminous Mixture No. 1100T, 20AA, submittal analysis required.

3.4 DISTANCE MARKING PAINT

- A. Paint used to mark letters and distance points shall be factory-mixed, quick drying, non-bleeding paint specifically formulated for line marking on asphaltic surfaces in a yellow color. Submittal of product required which has a life expectancy of not less than 10 years.

PART 4 - EXECUTION

4.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Layout of the required lines and grades for the work shall be in accordance with the specifications of Staking & Layout, Section 01300. Call for review/approval prior to starting excavation, and again once stone has been placed and compacted in place and compaction tested, to the City Representative at 313 224-1108.
- C. Proof-roll subbase using appropriate sized equipment rollers to locate areas that are unstable or that require further compaction.
- D. Proceed with paving only after unsatisfactory conditions have been corrected and both the testing engineer has reviewed and City Representative have approved the sub grade.
- E. The Contractor shall take all necessary measures to access the site to install the required work as part of the costs of the Project and at no additional costs to the City.

4.2 SURFACE PREPARATION

- A. General: Immediately before placing aggregate and asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 - 1. Do not dislodge or disturb aggregate embedded in compacted surface of the 21AA aggregate base course.
 - 2. Maintain the established approved line and grade stakes for proper installation of the work for slope, crown and cross section slope during the paving operations.

4.3 AGGREGATE & HOT-MIX ASPHALT PLACING

- A. Carefully place the limestone stone aggregate on the prepared sub grade to the lines and grades required to in general provide for a finished surface that is flush with existing grades, but avoiding all depressions and or humps in the existing grade, such that a smooth uniform finish surface is achieved. The stone material shall extend approximately 12” on either side of the Asphalt walking trail. Compact the sub base aggregate material to satisfaction of the Testing Company’s Testing Engineer.
- B. With an appropriate sized paving machine, machine place the 3-inch 1100T hot-mix asphalt-wearing course on the prepared aggregate surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required finish grades, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt surface wearing course in single lift.
 - 2. Spread mix at minimum temperature of 250 deg F (121 deg C), as confirmed by testing.
 - 3. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat materials.
 - 4. The Testing Company’s Testing Engineer shall take samples of the materials to assure that it conforms to these specifications throughout the installation placement.
- C. Place paving in a single strip not less than 5 feet wide. Infill edge strips where required to meet the design lines; generally at entry intersections. Asphalt materials should in general be 12” in from the edge of the compacted stone sub base materials.
- D. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

4.4 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course. Comply with requirements as necessary listed below:
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.

3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints as described in Asphalt Institute specification AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

4.5 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 1. Average Density: 96 percent of reference laboratory density according to AASHTO-T-245, but not less than 94 percent nor greater than 100 percent.
 2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D-2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

4.6 INSTALLATION TOLERANCES

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. 6-inch 21AA Limestone Aggregate Base Course: Plus or minus 1/2 inch.
 2. 3-inch Asphalt Wearing Course: Plus 1/4 inch, no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
1. Asphalt single lift Course: 1/4 inch.

4.7 SEALER COATING & DISTANCE COLOR SURFACE MARKINGS

- A. Apply sealer coating in strict accordance with manufactures recommendations. In general it is anticipated that the application of two coats of the material would be applied approximately 3 months following installation of the asphalt materials, but not later than the following spring. Apply at manufacturers recommended rates and other requirements.
- B. Apply all line painting per manufacturer recommendations upon a thoroughly clean surface.
- C. Install distance color markings as called for on the Drawings or as located in the field by the City Representative shall be at the locations as approved by the City Representative. Apply two coats of the specified line marking material following the appropriate curing time for the asphalt sealer based upon manufactures specifications after installation of the asphalt-wearing course. The minimum 6" start & finish lines bars shall extend across the walkway to within 12" of the edges and shall also include distance marking numbers and letters, as required to say above the line either START or FINISH; a 6" line, and under the line; 1 MILE = X.X LOOPS.

4.8 FIELD QUALITY CONTROL

- A. Testing Agency: The Contractor shall engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports acceptable to the City Representative. The Testing Engineer must be on site during the asphalt placement.
1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing and inspecting work being done, at the Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D-3549.
- D. Surface Smoothness: Finished surface of the hot-mix asphalt-wearing course will be tested for compliance with smoothness tolerances.

- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T - 8.
1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D-041, and compacted according to job-mix specifications.
 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D-188 or ASTM D-2726.
 - a. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D -2950 and correlated with ASTM D 1188 or ASTM D -2726.
 - b. Testing Reports shall also state the temperatures of the asphalt materials per standard practices.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements, at no additional costs to the City.

*** END OF HOT-MIX ASPHALT PAVING SECTION ***

SECTION 02780
CONCRETE UNIT PAVERS AND RETAINING WALL

PART 1: GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Unit Concrete pavers set on aggregate base with a 2-NS sand-bedding course,
 - 2. Retaining Walls set on compacted aggregate base.

1.2 SUBMITTALS

- A. Product Data: For each product indicated on the Drawings,
- B. Samples: Show the selected color, texture, and pattern for each type of unit pavers indicated,
- C. Include samples of material for joints and accessories involving color selection,
- D. Shop Drawings: Provide shop drawings of the materials indicating, edge details, pattern and jointing and joint filler,
- E. Unit Pavers product line shall be as indicated on the Drawings, with the color being selected from the manufactures standard color range,
- F. Retaining walls shall be same color as the unit pavers unless otherwise indicated on the Drawings and shall match interlocking floor pavers.

1.3 PROJECT CONDITIONS

- A. Cold Weather Protection: Do not use frozen materials or build on frozen sub-grade or setting beds,
- B. Contractor to supply testing for compaction of soil and shall use appropriate machines and equipment to make sure sub-base is suitable for installation of all materials.

PART 2- PRODUCTS

2.1 Manufactures:

- A. Concrete Unit Pavers and Retaining Wall Units shall be as manufactured from precast concrete materials as manufactured by Fendt, Oaks, Unilock or approved equal.

2.2 COLORS AND TEXTURES/STYLE

- A. Paver Units: Colors and styles for pavers: shall be equal to that called for on the Drawings,
- B. Retaining Wall Units Texture and Style shall be equal to that called for on the Drawings.

2.3 UNIT PAVERS (not used)

- A. Unit concrete pavers: Solid, interlocking concrete unit pavers, equal to the size and shapes are as indicated below.
- B. Material Basis of Design:
 - 1. Precast concrete pavers shall conform to ASTM C 936.

2.4 AGGREGATE SETTING – BED MATERIALS WALLS

- A. Graded Aggregate for Base: MDOT 21-AA,
- B. Sand for Bedding Layer Course: 2-NS sand,
- C. Sand for Joints: Clean dry jointing sand - ASTM C-144 (Submit sample),
- D. Joint sand stabilizer additive for pavers: ‘Stalok’ or ‘Sandlock’ or approved equal. (if called for).

2.5 RETAINING WALLS

- A. Segmental concrete Retaining Wall Units shall conform to NCMA standard specification for concrete segmental retaining walls,
- B. Retaining Wall Cap adhesive shall be SRW adhesive or approved equal,
- C. Backfill behind retaining walls shall be equal to clear washed crushed stone $\frac{3}{4}$ to $\frac{1}{2}$ -inch gradation or clear washed pea stone, or approved equal as called for on the Drawings,
- D. Perforated drainage pipe with sock geofabric covering shall be used behind all retaining wall sections.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Paver Installation: Installation of Concrete Unit Pavers shall conform to ICPI Standards. See shop drawings for Retaining wall details, which shall conform to the manufacturers standard specifications for installation,

- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures,
- C. Cut unit pavers with motor-driven masonry saw to provide pattern indicated if necessary and to fit to adjoining work neatly. Use full and half units without cutting wherever possible. Minimum width of cuts should be no less than 3/8-inch,
- D. Joint Pattern: To be provided by Contractor on required Shop Drawings, and shall not exceed 1/8-inch joint width,
- E. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush and ¼ inch in 10 feet from level, or indicated slope,
- F. Expansion and Control Joints: Provide joint filler as backing for sealant-filled joints as necessary. Install joint filler before setting pavers,
- G. Provide concrete curb style edge restraints or Pave-Edge or approved equal edge restraint as called for on the Drawings for all walkways or paved areas. Detail on shop drawing submittal. Install edge restraints before placing pavers unless otherwise approved.

3.2 AGGREGATE SETTING - BED PAVER APPLICATIONS

- A. Compact soil sub-grade uniformly to at least 95 percent of ASTM D 1557 laboratory density,
- B. Provide proof by on site testing of prepared sub-grade and correct deficient areas. Re-test until proper sub-grade compaction has been achieved,
- C. Place aggregate base course material in thickness indicated on Shop Drawings. Compact by tamping with plate vibrator with a minimum force of 5000 psi in 3-inch maximum lifts. Moisten base materials as needed to achieve full compaction, as determined by testing,
- D. Place bedding layer course materials and screed to a loose thickness of 1-inch in according to ICPI Standards and as indicated on the shop drawings, taking proper precautions that moisture content remains constant and density is loose and constant until pavers are set and compacted,
- E. Set pavers with a minimum and maximum joint width according to manufacturer's recommendation, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars,
- F. Vibrate pavers into leveling course with a low-amplitude vibrator. Use appropriate care to prevent marring and or any other damage to pavers surface,

- G. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, repeating process as many times as necessary to achieve full joints, then remove excess sand,
- H. Upon completion of joint sand filling process, leave all surfaces in a broom clean condition.

*** END OF CONCRETE UNIT PAVERS & RETANNING WALL SECTION***

SECTION 02785
CLAY PAVERS

PART 1: GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Unit Clay Pavers set on aggregate base with a 2-NS sand-bedding course,
 - 2. All work shall be as called for and detailed on the drawings.

1.2 SUBMITTALS

- A. Product Data: For each product indicated on the drawings,
- B. Samples: Show the selected color, texture, and pattern for each type of unit pavers indicated,
- C. Include samples of material for joints and accessories involving color selection,
- D. Shop Drawings: Provide shop drawings of the materials indicating, edge details, pattern and jointing and joint filler,
- E. Unit Clay Pavers product line shall be as indicated on the drawings, with the color being selected from the manufactures standard color range or as called for on the drawings,

1.3 PROJECT CONDITIONS

- A. Cold Weather Protection: Do not use frozen materials or build on frozen sub-grade or setting beds,
- B. Contractor to provide all testing for compaction of the subbase soil and shall use appropriate machines and equipment to make sure sub-base is suitable for installation of all materials.
- C. Unsuitable soils that do not exhibit proper support characteristics, based upon testing above, shall be removed as required and backfilled with suitable engineered fill materials and compacted as required, and re-tested to assure proper subbase condition.

PART 2- PRODUCTS

2.1 MANUFACTURES:

- A. Unit Clay Pavers shall be made of clay materials as manufactured by Whitacre Greer, Belden Brick, Pine Hall, or approved equal.

2.2 COLORS AND TEXTURES/STYLE

- A. Unit clay pavers: Colors and styles for pavers: shall be equal to that called for on the drawings,
- B. Colors shall have permanent color fastness,
- C. Provide samples, if so requested.

2.3 UNIT PAVERS

- A. Unit clay pavers: Solid, interlocking unit clay pavers, equal to the size and shapes are as indicated below or as called for on the drawings.
- B. Store materials up off of the ground, and keep clean until installed.
- C. Material Basis of Design:
 - 1. Unit clay pavers shall conform to ASTM C 902, class SX, or ASTM C 1272, and shall exceed application PX for tolerance: 1/16 of an inch, shall have an average compressive strength of 12,500 psi with a average absorption no greater than 6.0%, pass Freeze/Thaw cycles of 150+, pass CSA-A231.2 freeze thaw test in saline solution without the use of sealers or other products applied to the units and British Pendulum Test (skin resistance): 74.5. Average coefficient of friction (ASTM C1028): 1.06 dry and 0.97 wet.
 - 2. Size: Standard units (3-5/8" x 7-5/8" x 2-1/4") or Modular (3-5/8" x 7-5/8" x 2-1/4"). If within an area that will have heavy vehicular access the heavy-duty paver units must be (2 5/8-inch minimum thickness) must be used; and must be installed in a herringbone pattern.
 - 3. Pavers shall have a slip and skid resistant surface.
 - 4. Provide certification meeting or exceeding the ASTM standard.

2.4 AGGREGATE SETTING – BED MATERIALS

- A. Cover and keep separate all stored materials until use.
- B. Graded Natural Aggregate for Base: MDOT 21-AA, at a minimum depth of 4-inches for pedestrian application, and 6-inches for vehicular application; or greater as maybe called for on the drawings, to ASTM D 2940 standard. Note: Limestone and slag aggregate products may not be used.
- C. A geotextile fabric shall be placed between the aggregate base materials and the sand used for the bedding layer. Submit sample.
- D. Sand for Bedding Layer Course: 2-NS sand, with washed sand no larger than 3/16," screenings may not be used.
- E. Sand for Joints: Clean dry jointing sand - ASTM C-144 (Submit sample), and bedding sand may not be used for jointing sand

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- F. Joint sand stabilizer additive for pavers: 'Stalok' or 'Sandlock' or approved equal. (if called for). Polymeric sand (joint sand pre-mixed with stabilizer) may be used for only small installations.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Paver Installation: Installation of Unit Clay Pavers shall conform to all current Industry Standards. See drawings for details, for which installation shall conform to the manufacturers standard specifications for each installation condition,
 - 1) On surfaces, which will have heavy vehicular access with the thicker clay paver units, the pattern must be laid in a herringbone pattern.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures as maybe required. Not required if factory pre-mixed,
- C. Cut unit pavers with motor-driven masonry saw to provide pattern indicated if necessary and to fit to adjoining work neatly. Use full and half units without cutting wherever possible. Minimum width of cuts should be no less than 3/8-inch,
- D. Joint Pattern: To be provided by contractor on required Shop Drawings, and shall not exceed 1/8-inch joint width,
- E. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush and ¼ inch in 10 feet from level, or indicated slope,
- F. Expansion and Control Joints: Provide joint filler as backing for sealant-filled joints as necessary. Install joint filler before setting pavers,
- G. Provide concrete curb style edge restraints, or Pave-Edge, or approved equal edge restraint, as called for on the drawings for all walkways or paved areas. Detail on shop drawing submittal. Install edge restraints before placing pavers on at least two sides of the work, unless otherwise approved.

3.2 AGGREGATE SETTING - BED PAVER APPLICATIONS

- A. Compact soil sub-grade uniformly to at least 95 percent of ASTM D 1557 laboratory density,
- B. Provide proof by on site testing of prepared sub-grade and correct deficient areas. Re-test until proper sub-grade compaction has been achieved,

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- C. Place natural aggregate base course material in thickness indicated on Shop Drawings and in accordance with finished grading. Compact by tamping with plate vibrator with a minimum force of 5000 psi in 3-inch maximum lifts. Moisten base materials as needed to achieve full compaction, as determined by testing,
- D. Place bedding layer course materials and screed to a loose thickness of 1-inch in accordance to Brick Industry Association (BIA) Standards and as indicated on the shop Drawings. Throughout the installation of the materials the contractor shall take proper precautions to assure that the moisture content remains constant and density is loose and constant until pavers are set and compacted,
- E. Set pavers with a minimum and maximum joint width according to the manufacturer's recommendation, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars,
- F. Vibrate pavers into leveling course with a low-amplitude vibrator equipped with a rubber liner. Use all further appropriate care to prevent marring and or any other damage to pavers surface,
- G. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, repeating process as many times as necessary to achieve full joints, then remove excess sand,
- H. Upon completion of joint sand filling process, leave all surfaces in a broom clean condition.

END OF UNIT CLAY PAVERS SECTION

SECTION 02800
SITE IMPROVEMENTS – PLAY AREAS

PART 1: GENERAL

1.1 DESCRIPTION

The work in general included under this Section provides all necessary materials, tools, equipment, labor and supervision required for the work related to the installation of the site improvements.

- A. All playground equipment, including playstructures and individual play units, shall be installed by Manufacture Certified Installers.
- B. Furnishing of all play equipment as listed in specifications or shown on Drawings including assembling, layout and installing of all play equipment.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Clearing & Demolition - Section 02100
- B. Earthwork – Section 02200
- C. Poured in Place Rubber Safety Surfacing – Section 02650
- D. Protective Surfacing: Engineered Wood Fiber – Section 02731
- E. Concrete - Section 03300

1.3 QUALITY ASSURANCE

- A. Installer Qualifications - An experienced installer, certified by the National Playground Safety Institute (NPSI) and the manufacturer, familiar with local building codes and with the latest safety guidelines, who has completed installation of playground structures similar in material, design, and extent to that indicated for this project, and whose work has resulted in construction with a record of successful in-service performance.
- B. The source(s) for the playground equipment are indicated on the drawings and scope of work. Approved equal playground equipment maybe allowed if the option presented to the City clearly shows and has supporting documentation to confirm that the option meets or exceeds the following.
 - 1. Warranty
 - 2. Specifications
 - 3. Similar or exact play component(s)Options presented that do not clearly demonstrate the equal value of the original specified product will be rejected. The City will make its determination of equal value following a review of the submitted document(s) and determine what is in the best interest of the City.
- C. Product Options - Drawing indicate size, components and dimensional requirements of playground structure and based on the specifics indicated.

1.4 SUBMITTALS:

- A. Catalogue cuts and numbers and manufacturer's literature are required for all site improvements listed.
 - 1. Product Data: Include physical characteristics such as materials, dimensions and finish.
 - 2. Shop Drawings: Show assembly and installation details.

3. Samples for Verification: Color selections for [upright posts], [steel accessories],
4. Product Data: Include physical characteristics such as materials, dimensions and finish.
5. Shop Drawings: Show assembly and installation details.
6. Samples for Verification: Color selections for [upright posts], [steel accessories], [freestanding panels & signs], [swings], [plastic components], [other].
7. Warranty: Include manufacturer's standard warranty.
[freestanding panels & signs], [swings], [plastic components], [other]. Warranty:
Include manufacturer's standard warranty.

1.5 REFERENCES

1. ASTM F1487-01 Standard Consumer Safety Performance Specification for Playground Equipment for Public use CAN/CSA-Z614-98 Children's Playspaces and Equipment.
2. ASTM F1292-99 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.
3. U.S. Consumer Products Safety Commission Handbook for Public Playground Safety.
4. Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Play Areas, as amended to the most current edition, November 20, 2000, or later.

1.6 DELIVERY, STORAGE and HANDLING

- A. Inspect all components on delivery to ensure that no damage occurred during shipping or handling. Materials shall be stored in original undamaged packaging in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft until ready for installation. Inspect components prior to installation.

PART 2: PRODUCTS

2.1 PLAYGROUND EQUIPMENT

- A. FUTURE REPAIRS: The equipment manufacture shall investigate and provide a schedule, and or costs to make repairs within 5 business days of such notification for repair.

PART 3: EXECUTION

3.1 INSPECTION

- A. Examine final grades and installation conditions. Do not start equipment installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. The all-new installation shall be laid out by the contractor in accordance with the construction plans. Once layout is completed the Contractor shall contact the City Representative prior to starting installation operations, to go over and approve the layout.

3.3 PLAYSCAPE EQUIPMENT INSTALLATION

- A. Layout of posts and other major components shall be in strict accordance with the manufacturer's instructions and as detailed on Plans, as required to meet the required open clear space around each play element.. Posts shall be set in concrete footings as called for in manufacturer's instructions. Concrete shall be allowed to cure sufficiently before commencing assembly of other components.
- B. Assemble and install play equipment components and items as specified and in accordance with manufacturer's written instructions, and as located and detailed on Plans.

3.4 CLEANING

- A. Perform cleaning operations during installation of work and upon completion of work so as to not allow debris to accumulate from site improvement construction. Remove from site all debris.
- B. The contractor shall clean the jobsite of excess materials, including excavation.**

3.5 DEMONSTRATION

- A. Instruct the owner's personnel on proper operation and maintenance of playground.

*** END OF SITE IMPROVEMENTS – PLAY AREA SECTION ***

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SECTION 02810
IRRIGATION SYSTEM

PART 1: GENERAL

1.1 SUMMARY

- A. General: The sprinkler system shall be constructed using the sprinklers valves, piping, fittings, controllers, wiring, pumps etc., of sizes and types as shown on the drawings and as called for in these specifications. The system shall be constructed to grades and conform to the areas and locations as shown on the plans.

1.2 SYSTEM DESCRIPTION

- A. Irrigation Sprinkler System: Provide a sprinkler system for the areas as indicated. The sprinkler system shall provide complete coverage to all intended areas
- B. Water Velocity: The irrigation system shall not exceed a velocity of 5.0 fps in all lateral and mainline piping.
- C. Layout: Coordinate all irrigation installations with the landscape work to avoid interferences and ensuring full coverage of proposed irrigated areas.
- D. Requirement: Unless otherwise specified, the plans and specifications are intended to include everything required and necessary for the proper installation and completion of the work whether each item is mentioned herein or not.

1.3 SUBMITTALS

- A. As-Built Plan: The CONTRACTOR shall furnish a complete set of as-built drawings showing the sprinkler system as installed. The drawing shall show all sprinkler heads, controller locations, wire routing and sizes, and all piping. All valve box locations shall be shown with actual measurements to reference points so they may be located easily in the field.

1.4 QUALITY ASSURANCE

- A. Insurance: Prior to work under this contract, the CONTRACTOR shall secure and maintain such insurance from any insurance company authorized to write insurance the state of Michigan. The CONTRACTOR shall protect himself, his subcontractors and the OWNER and DESIGNER from claims for bodily injury, death, or property damage, which may arise from operations under this contract.
 - 1. Each insurance policy shall contain a clause providing that it shall not be canceled by the insurance company without thirty-(30) days written notice to the OWNER.
 - 2. The CONTRACTOR shall additionally indemnify and save harmless the

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OWNER and DESIGNER from and against all losses and claims, demands, payments, suits, actions, recoveries and judgements of every nature and description.

- B. Permits: Permits and licenses necessary for the prosecution of the work shall be secured and paid for by the CONTRACTOR.
- C. Existing Conditions: The CONTRACTOR shall make themselves aware of all utility line locations, type and depth, and perform their work accordingly to avoid damaging existing utility lines.
- D. Final Acceptance: When the work under this Contract, including any approved change orders, is completed the OWNER'S are to conduct a final inspection and prepare a punch list of any items that are not satisfactory. The CONTRACTOR'S completion of the punch list items and the OWNER'S approval of the same will signify final acceptance by the OWNER.
- E. Codes: All materials and installations shall comply with the following:
 - National Electric Code
 - American Society for Testing and Materials (ASTM)
 - National Sanitation Foundation (NSF)
 - American Society of Agricultural Engineers (ASAE)

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Deliver components in manufacturer's original undamaged and unopened containers with labels intact and legible.
 - 1. Deliver plastic pipe in bundles, packaged to provide adequate protection of the pipe ends, both threaded and plain.
 - 2. Store and handle materials to prevent damage and deterioration.

1.6 PROJECT / SITE CONDITIONS

- A. Existing Conditions: Exercise caution against injury or defacement of existing improvements. Repair or replace items damaged by irrigation installations.

1.7 SEQUENCING AND SCHEDULING

- A. General: Prior to starting work, prepare a detailed schedule of work for coordination with other trades.

1.8 VERIFICATION OF MATERIAL

- A. The Irrigation Consultant has provided a design, which is scaled and schematic in nature. The Irrigation Contractor shall be responsible for calculating and verifying

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all quantities shown on the final design. The Irrigation Contractor is not to rely on any quantities from the General Contractor, Project Owner, or Local Distributor as the Irrigation Contractor is responsible for installing all components and material to make the irrigation system operational as intended.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Fittings: Fittings for pipe sizes 2 inch and smaller, except as noted below, shall be schedule 40 PVC, Type I, and meeting the requirements of ASTM 2466 socket type fittings. All threaded fittings shall be Schedule 80, Type 1. In accordance with ASTM D 2464
 - 1. Pipe sizes shall conform to those shown on the drawing. No substitutions of smaller pipe sizes will be permitted, but substitutions of larger sizes may be approved.
 - 2. Mainline piping shall be Poly-Vinyl Chloride (PVC) SDR 21, which meets the requirements of ASTM D 2241. All testing shall be in accordance with standards set forth in ASTM D 2241 and ASTM D 3139
 - 3. All piping downstream of zone control valves, sizes 2 inches and smaller, shall be NSF 100 polyethylene.

2.2 SWING JOINTS

- A. Swing Joints: All quick coupling valves to be installed on three elbow swing joints made from sch 40 PVC. The swing joint shall be pre-assembled, with O-Rings seals in each joint. Swing Joints shall be as manufacturer by Lasco, or Spears.

2.3 WIRE AND SPLICES

- A. Wire and Splices: All 24 Volt control wire shall be 600-volt soft annealed solid copper wire with PVC insulation conforming to U.L., type UF. All wire shall be suitable for direct burial and #14 Control (red) and #14 Common (white) and shall be manufactured by Paige Electric.
- B. Splice shall be 3M DBR and DBY or 3M wire Splice Kits. At each control valve a 2' service coil shall be provided in valve box. A spare wire shall be run to the farthest zone from the controller location, for future expansion.

2.4 SHUT OFF VALVES (if required)

- A. Shut-Off Valves: Lateral shut-off valves will be of bronze construction non-rising stem, with cross handle as manufactured by Hammond unless otherwise noted.

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2.5 IRRIGATION EQUIPMENT

- A. Irrigation Equipment: The automatic controllers, valves, sprinklers and pumps are as noted on the drawing, no or equal equipment will be substituted unless approved by the OWNER.
- B. Quick Coupling Valve: The quick coupling valve shall be constructed of heavy cast bronze. The cover shall be durable, protective self-closing rubber cover and 1" in size.
 - 1. Rain Bird 3RC series w/key & hose swivel

2.6 VALVE BOXES

- A. Valve Boxes: Valve access boxes shall be rigid plastic material furnished with lid, and manufactured by either Ametek or Carson.

2.7 SLEEVING

- A. Sleeving: Polyvinyl chloride (PVC). ASTM D1785, Schedule 80. Color different from PVC irrigation mainline.

2.8 SPRINKLERS

- A. Sprinklers: All pop-up sprinklers will be attached to the irrigation system piping with swing pipe at the locations and grade as indicated on the irrigation plan.
 - 1. Rain Bird 1804 4" pop up spray series (nozzle as indicated)
 - 2. Rain Bird 1812 12" pop up spray series (nozzle as indicated)
- B. They will be of the size and type as indicated on the plan. If detail calls for performance only the sprinkler equipment must fit within 5% of the specified performance.

2.9 CONTROLLER

- A. Controller: Controllers shall be located as indicated on plans and shall be enclosed in NEMA type boxes of appropriate size. Controllers shall be installed and grounded per manufacturer specifications. Controllers shall be installed and mounted on a concrete slab no less than 6" in thickness. All slabs will be brush finished, with smooth trim, and rounded edge.

2.10 DRIP ZONES

- A. Drip Control System: Drip control valve shall include a ball valve, remote control

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valve, in-line filter and pressure regulator as indicated on plans. Dripline shall utilize in-line pressure compensating emitters providing .9 GPH spaced 18" apart.

2.11 BACKFLOW PREVENTION DEVICE

- A. Pressure Vacuum Backflow Device: Backflow device shall be installed to meet minimum State and Local requirements. Device shall be installed in a 1 ½" x 1 ½" x 3/18" steel angle frame with No. 9 flattened metal screen.

2.12 CONTROL VALVE

- A. Control Valves: Valves shall be constructed of durable glass-filled nylon construction with nylon reinforced rubber diaphragm rated for 200 PSI. Control valves shall installed in 12" standard valve box as manufactured.

PART - 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine the areas to receive the work and the conditions under which the work would be performed. The CONTRACTOR shall remedy conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Install pipe, wire valves, controllers, and sprinklers in strict accordance with the manufacturer's recommended procedures, standard industry practices, and these specifications.

3.2 INSTALLATION OF PIPE AND FITTINGS

- A. Pipe and Fittings: Store PVC pipe such that it is protected from oil and grease, and from prolonged exposure to sunlight and excessive heat.
- B. PVC Solvent: Solvent welding shall be in strict accordance with manufacturer's recommendations and ASTM Standards D2564 and D2855, especially as they apply to ambient temperatures.
- C. General: Piping shall be securely capped at the end of each day's work to prevent entrance of foreign material. Pipe and fittings shall be handled in a manner to ensure delivery to the trench in sound, undamaged; or if materials are in poor condition, it shall be repaired or replaced.
- D. Minimum Cover:
 - 1. Pipe 1 1/2" to 2" O.D.: Install at least 18" below finish grade.
 - 2. Pipe 1" to 1 1/4" O.D.: Install at least 12" below finish grade.

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- E. Installation: Provide in accordance with manufacturers written instructions. Use only suitable pipe cutting tools. Do not use hacksaw. Coat metal threads with pipe joint compound. Use Teflon tape on PVC threads.
- F. Sleeves: Run pressure and non-pressure pipe through sleeves under pavement or through walls. Size sleeves 2x larger than outside diameter of irrigation pipe and fittings.
- G. Backfill Material: Install free from rock, large stones or other unsuitable substances to prevent damage to pipe during backfill operations. Tamp to its original density and as required to prevent settling.

3.3 INSTALLATION OF IRRIGATION EQUIPMENT

- A. Control Wiring: The complete electrical installation shall conform to the National Electrical Code, as adapted by the State of Michigan.

Do not yank, stretch, or excessively pull wire during installation. Take strict precautions to ensure that wires are not cut, scraped, or nicked during installation.

Install one control wire to each sprinkler or electric control valve to the designated controller. All grouping of stations will be done in the control box.

- B. Testing: The entire system shall be tested at 50% more than the normal working pressure for a period of one hour. Upon any visual inspection of the ground should any leaks be found, it shall be promptly repaired and retested until satisfactory.
- C. Electrical Installations: All electrical circuits will be tested in accordance with the control system manufacturer's recommendations prior to automatic sequencing.
- E. Sprinkler Heads and Quick Coupling Valves: All sprinklers and quick coupling valves will be installed on three elbow swing joints, and will be set plumb and level. After turf has been established and the ground has settled, the CONTRACTOR will lower heads to finish grade. Do not exceed spacing as shown on the plan. Adjust coverage to keep spray off building and paving.
- F. Emitters: Locate distribution tubing directly on top of the root ball of the tree.
- G. Layout Changes: Arrangements, positions and connections of pipes, valves, and sprinkler heads may be adjusted as directed to accommodate conditions, which may arise during progress of work.
- H. Flushing of Pressure (Main) Lines: Flush lines prior to installing remote control and quick coupling valves.
- I. System Layout Plans: Provide reduced prints of record document irrigation plans, laminated 4 mil plastic, and sized to fit controller door.

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3.4 FIELD QUALITY CONTROL

- A. Supervision: Provide a qualified foremen to supervise continuously.
- B. Observation of Construction: Request observation at the following stages.
 - 1. Testing of Main Line: test after installation of pressure pipe, controller, remote control valves, and control wire.
 - 2. Testing of Lateral Lines: Test after installation of non-pressure pipe and risers. Complete flushing operations prior to testing.
 - 3. Completion of System: Coordinate observation with the completion of planting. Perform preliminary coverage test.
 - 4. Final Acceptance: Perform final coverage test on date of final acceptance of landscape development. After coverage test is performed, adjust heads, nozzles, as required.
- C. Corrections: Furnish the material and perform the work required to correct inadequate or excessive coverage.

3.5 ADJUSTMENTS

- A. System Adjustments: Prior to OWNERS final acceptance, adjust and regulate entire system. Set watering schedule on controller appropriate to types of plants and season of year. Adjust remote control valves to operate sprinkler heads at optimum performance based on pressure and simultaneous demands through supply lines.
- B. Settlement: If settlement occurs during the 1 year warranty period, make adjustments in pipe, valves, or irrigation heads are necessary to bring system to proper level permanent grades.

END OF SECTION

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SECTION 02811
HOODED BACKSTOP CONSTRUCTION

PART 1: GENERAL

1.1 DESCRIPTION

- A. In general, the work under this section includes all removal, repair and new backstop construction work indicated and called for on the drawings and details. Provide all necessary materials, equipment, tools, labor, supervision and disposal necessary to complete the work called for on the drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
B. Measurement & Payment, Section 01025
C. Construction Staking & Layout, Section 01400
D. Clearing & Demolition, Section 02100
E. Site Restoration, Section 02932
F. Concrete Work, Section 03300

1.3 SUBMITTALS

- A. General - Submit the following:
1. Product data in the form of manufacturer's technical data, specifications, and accessories as maybe called for on the drawings and required by the work scope.
 2. Small sample piece of the wood, fabric and/or pipe section, if so requested.

1.4 QUALITY ASSURANCE

- A. Unless otherwise specified, the Work of this Section shall conform to the applicable portions of the following Standards:
- ASTM American Society for Testing and Materials
 - CLFMI Chain Link Fence Manufacturers Institute
 - PS U.S. Department of Commerce, National Bureau of Standards Product Standard
 - FS Federal Specifications as applicable
 - MDOT Michigan Department of Transportation, Standard Specifications for Construction 1996, as amended to date
- B. Installation: All backstop work; removals if any, layout, repair and installation are to be done by a contractor experienced as an installer of ball diamond backstops. Only contractors normally engaged in the installation of backstops shall perform this work. Materials and installation shall comply with the current CLFMI standards.
- C. Deliver all materials in the manufacturer's original packaging with tags and labels intact and legible. Handle and store material to prevent damage and or deterioration.
- D. All adjoining property shall be carefully protected from damage. If the contractor damages any adjacent property, he shall be solely responsible for replacement or restoration to original condition at no additional cost to the City.

PART 2: PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the manufacturers subject to compliance with specification requirements:

1. Galvanized Steel Fencing and Fabric:
 - a. Allied Tube and Conduit Corp.
 - b. American Chain Link Fence Company
 - c. American Tube Company
 - d. Anchor Fence, Inc.
 - e. Capitol Wire and Fence Co., Inc.
 - f. Century Tube Corp.
 - g. Cyclone Fence Div./USX Corp.

2.2 MATERIALS

A. Backstop Materials

1. Hood Fabric shall be composed of individual wire pickets helically wound and interwoven from No. 9 or No. 11 (see drawing details and or notes) gauge aluminum coated steel wire to form a continuous chain link having a 2" mesh size. Both top and bottom edges shall have knuckle-knuckle edge finish. The fabric shall conform to ASTM A-491068T. The aluminum-coated wire shall have a minimum tensile strength of 80,000 P.S.I.
2. Backstop Fabric used on the vertical surfaces shall be composed of individual wire pickets helically wound and interwoven from No. 6 gauge aluminum coated steel wire to form a continuous chain link having a 2" mesh size. Both top and bottom edges shall have knuckle-knuckle edge finish. The fabric shall conform to ASTM A-491068T. The aluminum-coated wire shall have a minimum tensile strength of 80,000 P.S.I. wire surface. The weight of coating shall be determined by the strip test defined in ASTM A 428-58T. Provide all chain link fence materials as a complete unit produced by a single manufacturer, including all necessary erection accessories, fittings and fasteners.
3. Posts and Other Accessories: All posts and other appurtenances shall be hot dip galvanized with a minimum zinc coating of 2.0 ounces per square foot of surface ASTM specifications A 120.68a, A 23-68 or A 153-67, as applicable. All pipe sizes shall be as called for on the detailed drawing. Support posts shall be 3.5" O.D., 9.11 lbs./ft. schedule 40 pipe and all rails and hood pipes shall be 1-5/8" O.D., standard schedule 40 pipe.
4. Pipe Connections and Fittings: All fittings entering into the hooded backstop to make a complete installation shall be malleable iron. All ferrous material shall be thoroughly galvanized by the hot-dip method. All caps and bands to be welded to pipes shall be a clean strong weld. Burn welds shall be discarded and replaced.
5. Fabric Connections: The wire fabric shall be securely fastened to all terminal posts by 1/4" x 3/4" tension bars to the posts every 12-inches apart with 11 gauge 1" wide steel bands and 3/8" diameter bolts and nuts; to all in between 3.5 posts by 6 gauge wire clips every 12-inches apart, to all top, middle and bottom rails by 9 gauge wire ties 12-inches apart and to the 9 gauge tension wires with 11 gauge hog rings every 24-inches.

B. Footings

1. All backstop posts shall be set in concrete (10' apart, a minimum of 3'-6" deep and 18" wide with a sloped top) as shown on the drawings. Contractor shall furnish all materials and make complete installation of footings as required to execute the fencing work specified herein. Standard tolerances apply. Installation is to be performed by experienced fence backstop erectors to the lines and grade called for on the drawings, or as dictated by site conditions.

C. Backstop Boards, Fastener and Angles

1. The boards for each backstop 10' section shall be constructed using standard grade pressure treated yellow pine 2" x 12" boards (actual size 1-9/16" x 11 1/2" by the required lengths). The boards shall be installed three boards high.
2. To each post section, two - 2-inch by the proper length angle irons shall be welded into place vertically to the backstop posts and each angle once installed shall be primed and painted 2-coats to match the post color of the backstop.
3. Each board shall be secured at each end by three 1 1/2" x 3/8" long galvanized lag bolts & washers or 3/8" x proper length stove bolts and washers with "locktight" applied to the threads.

D. Concrete Maintenance Strips

1. The 24" x 4" concrete maintenance strip shall extend underneath all dugout fencing and backstops, if called for on the drawings. The concrete shall extend into the field side of fencing by 12-inches, if called for and detailed on the drawings. Concrete is specified under section 03300.

E. Dugout Entrance Openings

1. All entrance openings shall be 48-inches wide, as called for and as detailed on the drawings.

PART 3: EXECUTION

3.1 INSPECTION

- A. Examine final infield grades and installation conditions in the presence of the City Representative and contractor. Do not start backstop construction or related infield dugout or other chain link fence system work until un-satisfactory conditions are corrected.
- B. Any infield fence, backstop sections and/or posts to be removed, repaired or replaced shall be reviewed and marked, as necessary, at time of this site review.

3.2 PREPARATION

- A. Layout complete backstop and any infield fencing as called for at the locations indicated on the drawings. Provide for accessible clearance at all fence openings used as entrances. Locate and mark all post positions including those needing replacement. Space line posts equally and at maximum 10'-0" on center spacing or as shown on the drawings. Provide corner posts at positions where fence changes direction, and where fence ends or begins.
- B. Call for City Representative review on site before proceeding with the installation work, once all work has been laid out and checked by the contractor.
- C. Fencing and backstops that are called to be re-painted shall have all surfaces properly prepared by whatever means and methods the contractor shall deem necessary to remove all loose existing paint. Prime posts and any other bare metal properly. Apply a finish coat of

exterior premium grade oil based metal paint to all metal surfaces. Paint any existing posts and fabric to remain to match finish color of any new fencing prior to installation of any needed new fence fabric.

3.3 INSTALLATION

- A. Install the chain link backstop and infield fence system in accordance with the manufacturer's installation instruction and complying with CLFMI specifications.
- B. Provide a rigid, plumb, finished backstop, hood and infield fence structures with fabric tight and in proper tension and of the heights indicated on the drawings. Install brace assemblies where required at corners and ends per standard practice. Stretch fabric tight between backstop posts and on hood (if called for).
 1. Position bottom of fabric maximum of ½" above ground level or concrete maintenance strip at each post. Pull the fabric taut and clip or tie to posts, top, middle and bottom rails.
 2. Install fabric on the infield side of the backstop fence system. Anchor to framework so that the fabric remains in tension after the pulling force is released.
 3. Bend heavy-duty wire ties to minimize hazard to persons. Install not less than 6 per post and four per each section of horizontal railing minimum.
 4. At dugout fencing provide and install "Sure-Loc" fasteners on the 6' high infield chain link fencing at every post and at all of the rails. There shall be a minimum 2 Sure-Loc fasteners per post and each rail per section of fencing: Refer to section 02821 for material information.
- C. Drill any new postholes into firm, undisturbed, or compacted earth. Hole diameter: Corner post 15", line post 12" and all a minimum of 42-inches in depth. Hole depth shall be a minimum of 3" deeper than the post setting depth as per drawing details. Place foundation concrete and tamp for consolidation. Align each post both vertically and laterally. Hold all posts in proper alignment and position during concrete placement and finishing operation.
- D. If called for on the drawings install after the setting of backstop and other infield fence posts, a concrete maintenance strip in accordance with the concrete work as specified under Section 03300.
- E. Remove excavated posthole soil from the site or if called for on the drawings place clean soils into low spots or berms on site.
- F. Backstop Angle and Board Installation
 1. Weld angles straight and plumb and at the proper angle to receive the backstop boards called for. Paint angles to match the posts color with primer and two coats of the specified exterior metal paint.
 2. Install and secure the pressure treated wood boards (generally three high unless otherwise called for on the drawings) in a level position with the bottom board approximately ½-inch above finish grade or concrete maintenance strip if called for. Secure each board to angle pieces with the specified stove bolts, washers and nuts. No more than three treads shall extend beyond the nut once securely tightened.
 3. Apply "Locktight" material to all threads and with a hammer peen the end of bolt threads to prevent removal of nuts.

3.4 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all debris and equipment. Repair all damage resulting from backstop chain link fence system installation to the satisfaction of the City Representative.

3.5 FINAL INSPECTION

- A. Once the installation of the all of the backstop and ball diamond work has been completed the contractor shall call for a final inspection. Any subsequent "Punch List" work shall be promptly attended to and the contractor shall call for a final acceptance of the work.

3.6 WARRANTY

- A. All material and workmanship guaranteed against defects for one-year from time of final acceptance, contractor shall return to the site to remedy any latent unsatisfactory conditions during guarantee period at no additional cost to the City, except for vandalism.

*** END OF BACKSTOP CONSTRUCTION SECTION ***

SECTION 02820

CHAIN LINK VINYL FENCING & GATE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Work Sections include the following:
 - A. Summary of Work, Section 01000
 - B. Measurement & Payment, Section 01025
 - C. Clearing & Demolition, Section 02100
 - D. Earthwork, Section 02200
 - E. Concrete, Section 03300
- C. All work under this Section provides for all necessary materials, tools, equipment, labor and supervision required for the work for the installation of the chain link vinyl fencing and related work.

1.2 SUMMARY

- A. Summary of Work: Chain link vinyl fencing with all accessories and any called for service double leaf gate for Park use and installation.
- B. This description includes the following items of work depicted on the Drawings. Fencing to be complete with required layout of new openings, and all work necessary to provide a complete the new chain link vinyl fence system with concrete maintenance strips and any service gate as called for on the drawings, including providing all necessary materials, tools, equipment, labor and including supervision. The work entailed includes but is not limited to in general the following:
 - 1. Removal of all existing fence fabric called for, which may consist of 4, 6, 10 and 12 foot fabric, fence posts, including the sand backfill and compaction of all post holes to be abandoned and or as indicated on the Drawings;
 - 2. Removal and otherwise clearing of all fence lines of all existing shrubbery, trees and tree roots with legal disposal of all debris off site and the top-soiling as necessary of any resulting holes to surrounding existing finish grades;
 - 3. Installation of all needed new posts complete with required excavation and backfill, concrete post foundations, chain link vinyl fence framing including top, middle and bottom rails as required, fence system accessories, and vinyl fabric providing openings where called for and to specifically provide all materials and workmanship to provide a complete job, without any extras, whether specifically called for or not on the drawing or in these specifications;

4. Fabrication and installation of any called for service double gate. Service gate complete with two support and keeper posts to hold gate open while in use, locking box, reflective boards, gate system hardware, gate adjustments and hinge lubrication all as required for complete and proper functioning gate.

1.3 SUBMITTALS

- A. No changes in these specifications may be made after the bid date.
- B. Shop drawings: Provide 4 copies of layout of fencing and gate with dimensions, details, and finishes of components, accessories, and post foundations details.
- C. Product data: Provide 4 copies of all Manufacturers' catalog cuts indicating material compliance and specified options.
- D. Sample: Black is the color selection for all PVC finishes. If requested, provide samples of materials (e.g., fabric, wires, and accessories).
- E. Manufactures materials shall carry a minimum 15-year Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products from qualified manufacturers listed below and having a minimum of five years experience manufacturing thermally fused chain link vinyl fencing will be acceptable by the City Representative as equal if they meet the following specifications for of the following two manufacturers for design, size gauge of metal parts and fabrication.
- B. Approved Manufacturers:
 1. Master Halco / Anchor Fence, Inc.,
 2. Merchants Metals
 3. Or Approved Equal

2.2 CHAIN LINK FENCE FABRIC

- A. Unless replacing or repairing existing fence work all park fence fabric shall be 9 gauge (0.148 – inch diameter) with a breaking strength of 1290 lb/ft, 2 inch mesh size with a Class 2 Coating (1.003 / sq ft), fabric to be a helically wound and interwoven fabric with a vinyl PVC coating thermally fused to zinc-coated or zinc-5% aluminum-mischmetal alloy-coated steel core wire: ASTM F 668 Class 2b, 7 mil thickness thermally fused. Core wire tensile strength 75,000 psi, or Colorbond II System or approved equal.
 1. Color **Black** ASTM F 934, and testing method 1043 for coating.

2. Salvage of all fabric - knuckled at top and knuckled at bottom.
3. Wire tolerance for wire fabric +/- 0.005-inch diameter.

2.3 STEEL FENCE FRAMING

- A. Steel pipe - Type I: ASTM F 1083, standard schedule 40 weight; minimum yield strength of 25,000 psi; sizes as indicated. Hot-dipped galvanized with minimum average 1.8 oz. zinc per sq ft of coated surface area. All posts shall be of the round type.
- B. PVC-Coated finish: In accordance with ASTM F1043, apply supplemental color coating of 10 to 15 mils (0.254 - 0.38 mm) of thermally fused PVC in Black color to match fabric or equal for Colorbond II manufactures specifications.
- C. End and Corner Posts shall be:
 1. Pipe for 4 & 6 foot posts: NPS 2 ½", 2.875" OD pipe; wt. of 5.79 lbs/ft
 2. Pipe for 10-foot posts: NPS 3", 3.500 OD pipe; wt. of 9.11 lbs/ft
- D. Line (intermediate) Posts:
 1. Pipe for 4 & 6 foot posts: NPS 2": 2.375 OD, wt. of 3.65 lbs/ft
 2. Pipe for 10-foot line posts: NPS 2 ½ ", 2.875 OD pipe, wt. of 5.79 lbs/ft
- E. Top and Bottom Rails:
 3. Top & Bottom Rails shall be: 1.66 OD pipe, 2.27 lbs/ft

2.4 ACCESSORIES

- A. Chain link fence accessories: [ASTM F 626] Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing. All tops shall match the fence fabric vinyl color
- B. Post caps: Formed steel, cast malleable iron, or aluminum alloy weather-tight closure cap for tubular posts. Provide one cap for each post. Line post tops shall have tops to permit passage of the top rail.
- C. Top, middle and bottom rail and rail ends: Formed steel, malleable or cast iron, for connection of rail and brace to terminal posts.
- D. Top, middle and bottom rail sleeves: 6" sleeve allowing for expansion and contraction of top rail.
- E. Wire ties: 9-gauge (0.148") galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge (0.092") for rails and braces. Brace and tension (stretcher bar) bands: Pressed steel. Tension (stretcher) bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16" x 3/4" rod. Provide tension (stretcher) bars where chain link fabric meets terminal end posts.
- F. Fence "Sure-Loc" fasteners shall be as manufactured by Security Fabricators, Inc., 321 Lafayette Avenue, Kenilworth, NJ, 07033, phone 908-272-9171, fax 908-272-6089.

Fasteners shall be installed between the fence fabric and the fence pipe frame as follows: Top and Bottom Rail @ 2 per section part #SFI 2136; all posts @ 1 per post part # SFI 2126; each rail joint section @ 1 per joint coupling part # SFI 2126 and each fence cap @ 1 per cap part # SFI 2126.

- G. Tension wire: Not used.
- H. Truss rods: Steel rods with minimum diameter of 5/16".
- I. Nuts and bolts are galvanized but not vinyl coated. Color coat in field all nuts, bolts and snap ties with PVC touch up paint.

2.5 GATE

- A. Gate frames: Fabricate alley swing gates in accordance with ASTM F 900 using square galvanized steel tubular members, forming rigid one-piece unit for each gate leaf. Gate framing square steel members shall be NPS 2", 2.375 OD and wt of 3.65 lbs/ft.
- B. Gate Posts: The gate support posts shall be NPS 4", 4.500 OD and wt of 10.79 lbs/ft
- C. Hardware materials: Hot dipped galvanized steel per ASTM A153, or malleable iron shapes to suit gate size. Field coat moveable parts (e.g. hinges, latch, keeper) with PVC touch up paint, provided by manufacturer, to match adjacent finishes. All fasteners shall be non-rusting material.
- D. Hinges: Non-rusting, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off offset type hinge design shall permit gate to swing 180° inward or 180° outward.
- E. Latch: Forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate. Provide locking device and padlock eyes as an integral part of latch, requiring one padlock for locking both gate leaves.
- F. Keeper: Provide keeper for each gate leaf, which shall automatically engage the gate leaf and hold it open until manually released. Gatekeeper shall consist of mechanical device for securing free end of gate when in full open position.
- G. One - 6" min width MDOT type reflective board with orange stripes shall be mounted horizontally to each of the two gate leaves. Detail on shop drawing.
- H. Fabrication of Gate: Fabricate service gate of square galvanized steel pipe and finish to match fence framework and fabric. Assemble gate frames by welding to provide an assembly that is rigid and watertight. Provide horizontal and vertical members to ensure proper heavy-duty gate operation, attachment of hardware and accessories. Space frame member's at a maximum of 8 feet apart. Provide shop-drawings details of alley gate, reflective safety boards and locking device for gate.

2.6 CONCRETE MATERIAL

- A. Concrete consisting of Portland cement, ASTM C150, aggregates ASTM C33 (1-inch maximum (2NS) size fine aggregate with a maximum 3-inch slump, 2-4 percent air entrained) and clean water to yield with a minimum 28-day concrete with a compressive strength of 3,000 psi. Provide concrete mix design from supplier for concrete materials to be used for approval.

PART 3 - EXECUTION

3.1 EXAMINATION AND LAYOUT

- A. Verify areas to receive fencing are completed to final grades and elevations of adjacent surfaces.
- B. Ensure property lines and legal boundaries of work are clearly established.
- C. Contractor shall layout all fence lines carefully marking all post - positions. Locate end (terminal) and corner posts at each fence termination, opening and change in horizontal or vertical direction of 30° or more. Space line posts equally and uniformly, at no more than 10 feet on centers.
- D. Excavate for concrete maintenance strip underneath fence where called for on the drawings.

3.2 FENCE FRAMING AND MAINTENANCE STRIP INSTALLATION

- A. Install the new chain link vinyl fence system in accordance with ASTM F 567 and manufacturer's instructions.
- B. Concrete set end, corner and line posts: Drill new holes in firm, undisturbed or compacted soil. Existing holes which are clean and tight maybe reused adjacent to residential property. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6" deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom: 36" below surface for 4 and 6 foot line posts and when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.
- C. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.
- D. Install concrete maintenance strip as called for on the drawings. Protect all posts by wrapping them to prevent concrete from getting on them. Any concrete residue, which

may get onto the posts, must be removed completely and immediately, so as not to be visible, what's so ever.

- E. Once fence posts are installed a concrete maintenance strip shall be installed that will be underneath the installed fence fabric where and as called for on the Drawings. The concrete shall run continuously through and above the tops of the individual fence posts footings. Where the concrete strip abuts an existing sidewalk it shall be at the same finish grades as the sidewalk. Sidewalk flag repairs must be made in advance of the installation of the maintenance strip.
- F. Top, Middle and Bottom rails: Install lengths, 21' where ever possible. Connect joints with 6" sleeves for rigid connections for expansion/contraction and install one safety latch per joint. Ten foot fencing and higher shall also have a middle rail installed.

3.3 CHAIN LINK FABRIC INSTALLATION

- A. Fabric: Install fabric on street side where that condition is present and on the Park side where adjacent to private property, and attach so that fabric remains in tension after pulling force is released. Position fabric a maximum of approximately 1 to 2" above finish grade or concrete maintenance strip and bottom selvage. Attach fabric with wire ties to line posts at 15" on center and to rails, braces, and posts in addition to the required safety latch fasteners specified above under accessories 2.4 F.
- B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15" on center. Cut fabric to form a continuous piece between terminal posts. Pull fabric taut and clip or tie to posts and rails as specified. Anchor to framework so that the fabric remains in tension after the pulling force is released. Bend all wire ties to minimize hazard to people or catch on clothing. Install wire ties at one per every 15 inches in height and at one per every 24 inches horizontal distance to rails. Tension bar fasteners shall have their threads peened or have lock tight applied to prevent nut removal.

3.4 GATE POST INSTALLATION

- A. Install gateposts in accordance with manufacturer's instructions and as maybe called for on the Drawings.
- B. Concrete set gateposts: Drill holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6" deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 42" below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post and slope to direct water away from posts. Gate posts and hardware: Set gateposts and keeper posts into concrete. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

3.5 CLEANING & MISCELLANEOUS WORK

- A. Clean up debris and unused material, and remove from the site.
- B. Reinstall green screen material removed from the fence as required. See Spec Section 01500 3.1 C.

*** END OF SECTION ***

END OF CHAIN LINK VINYL FENCING & GATE

SECTION 02821
CHAIN LINK GALVANIZED FENCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. These Specifications & the Drawings make up the Contract Documents:

1.2 SUMMARY OF WORK

This description includes the types of fencing work depicted on the Drawings complete with required layout of the work, excavation and backfill, concrete footings and fence posts, fence framing, fabric, rails, wires, hardware and other accessories, gates and hardware, hardware adjustments and lubrication, bollards, pickets and privacy slats if called for. Fence installation will at times require the installation of a concrete maintenance strip underneath the fence system, refer to the drawings for those requirements, if any.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurements & Payments, Section 01025
- C. Alternates, Section 01100
- D. Submittals, Section 01300
- E. Construction Staking & Layout, Section 01400
- F. Clearing & Demolition, Section 02100
- G. Earthwork, Section 02200
- H. Turf Restoration Blanket & Maintenance, Section 02920
- I. Concrete Work, Section 03300

1.4 SUBMITTALS

- A. General: Submit four copies the following:
 - 1. Product data in the form of manufacturer's technical data, specifications, and installation instructions for fencing including posts, fabric, and accessories.
 - 2. Small sample pieces of the fabric and rail pipe section

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain chain link fencing materials and gates as complete units, including necessary erection accessories, fittings, and from a single source or manufacturer.
- B. Unless otherwise specified, the Work of this Section shall conform to the applicable portions of the following Standards:
 - ASTM American Society for Testing and Materials
 - PS- U.S. Department of Commerce, National Bureau of Standards Product Standard
 - FS- Federal Specifications
 - MDOT Michigan Department of Transportation, Standard Specifications for Construction 1996, as amended to date.
 - CLMI Chain Link Manufacturers Institute
- C. Installation: Fencing installation is to be done only by the manufacture or an contractor experienced chain link fence installer approved by the manufacturer and that complies with CLMI standards. Only Contractors normally engaged in the installation and or manufacturer of fencing shall perform the work

- D. Deliver all materials in the manufactures original packaging wit tags and labels intact and legible. Handle and store material to prevent damage and or deterioration.
- E. All adjoining property shall be carefully protected from damage. If the Contractor damages any adjacent property, he shall be solely responsible for replacement or restoration to original condition at no additional cost to the City.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Galvanized Steel Fencing and Fabric:
 - a. Allied Tube and Conduit Corp.
 - b. American Chain Link Fence Company
 - c. American Tube Company
 - d. Anchor Fence, Inc.
 - e. Capitol Wire and Fence Co., Inc.
 - f. Century Tube Corp.
 - g. Cyclone Fence Div./USX Corp.

2.2 FABRIC

- A. Fabric shall be 9 gauge (0,148 - inch diameter), 2 inch mesh and shall comply with ASTM A392, Class 2 Coating; fabric is to be helically wound and interwoven steel chain link fabric, galvanized zinc coated after weaving with minimum 2.0 oz. zinc per sq. ft. of uncoated wire surface as determined from the average of two or more samples and not less than 1.8 oz. zinc per sq. ft. of uncoated wire surface for any individual sample, and knuckled at both selvages. Steel Fabric shall comply with Chain Link Fence Manufacturers Institute (CLFMI) Product Manual. Furnish one-piece fabric widths for fencing up to 12 feet high. Wire size includes zinc coating.

2.3 FRAMING

- A. Strength requirements for posts and rails conforming to ASTM F 669.
Steel Framework, General: Posts, rails, and gate frames.
 - 1. Type I Pipe: Hot dipped galvanized steel pipe conforming to ASTM F 1083, plain ends, standard weight (schedule 40) with not less than 1.8 oz. zinc per sq. ft. of surface area coated.
 - 2. Top Rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6 inches long, for each joint. Provide means for attaching top rail securely to each gate corner, pull, and end post.

2.4 FITTINGS AND ACCESSORIES

- A. Material: Comply with ASTM F 626. Mill finished galvanized steel, to manufacturer's standards.

1. Galvanized Zinc Coating: Unless specified otherwise, galvanize steel fence fittings and accessories in accordance with ASTM A 153, with Mfgs. standard zinc weights per
 - a. Class 1, with a minimum coating weight of 0.80 oz. per sq. ft. of uncoated wire surface.
 - b. Class 2, with a minimum coating weight of 1.20 oz. per sq. ft. of uncoated wire surface.
 - c. Class 3, with a minimum coating weight of 2.0 oz. per sq. ft. of uncoated wire surface.
- B. Tension Wire: Not used
- C. Fence "Surelock" fasteners shall be as manufactured by Fasteners, Inc. Known Local Rep Mr. Greg Engel's at (810) 691-2108. Fasteners shall be as follows: Top and Bottom Rail part #SFI 2136; all posts part # SFI 2126; each rail joint section joint coupling part # SFI 2126 and each fence cap part # SFI 2126. Note: the parts are different numbers.
- D. Tie Wires: 12 gage (0.106 inch diameter) galvanized steel with a minimum of 0.80 oz. per sq. ft. of zinc coating of surface area in accordance with ASTM A 641, Class 3 or 9 gage (0.106 inch diameter) aluminum wire alloy 1100 H14 or equal, to match fabric core material.
- E. Top & Bottom Rails: Shall be 1 1/2 inch galvanized steel pipe. Provide manufacturer's standard galvanized steel cap for each end.
- F. Post and Line Caps: Provide weathertight closure cap for each post. Provide line post caps with loop to receive top rail. All end; loop line and terminal caps shall be galvanized
- G. Tension or Stretcher Bars: Hot-dip galvanized steel with minimum length 2 inches less than full height of fabric, minimum cross section of 3/16 inch by 3/4 inch and minimum 1.2 oz. zinc coating per sq. ft. of surface area. Provide one bar for each gate and end post, and two for each corner, except where fabric is integrally woven into post.
- H. Tension Bands: Minimum 3/4 inch wide hot dipped galvanized steel with minimum 1.2 oz. zinc coating per sq. ft. of surface area. Tension Bands shall be a minimum of 12 gage (0.105 inch) thick.

2.5 BOLLARDS

- A. Galvanized metal pipe bollards shall be constructed from heavy wall Schedule 80 4-inch diameter galvanized pipe. Bollards shall be either in-ground type set into a 42" deep concrete footing with a rod through the pipe protruding 3 inches from the pipe to hold the pipe in the concrete footing, or shall be surface mounted to a 1/4" galvanized steel plate which shall be not less than 12 x 12" square or round. Anchoring bolts shall be to accommodate at least a 3/8 " stainless steel anchor bolt, or the use of drilled anchor bolts (submittal required). Bollard pipes shall be filled with concrete and shall have a smoothly finished rounded top. No more than three threads may protrude from the top of anchor bolts above the secured nut. All threads shall have lock tight, welded or other means of securing the fasteners.
- B. Bollard sleeve covers: if called for on the drawings shall be as manufactured by "Ideal Shield", yellow in color and secured at the bottom with at least three stainless steel fasteners, or.
- C. Paint bollards to match existing adjacent fence color using exterior grade paint 2 coats unless otherwise called for on the drawings.

2.6 METAL GATES

- A. Gate frames: Fabricate swing gates in accordance with ASTM F 900 using square galvanized schedule 40 steel tubular members, forming a rigid one-piece unit for each gate leaf. Gate framing pipe shall be NPS 2", 2.375 OD and wt of 3.65 lbs/ft. Gate Posts: The round gate support posts shall be NPS 4", 4.500 OD and wt of 10.79 lbs/ft. : Assemble gate frames by welding to provide an assembly that is rigid and watertight. Provide horizontal and vertical members to ensure proper heavy-duty gate operation, attachment of hardware and accessories. Space frame member's at a maximum of 8 feet apart. Provide shop-drawings details of alley gate, reflective safety boards and locking device for gate.
- B. Hardware materials: Hot dipped galvanized steel per ASTM A153, or malleable iron shapes to suit gate size. Field coat moveable parts (e.g. hinges, latch, keeper) with touch up paint as maybe required, provided by manufacturer, to match adjacent finishes. All fasteners shall be non-rusting material.
1. Heavy Duty Hinges: Non-rusting, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off offset type hinge design shall permit gate to swing 180° inward or 180° outward.
 2. Latch: Sliding Rod type or as maybe recommended by the manufacturer, capable of retaining gate in closed position and have provisions for a heavy-duty padlock. Latch shall permit operation from either side of gate. Provide locking device and padlock eyes as an integral part of latch, requiring one padlock for locking both gate leaves.
 3. Keeper: Provide a keeper post for each gate leaf, which shall automatically engage the gate leaf and hold it open until manually released. Gatekeeper shall consist of mechanical device for securing free end of gate when in full open position. Keeper post shall be set in a 42-inch deep x 12-inch diameter concrete footing.
- B. One - 6" width x 4-foot long (minimum) MDOT type white reflective board with orange reflective stripes shall be mounted horizontally to each of the two gate leaves. Detail on the shop drawings.
- C. Paint gate to match existing adjacent fence color using exterior grade paint, prime and two coats.

2.7 CONCRETE

- A. Provide concrete consisting of Portland cement, ASTM C 150, aggregates ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 3000 psi. Use at least 5 to 5 1/2 sacks of cement per cy., 1-inch maximum (2NS) size fine aggregate, maximum 3-inch slump, and 2-4 percent entrained air. Provide mix design submittal for approval. Also see Concrete Specification section 03300.

2.8 LAWN WORK

- A. Refer to the Landscape Section (s) of work as described under that section of the specification.

PART 3 - EXECUTION

3.1 FENCE INSTALLATION

- A. General: Install fence in compliance with ASTM F 567. Do not begin installation and erection before final grading is completed, unless otherwise permitted, and inspected by the City Representative
1. The existing fence lines shall be cleared of all trees, tree roots, brush and shrubbery or other debris, and upon completion and disposal of the debris off site. Call for approved by the City Representative.
 2. The existing fence posts that are damaged are to be removed and replaced. Any bent or otherwise damaged fence posts are being removed and replaced shall be using new round pipe type posts as appropriate.
 3. All other existing fence posts described above at 2B are to be repainted using standard exterior grade silver/grey fence metal paint and in accordance with the plans, before new railings and fabric is installed. Call for approval, before proceeding to fabric installation.
 4. Apply fabric to outside of framework on existing and new posts fencing system.
- B. Excavation: Drill or hand excavate (using a post hole digger) holes for posts to be replaced and for any new posts as required.
1. Excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than 12 or 18 inches as called for.
 2. Unless otherwise indicated, excavate hole depths approximately 6 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface. Gate posts to be a minimum of 48"deep by 18". Extend concrete to 2 inches above finish grade with sloped top.
- C. Setting Posts: Center and align posts in holes 6 inches above bottom of excavation. Space maximum 10 feet o.c., unless otherwise indicated.
1. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
 - a. Unless otherwise indicated, extend concrete footings 2 inches above grade and trowel to a crown to shed water.
- D. Top & Bottom Rails: Run top rails continuously through line post caps, bending to radius for curved runs and at other posts terminating into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer. Provide necessary post accessories for bottom rail.
- E. Brace Assemblies: Install braces so posts are plumb when diagonal rod are under proper tension.
- F. Fabric: Leave approximately 2 inches between finish grade and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric securely to framework, on the outside/exterior side of fence framework, and anchor to framework, so after pulling force is released, that the fabric remains in tension.

- G. Tension or Stretcher Bars: Thread through or clamp to fabric 4 inches o.c., and secure to end, corner, pull, and gate posts with tension bands spaced not over 15 inches o.c.
- H. Tie Wires: IF USED: Use U-shaped wire of proper length to secure fabric firmly to posts and rails with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to rails and braces 24 inches o.c.
- I. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- J. Fence "Sure-Loc" fasteners shall be as manufactured by Security Fabricators, Inc., 321 Lafayette Avenue, Kenilworth, NJ, 07033, phone 908-272-9171, fax 908-272-6089. Fasteners shall be installed between the fence fabric and the fence pipe frame as follows:
Top and Bottom Rail @ 2 per section part #SFI 2136; all posts @ 1 per post part # SFI 2126; each rail joint section @ 1 per joint coupling part # SFI 2126 and each fence cap @ 1 per cap part # SFI 2126.

3.2 BOLLARD INSTALLATION

- A. Install Bollards plumb. If installed onto an existing surface, shim bollard so as to make completely plumb in all directions. Fasteners (anchor bolts or drilled fasteners shall be secured so as to be theft proof by the means of using lock tight, welding or other approved means.
- B. Paint bollards to match existing adjacent fencing as maybe applicable. Touch up as required.
- C. Install the PVC yellow shield over bollard pipe, if called for, and secure at the bottom with at least three fasteners.

3.3 GATE INSTALLATION

- A. Install gateposts plumb so gate freely swings in either direction as intended. Keeper posts shall be installed so as to properly catch the gate leaves and properly secure them. Manual fasteners shall operate smoothly.
- B. Remove and concrete splatter from surface of the posts.
- C. Obtain from the Recreation Department a lock at the end of the project. Use contractors' lock during the construction period, providing the owner with keys as required.
- D. Demonstrate the proper function of the gate to the City Representative at acceptance.
- E. Lubricate all moving parts.
- F. Touch up paint as maybe required.

3.4 SODDING OR SEEDING OF LAWN, FINAL CLEAN UP & FINAL INSPECTION

- A. All lawn areas that have been disturbed by the fence work are to be fine graded to and sodded or hydroseeded as called for, per that Section of these specifications.
- B. Upon completion of the work, all miscellaneous debris of whatever nature resulting from the construction installation operations is to be picked-up and removed from the site. The contractor shall then call for a final acceptance inspection by the City.

*** END OF SECTION 02821 ***

SECTION 02823

SPLIT RAIL FENCING, BOLLARDS & GATES

PART 1: GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Work Sections include the following:
 - 1. Section 02100 Clearing & Demolition Work, for removals of selected split rail fencing, posts and any other elements, all as called for on the drawings.
- C. All work under this section provides for all necessary materials, tools, equipment, labor and supervision required and incidental for the installation of the split rail fencing, two new gates and related work.

1.2 WORK SUMMARY

Summary of Work: This description includes the following items of work depicted on the Drawings.

- A. Demolition Work: Split Rail Fencing to be removed is depicted on drawing # 1 Existing Conditions & Demolition Plan. Removal work in general is for the removal of all existing split rail fencing, any posts, all as indicated on the drawings.
- B. New Split Rail Fencing: If called for, this work shall be complete with required layout, materials, tools, equipment, and labor for the complete installation for the indicated split rail fencing, any new openings and all work necessary to provide and complete the installation of the new split rail fencing indicated including all rails and posts as called out on the drawings.
- C. New double leaf gate(s): Fabrication and installation of new double leaf gate(s). Gate shall be complete with three horizontal members and two vertical members per gate leaf. Each gate leaf shall have a keeper post (4 total) to hold gate leaf's open while in use. Each gate unit shall be lockable with a standard outdoor Master Padlock (provided by the City). Gates shall include all necessary heavy-duty hardware. Gate adjustments and hinge lubrication all as required for complete and proper functioning gate.

1.3 REFERENCE STANDARDS

- A. NEPA, National Forest Products Association – National Design Specification for stress grade lumber and its fastenings.
- B. Lumber: Comply with the American Softwood Lumber Standard PS-20-70. Provide species complying with grading rules of the associations for the type of lumber to be used. Provide lumber grading agency certificate of inspection and grade compliance, with each shipment.

- C. Lumber Treatment: Comply with the American Wood Preservation Association (AWPA) Standards for Wood Preservative Treatment Scheduled.
- D. Hot-Dip Zinc Galvanizing Coating for all fasteners, connectors, anchors and accessories, ASTM A-153.

1.4 QUALITY ASSURANCE

- A. Shop, precut, drill and line dry or air-seasoned all wood members as required, and deliver to job site ready for installation.
- B. Identify lumber with a grade stamp of an agency certified by NFPA.
- C. All metal components to meet applicable ASTM standards, and recommendations of the American Zinc Institute.

1.5 SUBMITTALS

- A. Shop drawings: Provide 4 copies of layout of fencing and gates with dimensions, details, and finishes of components, fasteners, accessories, and post footing details. Submit locking device detail.
- B. Product data: Provide 4 copies of all Manufacturers' catalog cuts indicating material compliance and specified options. Submit certification that the required grade of lumber has complied with the specification requirements. Submit color sample.
- C. Sample: Submit a sample of any parts, if so requested by the City Representative.
- D. Provide a 2-year Warranty certificate for gate(s).

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver and handle all wood split rail fencing and or bollard members with care during shipping and installation to maintain undamaged and unmarked exposed faces. Damaged members shall not be installed, and will be rejected by the City. All parts shall be kept up off the ground and protected.

PART 2: PRODUCTS

2.1 MANUFACTURERS

- A. Products from split rail fencing manufacturers and having a minimum of five years experience manufacturing split rail fencing will be acceptable by the City Representative. Submit source of all materials.
- B. The steel gate leafs shall be fabricated by a shop that normally is engaged in the fabrication of fence gates or similar types of fabrication required for the two gates. Submit source of fabrication of the gates.

2.2 MATERIALS

- A. Split Rail Fence Rails and Posts: All wood shall be of the same variety and cut so as to match the existing Split Rail Fencing that will remain. Rails and posts shall be of the same sizes as the existing. Rail heights are to match the existing heights.
- B. Double leaf entry gates and keeper posts: Posts shall be fabricated as specified below. Each gate leaf shall be faced with split railing wood on two sides so as to not be readily apparent when viewed from outside or inside of the Park. Each support post shall likewise be faced.
- C. Wooden Bollards: All wood bollards shall be constructed from pressure treated high quality grade southern yellow pine or equal and of the dimensions as called for on the drawings. Bollards shall have an angular cut across the top as indicated on the bollard detail. Bollards shall be backfilled with granular 21AA material as indicated in the detail. Submit an approximately 1-foot sample.

2.3 ACCESSORIES & FINISHES

- A. Top, middle and bottom rail and rail line and end posts shall all match existing split rail fence system.
- B. The gate frame, support posts and keeper posts shall all be prime painted and have two coats of finish exterior grade metal paint applied during shop fabrication. Submit paint data sheet for review and approval. Color Brown, submit color sample.

2.4 GATE

- A. Gate frames: Fabricate park entry swing gates in accordance with ASTM F 900 using galvanized steel tubular members, forming rigid one-piece units for each gate leaf. Gate framing pipe shall be NPS 2", 2.375 OD and wt of 3.65 lbs/ft. Gate leaf's shall match the spacing of the adjacent existing split rail fence system, and shall be faced with wood as indicated above. Frame shall have a primer and two coats of specified color finish paint applied during fabrication.
- B. Gate Posts: The gate support posts shall be NPS 4", 4.500 OD and wt of 10.79 lbs/ft, and shall likewise be faced. Posts shall have a specified color finish paint applied during fabrication.
- C. Hardware materials: Hot dipped galvanized steel per ASTM A153, or malleable iron shapes to suit gate size. Field coat moveable parts (e.g. hinges, latch, keeper) with the brown touch up paint, to match adjacent finishes. All fasteners shall be non-rusting material.
- D. Hinges: Non-rusting, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off offset type hinge design shall permit gate to swing 180° inward or 180° outward.
- E. Latch: Forked type capable of retaining gate in the closed or open position and have provision for padlock. Latch shall permit operation from either side of gate. Provide locking device and padlock eyes as an integral part of latch, requiring one padlock for locking both gate leaves.
- F. Keeper: Provide keeper for each gate leaf, which shall automatically engage the gate leaf and hold it open until manually released. Gatekeeper shall consist of mechanical device for securing free end of gate when in full open position.

- G. Fabrication of Gate: Fabricate gate of galvanized steel square tubing and finish coat paint. Assemble gate frames by welding to provide an assembly that is rigid and watertight. Provide horizontal and vertical members to ensure proper heavy-duty gate operation, attachment of hardware and accessories. Provide shop-drawings details of gate, and locking device for gate.

2.5 CONCRETE MATERIAL

- H. Concrete consisting of Portland cement, ASTM C150, aggregates ASTM C33 (1-inch maximum (2NS) size fine aggregate with a maximum 3-inch slump, 2-4 percent air entrained) and clean water to yield with a minimum 28-day concrete with a compressive strength of 3,000 psi. Provide concrete mix design from supplier for concrete materials to be used for gate post footings for approval.

PART 3: EXECUTION

3.1 EXAMINATION AND LAYOUT

- A. Verify areas to receive fencing are completed to final grades and elevations of adjacent surfaces.
- B. Locate end (terminal) and corner posts at each fence termination, opening and change in horizontal or vertical direction of 30° or more. Space line posts equally and uniformly to match existing spacing.

3.2 FENCE LAYOUT AND INSTALLATION

- A. Install the new split rail fence posts and rails as called for on the Drawings, to match the existing split rail fence system.
- B. It is the City's intent that the split rail fence removal and installation of new split rail fencing be accomplished as quickly as possible so that the park does not remain open to unauthorized public access. The contractor shall erect temporary closures to insure that the Park does not remain open over any night.
- C. Prior to removal of split rail sections and posts the contractor shall mark all sections and posts scheduled to be removed for review and approval by the City Representative, and as called for on the Drawings.
- D. Check each post for vertical and top alignment, and maintain in position during placement and backfill finishing operations.

3.3 GATE POST INSTALLATION

- A. Install gateposts in accordance with manufacturer's instructions.
- B. Concrete footings for gate and keeper posts: Drill new holes in firm, undisturbed or compacted soil. Existing holes from the old gates shall be filled and compacted in layers with sand. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6" deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom: 42" below surface for all gate

posts and when in firm, undisturbed soil is present. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.

1. Gate posts and hardware: Set gateposts and keeper posts into concrete. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

 2. At the contractor's option, the split rail facing for the gate and posts maybe attached either prior to or after setting of the support posts. Keeper posts shall not be faced, only painted in the required brown color.
- C. Protect all posts by wrapping them to prevent concrete from getting on them. Any concrete residue, which may get onto the posts, must be removed completely and immediately, so as not to be visible, what's so ever.
1. **CLEANING:** Clean up debris and unused material immediately upon finishing installation operations, and remove from the site.

3.4 BOLLARD INSTALLATION

- A. The Contractor shall contact the City Representative (224-1108) prior to starting layout and installation operations. The contractor shall measure in all bollard locations and stake them as appropriate.

- B. The City Representative will check all work layouts with the contractor, prior to the installation.

*** END OF SECTION 02821 ***

SECTION 02830
SITE AMENITIES

PART 1: GENERAL

1.1 DESCRIPTION

The work in general included under this section provides all necessary materials, tools, equipment, labor and supervision required for the work related to the installation of the site amenities called for on the drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurements & Payments, Section 01025
- C. Alternates, Section 01100
- D. Earthwork, Section 02200
- E. Ball Diamond Construction, Section 02210
- F. Prefabricated Park Shelter, Section 02875
- G. Horseshoe Courts, Section 02840
- H. Concrete, Section 03300

1.3 SUBMITTALS

- A. Catalogue cuts and numbers and manufacturer's literature are required for all site improvements amenities listed below. Shop drawings, catalogue cuts, CAD drawings, specifications, color selectors for all of the amenities that are required for all items listed, or any "or equals," that were approved during the bid process for review and approval by the City Representative, prior to installation.
- B. During the bid process submit manufactures detail specification and shop drawings of the product to be considered, which must meet or exceed that specified for consideration, for review and approval.

1.4 KNOWN SOURCES:

- A. The sources indicated below under Section 2 have or represent the necessary products as specified under this section of the specifications. Alternate "or equal" manufactures maybe considered if approved and done prior to the receipt of bids.

PART 2: PRODUCTS

2.1 EQUIPMENT

- A. Galvanized or stainless steel screws, nuts, washers & bolts etc. shall have an application of a product equal to "Lock Tight" applied to threads.

PART 3: EXECUTION

3.1 GENERAL

- A. All amenities that require a concrete footing or concrete pads shall be set in concrete, as specified within the concrete section of these specifications. All posts, poles or other embedded items necessary to install all called for site amenities shall be set in concrete as detailed and or called for by the manufacturer.
- B. Contractor shall provide barricades or other such means to prevent usage or pedestrian traffic upon freshly installed site elements until they have developed sufficient strength to avoid damage and/or personal injury.
- C. Any settlement, damages, or defects occurring in any portion of the work shall be repaired or that portion of the work replaced as directed by the City representative prior to and as condition of final acceptance (end of one-year guarantee period).
- D. Any existing site elements damaged or destroyed during site amenities installation shall have new parts installed or old parts fully repaired so as to be returned to their original condition and shall be done prior to substantial completion and acceptance by the City
- E. All site amenities shall be installed plumb and/or level, at the locations shown on the plan.
- F. Bollards as called for and shall be set plumb, in straight lines and alignment as indicated on the drawings.

3.1 INSPECTION

- A. Examine final grades and installation conditions. Do not start installation of site amenities until unsatisfactory conditions are corrected.

3.2 PREPARATION & LAYOUT

- A. The Contractor shall contact the City Representative prior to starting layout and installation operations. The contractor shall measure in all site amenities and stake them as appropriate.
- B. The City Representative will check all site amenities layout with the contractor, prior to the installation of each item.

3.3 SITE AMENITY INSTALLATION

- A. Assemble and install all site amenity components and items as specified herein in strict accordance with manufacturer's instructions, as located and detailed on drawings, or as may be adjusted by the City Representative during the staking layout process.

- B. Layout of all site amenities and anchoring devices, footings and or other components shall be in strict accordance with the manufacturer's instructions and as detailed on drawings.
- C. Embedded items, anchor bolts, and anchor plates shall be carefully installed so as to receive the site amenity as intended, and properly secured in accordance with the manufactures intent.
- D. Surface mounted amenities as called for shall be securely anchored into place. Improperly set items shall be removed and re done or corrected to the satisfaction of the City.
- E. Concrete shall be allowed to cure sufficiently before commencing assembly or erection of other site amenity components.
- F. Lawns adjacent to the concrete pads shall be sloped away from each amenity item at no greater slope than six (6") inches in ten (10') feet as called for elsewhere.
- G. All concrete footings shall be not less than 42" deep and of the sizes called for on the drawings, details or as required by the manufacturer, which ever is the greater.
- H. All site amenities shall be installed true to alignment called for and in a plumb, straight, and clean (of concrete splatter) or other surface blemishes or scratches condition indicative of a new item, properly installed.
- I. All fasteners shall be at a minimum hot dipped galvanized, and stainless steel where called for. Contractor shall use the locking type nuts or pliable type of "lock tight" to insure that the nuts and bolts are installed firmly.
- J. The contractor shall store, handle and assemble all site amenities carefully to prevent damage. In the event that damage the contractor shall immediately repair with new part or parts to the full satisfaction of the City and with no additional costs to the City.

3.4 CLEANING

- A. Perform cleaning operations during installation of work and upon completion of work so as to have a clean site amenity. The contractor shall not allow debris to accumulate from the installation operation. Promptly remove daily from the site all packing protective items or any other debris from whatever the source.

*** END OF SITE AMENITIES SECTION ***

PIWOK PLAYGROUND RENOVATIONS

02840 - 1

**SECTION 02840
HORSE SHOES**

PART 1: GENERAL

1.1 DESCRIPTION

- A. The work included under this Section provides for all necessary materials, labor, equipment, tools and supervision required for: installing new horseshoe courts including, all concrete work, wood framing, excavation, miscellaneous materials, preparation, staking and layout as shown on the Drawing Details and as noted in these Specifications.

1.2 RELATED WORK DESCRIBED ELSEWHERE

- A. Alternates, Section 01100
- B. Earthwork, Section 02200
- C. Landscape Work, Section 02900
- D. Concrete Work, Section 03300

PART 2: MATERIALS

- A. Provide all necessary equipment, tools, labor, supervision and materials to install horseshoe courts as called for in the detailed drawings and as listed in these specifications.
- B. Submit sample of Blue Clay
- C. Wood shall be all pressure treated and (below grade) where in contact with soil. All lumber shall be grade A free of cracks and knots and of the sizes required and called for on detail drawing.
- D. The game pins shall be 1-inch diameter x 34" long, and shall be galvanized as indicated on the Drawings.

PART 3: EXECUTION

- A. Excavate and compact soil at each end of the courts
- B. Install wood forms and footings as called for on the drawing details. At each end of the horseshoe courts. Frames can be wood beams or concrete as shown on drawings. Wood beams must be anchored in with 12" long galvanized steel nail spikes.
- C. Install wood backstop as shown on drawing details.
- D. Install horseshoe game pin stake in center of each end pit in a concrete bucket footing per the drawing details and as located on drawings.
- E. Clean work area and restore any disturbed areas with hydro seed and topsoil.

END OF HORSE SHOES SECTION

**SECTION 02875
PREFABRICATED PARK SHELTER**

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

- A. Extent of shelter work is shown on the drawings and by the requirements of this section. The contractor shall obtain all required permits & pay all associated costs.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 0100
- B. Measurement & Payment, Section 01025
- C. Alternates, Section 01100
- D. Site Amenities, Section 02830
- E. Concrete, Section 03300

1.3 QUALITY ASSURANCE

- A. Installer's qualification: Firms shall have at least 3-years of successful installation experience on projects with site shelter work similar to that required for project. submit said qualifications.
- B. Comply with City of Detroit codes and ordinances regarding materials and specification requirements for outdoor prefabricated park shelter.
- C. All shelter parts and components shall be individually wrapped and properly protected and handled so as to prevent any damage to the shipped materials. All materials shall be properly placed up off the ground on adequate support materials, covered and otherwise protected from weather or other forms of damage throughout the handling and installation process

1.4 SUBMITTALS

- A. Shop Drawings: Provide manufacturer's shop drawings and structural calculations sealed by a Registered Michigan Professional Engineer showing shelter size, including concrete footings and size requirements, and anchor details, elevations, roof decking, and framing members and all other component parts.
- B. If an alternative manufacturer other than those listed is proposed, the bidder must submit a letter prior to bid indicating the manufacturer of the shelter with typical details of a shelter unit that is equal in all aspects to that specified herein, at least 10 days prior to bid opening for review and possible approval by the City.
- C. Other submittals required include:
 - 1. Submit roof shingle samples and 20-warrant for color and texture to City for selection.
 - 2. Submit a drip edge material sample and color selector to the City for color

- selection.
3. Paint colors shall be as selected by the City Representative from manufacturers standard paint colors.

1.5 PROJECT WARRANTY

- A. The manufacturer shall supply a 5-year written warranty based on the supply of the materials that will fit, be structurally sound, and can be assembled with normal expertise and tools required in the construction trades.

PART 2 SHELTER MATERIALS

2.1 SHELTER MANUFACTURERS

- A. Manufacturers: Subject to compliance with all code and local requirements, provide a prefabricated park shelter equal to those manufactured by one of the following known sources or prior approved equal.

2.2 SHELTER REQUIREMENTS

- A. Size: The prefabricated park shelter shall be 24' by 44' roof outside edge to outside edge. Corner Columns shall be approximately 2'-0" in from end and side edges. Six (6) steel columns per side, twelve (12) in all, shall support structure.
- B. Roof Pitch: The roof pitch shall be 3.5 to 4: 12 from the point of the peak.
- C. Frame: Frame shall be designed to carry a minimum 40-pound per square foot live load. All connections shall be stainless steel bolt together type of connections. Field welding will not be required.
 1. Columns shall be 7"x5"x3/16" structural steel tubes, spaced every 8'- 0" o.c. and shall have brown powder coated paint finish, factory applied.
 2. Roof beams shall be laminated wood, architectural grade, of southern yellow pine with full through bolt connections. Roof beams shall be factory finished with a single coat of Olympic, Wood RX or approved equal, penetrating sealer.
- D. The structural columns are to be shop fabricated with all bolted connections.
- E. All steel shall be finished in a factory applied baked powder coat brown paint material finish. All welded joints shall be in accordance with ASTM and AISC standards.
- F. Frame structure shall be furnished by the manufacturer, with all necessary 304-stainless steel nuts, bolts and fastening devices for total assembly of parts.

- G. All steel columns shall be anchored to foundations with hot dipped galvanized 3/4" x 14" lag anchor bolts with 4-inch lag set in the concrete foundation. Anchor bolts to be furnished by the contractor. The shelter manufacturer shall supply layout drawing for field installation of anchor bolts.
- H. Roof Deck: Roof deck shall be 2x6 # 1 grade Southern Yellow Pine tongue and groove v-joint bottom face planking system as supplied by shelter manufacturer. Deck shall be field cut and attached with galvanized 16 D twist type nails as per manufacturers requirements. Roof decking shall be factory finished with a single coat of Olympic or Wood RX or approved equal, penetrating sealer.
- I. Shingle Roofing: Provide and Install new 285 lb. Fiberglass Shingles over 25 lb. Felt Builder's paper. Install per manufacturer's standards, using stainless steel roofing nails. Shingles to have glue down tabs. Provide a 20-Year Guarantee for Materials and Workmanship of all roofing work.
- I. Drip Edge: Provide and install new metal drip edge around perimeter eaves of shelter. Use 20-gauge-galvanized steel, with factory-baked enamel, or powder coat finish. Drip edge is to extend a minimum of 6-inches up the roof, under the roofing materials, and 2-inches over the top of the fascia boards.
- J. Fascia: Fascia shall be S4S 2-inch x 6-inch western red cedar. Fascia shall be factory finished with a single coat of Olympic, Wood RX or approved equal penetrating sealer.
- J. Paint: Paint shall be oil based and/or sealer as specified above.
- L. Refer to Concrete Work, section 03300 for required concrete specifications for the footings and slab on grade.

PART 3 EXECUTION

3.1 PREPARATION

- A. General: Coordinate installation of shelter with concrete work. Provide all necessary materials related to shelter prior to installation of concrete footings. The shelter installer must check and approve concrete footings and anchor bolt placement if done by others prior to the pour. Following the pour the shelter installer shall return to the site to recheck the anchor bolt pattern layout to assure that they are installed as required to receive the shelter components.
- B. The contractor shall insure that the concrete slab on grade has been installed, including the anchor bolt for the posts have been correctly installed regardless of who has done the concrete work under section 03300.

3.2 INSTALLATION

- A. Shelter shall be field erected as per manufacturer's recommendations by the

manufacturer, or a manufacturer certified installer. If the shelter installation is done using local labor, the manufacturer shall provide on site technical direction during the installation of the prefabricated park shelter unit to insure its proper installation, and as shown on drawings.

- B. Prior to pouring of any concrete for shelter footings and after all resteel to be placed within the footing has been placed, they must be inspected by a B&SE Department inspector and his/her approval given to proceed with the footing pour.
- C. Install all shelter posts columns straight and plumb to the anchor bolts as per drawing details. Install wood beams as called for and insure connections are tight fitting and secure.
- D. Roof decking shall be installed such that all decking joints occur over support beams and shall not be visible from below.
- E. Install asphalt shingles as per the requirements of this section herein. Ensure that there are no leaks of any kind.
- F. Install drip edge work in accordance with specifications of this section.
- G. Stain shall be applied in accordance with manufacture's instructions and when the temperature is above 50 degrees F and humidity is below 70%, as called for. Most if not all wood should have a factory applied finish, as specified above under materials.

3.3 CLEANING AND PROTECTION

- A. Remove and dispose of all excess materials. Shelter shall be kept clean after erection and maintained during construction operations up to final acceptance by the City.
- B. The contractor shall provide final protection and maintain conditions in a manner, which ensures that the shelter work will be without damage until accepted by the City. Any damage to the shelter prior to acceptance by the City as part of the whole project shall be remedied to the full satisfaction of the City by the contractor and at no additional costs to the City regardless of the nature of the needed work.

*** END OF PREFABRICATED PARK SHELTER SECTION ***

SECTION 02900
LANDSCAPING WORK

PART 1: GENERAL

1.1 DESCRIPTION

- A. The work included under this section provides all necessary materials, labor, equipment, tools, watering, trash clean up, maintenance and supervision required for the execution of all plantings, installation of lawn turf areas and related work as shown on the drawings and as noted in these specifications.
 - 1. The shade trees are subject to the two-year warrantee provisions indicated below.
 - 2. The perennials, ground covers, flowering ornamentals and any evergreens plants are subject to only a 1-year warrantee.
 - 3. All plant materials, plant beds and lawn areas shall be fully watered, mowed and otherwise fully maintained until accepted by the City Representative.

- B. The work includes only those things called for on the drawings & specifications, or as otherwise called for under the alternates section of these specifications and in general may include the installation of called for plant materials, hydro-seeding, or turf blanket and/or sodding of lawn areas and areas disturbed during the construction process, the procurement and transportation of all materials to the site, the preparation of and installation of all lawn turf areas, planting beds and planting of all materials, including: mulching, watering, protection, replacements and a maintenance guarantee period; including the edging of sidewalks and weed removal, plant material care, lawn area care and miscellaneous landscape materials and other items of work, as required to complete the landscape work in strict accordance with the drawings and specifications.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 0100
- B. Measurement & Payment, Section 01025
- C. Alternates, Section 01100
- D. Clearing & Demolition, Section 02100
- E. Earthwork, Section 02200

1.3 SUBMITTALS AND INSPECTION

- A. Plant Materials:
 - 1. The contractor shall deliver to the City Representative, a sample of the planting mixture and topsoil in a re-sealable one-gallon bag accompanied with an analysis report and source obtained from. Approval of the reports, source and samples are required prior to delivery of any materials to the job site.
 - 2. The contractor shall submit a small sample of the planting bed and tree mulch material.

3. The contractor shall notify the City Representative, to go out into the plant nursery to select and tag the plant material stock for the project, if called for. All plant materials shall be subject to inspection and approval at the nursery, contractor's yard and upon delivery to the job site for quality, condition, size, shape, variety and overall appearance by the City Representative. At no time shall any approval impair the right of further inspection and rejection at the park site during the progress of the work or contract life for failure to conform to the listed size and condition requirements or latent defects, diseases or injuries. Rejected plant materials shall be promptly removed from the site by the contractor.
- B. Other Materials:
1. Submit product literature and other relevant data sheets for proposed weed killer, fertilizer, and weed and feed, hydro-seed materials, turf restoration blanket materials and/or sod source.
 2. Hydro-seeding, turf restoration blanket and/or sod materials shall be subject to inspection and approval at the contractor's yard or upon delivery to the job site for quality, condition, and overall appearance by the City Representative. At no time shall any approval impair the right of further inspection and rejection at the park site during the progress of the work or contract life for failure to conform to the listed condition requirements. The contractor shall promptly remove rejected lawn turf materials from the site.

1.4 QUALITY ASSURANCE

- A. All landscape work shall be performed only by skilled persons with satisfactory record of performance on completed projects of similar size and quality.
- B. The contractor shall provide all required soils testing for the purposes of determining the correct chemical analysis of fertilizers to be used as required for completion of the work covered under these specifications including the Landscape Maintenance Guarantee Period indicated later in this specification section.
- C. "Certificates of Inspection" for all plant materials provided by the contractor shall be furnished as may be required by any Federal, State, or other authorities to accompany shipments. Inspection certificates shall be turned over to City Representative.
- D. Any materials delivered to job site, which does not conform to the approved samples shall be grounds for rejection by the City's Representative.
- E. The contractor shall advise the City's Representative of his/her schedule for placement of topsoil, fertilizer, and landscaping work operations so a representative can be present as may be desired for observation.
- F. The contractor shall submit a written description of means and methods of transplanting/handling operations to the City Representative for approval.

- G. The contractor shall provide the City Representative with all topsoil delivery tickets, which must be obtained from the trucker hauling topsoil to the site.
- H. The contractor shall have the following current licenses and submit a copy of each:
 - 1. Nurseryman, State of Michigan License
 - 2. Economic Poison Application License (State of Michigan)
 - 3. City of Detroit Landscape License
- I. Trained personnel using current, acceptable horticultural practices shall perform all landscaping services.
- J. All chemical applications shall be performed in accordance with current county, state, and federal law, utilizing EPA-approved materials and methods of application. These applications shall be performed by or under the supervision of a Licensed Certified Applicator.

1.5 GENERAL SITE OBSERVATION

- A. The contractor shall immediately report any damage, which has occurred to any site items such as pavement areas, walks, signage, play equipment or surfacing, fencing, site amenities and plant materials, etc.
- B. In addition, the contractor shall immediately notify the City Representative of any damage due to vandalism and any other facilities not necessarily described herein, during his regular site visits to perform maintenance work.

1.6 APPROVALS

- A. Any work performed beyond these specifications, which are outlined herein and on the drawings shall only be done upon written approval by the City Representative. Work performed without written authorization, will be at the Contractors sole expense and done so at no additional costs to the City.

PART 2: MATERIALS

2.1 PLANT MATERIALS

- A. Contractor supplied plant materials shall conform to the following requirements:
 - 1. Plants shall be true to name. The standard names are those adopted by the American Joint Committee on Horticultural Nomenclature. No substitution of species or varieties shall be accepted without the written consent of the City Representative.
 - 2. Plants shall have a normal habit of growth and shall be typical of their species unless the general shape and overall character of a particular plant is specifically noted in the Plant List on the drawings.
 - 3. Plants shall be certified healthy, freshly dug, vigorous and free from defects, decay, disfiguring roots, sun scale injuries, abrasions of the bark, plant

- diseases, insect pests, eggs or larvae and noxious weeds in potting or plant soils.
4. All plants shall be northern nursery grown hardiness zone climatic conditions similar to those in the locality of the project for at least two (2) years and shall have normal healthy root systems, having been subjected to proper transplanting, and shall include all trees, ornamental trees, shrubs, evergreens, and ground cover as called for on the drawings.
 5. Plant types shall be as listed in the "Planting Materials List" if called for on the drawings.
 6. Measurement: Trees and shrubs shall be measured when their branches are in normal position. Height and spread dimensions specified refer to the main body of the plant, and not from branch or root tip to tip. Caliper of trees shall be taken 6" above ground level.
 7. Plants shall not be pruned prior to delivery.
 8. Balled and burlapped ("B & B") plants shall have firm, natural balls of soil of a diameter to conform to the above standards, but large enough to encompass sufficient fibrous feeding roots to insure full recovery and development of the plants. Plants grown in sand are not acceptable.
 9. All precautions, which are customary in good nursery practice, shall be taken to insure the arrival of the plant material in good condition for successful growth. Plant material which is poorly packed, or which arrives with the roots in a dry condition, as a result of improper packing, delay in transit, or with the leaves in a dehydrated condition, or from any other cause, will not be accepted.
 10. All plants shall be freshly dug. All plants shall be typical of their species or variety and shall have a normal habit of growth unless otherwise specified. Trees shall have straight trunks and all old abrasions and cuts shall be completely calloused over. Trees with multiple leaders will not be accepted.
 11. Plants shall have a well-developed fibrous root system.

2.2 OTHER PLANTING & MISCELLANEOUS MATERIALS

A. Fertilizer:

Shall be commercial grade and shall bear the manufacturer's label and guaranteed analysis, fertilizer shall be complete (time-released) fertilizer with a minimum of 50% of the nitrogen derived from natural organic sources; Fertilizer shall be added in proportions determined by soil analysis and per manufacturer's recommendation. The following is a standard for bidding purposes only:

1. Trees: Use 1/2 lb. of time-released 10-6-4 fertilizer per inch of trunk diameter.
2. Shrubs: Use 1/4 lb. of time-released 10-6-4 fertilizer per foot of height or spread per plant, or 3-5 lbs. per 100 sq. ft. of bed area.
3. Groundcover: Use 3 lbs. of time-released 10-6-4 fertilizer per 100 sq. ft. of bed area.
4. Perennials and annuals: Use 3 lbs. of time-release, high-phosphate fertilizer per 100 sq. ft. of bed area.
5. Bulbs: Use 5 lbs. of bonemeal per 100 sq. ft. of bed area. (If bulbs are to be planted.)

6. Apply a pre-emergent (soil applied) herbicide such as Preen to all plant beds at rates specified by the material manufacturer.
- B. **Planting Mixture:**
A planting mixture shall be used for all tree, shrub, or plant beds in the planting operations. This mixture shall be composed of three parts sandy loam topsoil and one part shredded leaf humus or equal and one part peat moss. It shall be mixed dry at the Contractor's yard, or on the site to a uniform texture without lumps and containing no stones, sticks, roots or other foreign material.
- C. **Topsoil:**
The topsoil shall be fertile, friable natural topsoil of clay loam character obtained from a well-drained arable site. It shall contain at least 5% but not more than 20% by weight of organic matter determined by ignition after being dried to a constant weight at 221 F. It shall be reasonably free from heavy clay lumps, coarse sand, stones, plant roots, sticks or other foreign material and shall not be delivered in frozen or muddy condition. It shall be the contractor's responsibility to supply topsoil for all lawn areas with a pH range from 6.0 to 7.0 either natural or corrected for deficiency. Topsoil tests shall yield the following results to be acceptable or be modified at no additional costs to the City per recommendations by the Testing Laboratory: Nitrogen (N), Medium Range; Potassium (K), 180 pounds per acre; and Phosphorus (p), 30 pounds per acre.
- D. Planting bed mulch shall be of the double shredded bark type. Provide enough to insure a 4" depth on all beds and tree pits shown on the drawings.
- E. **Miscellaneous**
1. Tree wrapping shall be first quality, 4-inch wide bituminous impregnated tape, two-ply, corrugated or crepe paper, specifically manufactured for tree wrapping.
 2. Twine: Jute twine not less than two-ply or approved tape.
 3. Guying devices for shade trees shall be "Tree Staples" or approved equal. In sizes required by manufacturer for various tree caliper sizes and as detailed on the drawing detail sheet. Known Source: AM Leonard Co. (800) 543-8955.
 4. Slim-Edge Polyethylene Edging: Shall be as manufactured by Oly-Ola Sales (630) 833-3033 or approved equal. Material shall be 5" wide. Enough stakes shall be included to allow for staking at 2 every 18-inches in lineal feet, installed in an X fashion (28 for a 20 foot length of edging).
 5. All other materials not specifically described but required for a complete, proper and well-maintained installation, shall be as selected by the contractor subject to approval by City Representative.
 6. Weed killer spray materials where called for shall be equal to "Round Up" or as maybe approved by the City Representative.

2.3 SOIL AMENDMENTS

- A. Lime: Ground limestone containing not less than 85% of total carbonates and shall be ground to such a fineness that 50% will pass through a 100 mesh sieve and 90%

will pass through a 20 mesh sieve. Limestone shall be used to raise the pH of planting soil.

- B. Aluminum Sulfate: Unadulterated free flowing and delivered in containers with the name of the material, name of the manufacturer, net weight and purity. Aluminum sulfate shall be used to lower the pH of planting soil.
- C. Composted Leaf Humus: Leaves composted 18-24 months in high temperatures, creating rich, mellow dark leaf humus. Leaf humus to be shredded and screened.
- D. Peat Moss:
 - 1. A natural product of sphagnum peat moss, taken from a fresh water site and suitable for horticultural use. Peat shall be free from lumps, roots, and stones or other foreign matter, and of such consistency that it can be passed through a 1/2" mesh and can be readily incorporated with topsoil.
 - 2. Conditioned in storage piles after excavation for at least 6-months, including freezing and thawing periods.
 - 3. Contain not less than 90% organic matter by weight on an oven-dried basis.
 - 4. Shall not contain more than 66% moisture by weight.
 - 5. A minimum of 35% moisture at the time of incorporation into the soil.
- E. Manure:
 - 1. Well-rotted, unleached, dehydrated and shredded cattle manure or a combination of not less than 50% well-rotted cattle manure and horse manure.
 - 2. Not less than 8-months or more than 2-years old.
 - 3. Free of all extraneous matter and shall contain no more than 25% by volume of straw, sawdust or other organic bedding litter.

2.4 LAWN MATERIALS:

- A. Sod materials - if called for
 - 1. Topsoil for sod installation shall be of the same quality as specified for plant materials.
 - 2. Sod shall be predominantly a 2-year or more Kentucky Blue Grass mix, consisting of the following grasses, or approved equal:
 - Nugget Kentucky Bluegrass 50%
 - Pennfine Perennial Ryegrass 25%
 - Creeping Red Fescue 25%
 - 3. Sod shall have a well knit root system and be obtained from a loam soil. Sod shall be of such character and condition that it will not fall apart during the operation of cutting, transporting and laying. Sod shall be of a thickness to incorporate a good stolon growth with one half to three quarters of soil thickness. Sod shall be properly mowed to one and one half to two inches in height. Sod shall be of uniform width, length and thickness by machine cut.

4. Sod, which does not show the characteristics as specified, or which arrives in poor condition, shall not be accepted and must be immediately removed from the site.
5. Sod shall be cut, delivered, and laid within the same day if possible; but in no case left beyond the second day. Second day sod material conditions can be grounds for rejection of the materials, if in the sole opinion of the City to much heat has built up within the rolls of the sod materials.

B. Hydro-seeding materials - if called for

1. Fertilizer: 700 to 750 lbs. per acre shall be used. The fertilizer shall be of a standard commercial fertilizer blend, with an analysis of 18-24-12 or as otherwise approved. Fertilizer shall be kept dry in storage prior to being used.
2. Hydro-mulch: 2200 lbs. per acre of the approved wood mulch shall be used. Mulch used shall be an all-natural wood fiber product equal to that known as Terra-mulch by Profile, Silva-Fiber produced by the Weyernauser Company; or Conwed produced by Agronomy Products, Inc., or other approved equal. Hay or straw mulch is unacceptable.
3. Mulch shall be produced from clean whole woodchips and shall contain a water-soluble, non-toxic green dye and a non-toxic dispersing agent. The mulch shall contain no growth or germination inhibiting factors.
4. The fiber mulch shall have the following physical and chemical properties:

(1) Percent Moisture	90%	3%
(2) Percent Organic Matter-O.D.Basis	99.2%	0.8%
(3) Percent Ash Content	0.6%	0.2%
(4) Ph	4.8%	0.5%
(5) Water Holding Capacity	1080 gallons minimum	
5. Wetting Agent: The wetting agent used shall be potable water.
6. Mulch tie down for hydro-seeding: shall be the standard provided from the manufacturer/producer as a tackafier from the hydro-mulch supplier.
7. Seed materials: Shall be as specified below under C – 1 for the turf restoration blanket.

C. Turf Restoration Blanket materials - if called for

1. Seed - 200 lbs. of seed per acre for turf restoration blanket seeding shall consist of the following:

Kentucky Bluegrass "Poa Trivialis"	32%	64 lbs.
Rough Kentucky Bluegrass "Poa Pratensis"	24%	48 lbs.
Creeping Red Fescue	24%	48 lbs.
Perennial Ryegrass	20%	40 lbs.

All seed shall be of the highest quality and purity, and the weed/seed content shall not exceed 0.03 of 1%. All grass seed shall be fresh, clean, new-crop seed from certified seed sources.

2. Compost materials shall be certified to be weed and disease free and meet the following criteria in accordance with MDOT - CFR503 regulations. Test methods for the following criteria should follow US Compost Council USCC & TMECC guidelines for laboratory procedures.

- a. Ph – 5.0 – 8.0 in accordance with TMECC 04:11-A, “Electrometric Ph determinations for compost”
- b. Particle size: 100% passing a 2” sieve, 99% passing a 1” sieve, minimum of 60% passing ½” sieve.
- c. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
- d. Materials shall be relatively free (<1% by dry weight) of inert, foreign, or man made materials

PART 3: EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected and the City Representative has approved.
- B. Refer to the additional provisions stated above under paragraph 1.3 A-3.

3.2 GENERAL

- A. The Contractor shall provide the necessary means to lift transplanted trees and other plant materials from the nursery to and into the new tree and plant pits at the project site. All plant materials shall be properly handled using standard horticultural means and methods.
- B. The contractor shall remove the subsoil dug from the plant pits off site, unless otherwise indicated on the drawings, or as approved in writing by the City.
- C. Trees shall be balled and burlapped, or dug, handled, transported and replanted in a manner recognized as good horticultural practice to insure plant life.
- D. Large tree planting holes shall have vertical sides, and holes shall be a minimum of 24" wider than the tree ball they are to receive. See planting drawing details.
- E. All plants shall be so set that when the planting mixture has settled, they will bear the same relation to the finished grade as they bore to the natural grade before being transplanted.
- F. When balled and burlapped trees are set compact topsoil around base of ball to fill voids. All burlap, ropes and wire shall be removed from top of balls. Puddling of soil will not be permitted.
- G. Plants shall be located as shown on the drawings as approved in the field by the City Representative after staking by the contractor. Prior to digging, verify with City Representative that weather and ground conditions permit transplanting of plant materials. The contractor shall stake all plant material locations and then call

for a review and approval by the City Representative. No plant holes shall be dug until the contractor receives the City approval.

- H. During landscaping and maintenance operations, all areas shall be kept neat and clean. Precautions shall be taken to avoid damage to existing site elements. All work shall be performed in a safe manner to the operators, the occupants and any pedestrians.
- I. Upon completion of each site visit maintenance operations, all debris and waste materials shall be cleaned up and removed from the site, on site trash receptacles shall not be used to dispose of debris materials. The sidewalk shall be edged monthly.
- J. The contractor shall repair any damage to the landscape, paving, utilities caused by the contractor without charge to the owner.

3.3 PLANT MATERIAL PROTECTION

- A. Root Protection: Plants shall be handled at all times in accordance with the best horticultural practices so that the roots or balls are adequately protected from the sun and drying winds. No plant shall be bound with rope or wire in a manner that would damage the bark, break the branches or destroy its natural design.
- B. Balled and burlapped ("B & B") plants shall be dug with a firm, natural ball of earth of sufficient diameter and depth to encompass the fibrous and feeding root systems necessary for full recovery of the plant. Balls shall be securely wrapped with burlap and bound with cord. No balled and burlapped plants shall be lifted and handled from the bottom of the ball only. Plants handled otherwise will be cause for rejection. Plant balls shall have 9 inches of ball per 1 inch of tree caliper AAN measured 12 inches above grade.
- C. All plant material shall be planted as soon as possible after delivery. Plants that cannot be planted immediately shall have their roots & foliage kept moist and adequately protected from direct sun light, until planted.

3.4 DIGGING AND HANDLING OF PLANT MATERIAL

- A. Shipping & Handling
 - 1. Digging and delivery shall be made during the dormant season, preferably between March 1st and May 15th or after October 1st. Experienced workman shall dig all plant material with care not more than 24 hours before shipping. Avoid all possible injury to roots, branches and trunks by mechanical equipment, frost or other weather conditions. If plant materials must be moved during the active growing season and are foliated, approved anti-transpiration (foliage drying) measures shall be utilized, and they shall be properly covered and supported during transportation to the site so as to prevent foliage drying and other kinds plant damage. Due care shall also be

taken to keep root system moist and plants protected from the direct sun and wind. Any damaged plants shall be promptly removed from the site and replaced.

2. Any container grown shrubs, other plant materials and perennials shall have the container carefully removed so as not to damage the plant ball.

B. Tree and Shrub Planting

1. Prior to setting shrub plants, place a 6-inch compacted layer of planting mixture in the bottom of the pit, and as detailed on the detail drawing.
2. Set balled and burlapped and transplanted plants in the planting pit to the proper grade equal to that grown in the nursery, in a plumb upright position and faced to give the best appearance or relationship to each.
3. Each tree hole in lawn areas shall be excavated to a depth and width necessary to allow for the tree ball to rest on undisturbed soils and surrounded by the 24-inches of plant mixture called for above in paragraph 3.2.
4. After approximately 2/3'eds of the planting pit has been backfilled and tamped, the pit shall be filled with water and the soil allowed settling around the roots. Cut away or fold back the burlap from the top of the ball before backfilling the top 1/3 of the planting pit. Planting mixture shall be carefully worked all the way around each plant ball.
5. After the water has been absorbed, fill the planting pit with planting mixture and tamp lightly to grade. Bring any settlement to grade with additional planting mixture.
6. Install required mulch and in the case of all trees (including recently planted small trees in smaller than 6-inch caliper) a 6-inch section of black coil drainage pipe, to prevent damage to the truck of the tree, shall be installed. Large existing trees are not to have this bark protective measure installed.
7. All newly planted and existing trees shall have a 6 to 8-inch deep wood mulch ring placed around the truck of the tree, which extends approximately 36-inches beyond the tree trunk in accordance with standard horticultural practices, as called for on the drawings. Care shall be taken to keep the wood mulch away from the tree trunk.

C. Bed Preparation:

1. For all areas that are specifically pointed out on the drawing for planting beds preparation, all existing sod and undesirable plant growth shall be removed from the entire bed area. All undesirable materials shall be removed and disposed of off the site.
2. The bed shall be loosened prior to planting by rototilling, or picking (generally done on small areas or on slopes). Soil shall be loosened to a depth of 6-8". Poor soils shall be removed and replaced with planting mixture.
3. Planting mix shall be spread over the bed to a depth of 4" after the soil has been loosened. The planting mix shall then be worked into the bed by rototilling.

4. Fertilizer shall be top-dressed over bed area (except when compost is used) at the rate specified for each type of plant material. Incorporate fertilizer thoroughly into bed.

D. Fertilizing

1. All ornamentals, shade trees, evergreens and shrubs shall have an application of slow release fertilizer after planting at the supplier's and/or in keeping with standard horticultural practices at each plant's recommended rates. The fertilizer shall be raked into the top surface above the root system of each plant.

E. Pruning

1. After planting, the branches of deciduous stock shall be pruned to balance the loss of roots in such manner as to retain the natural form of the plants type according to best horticultural practice and shall be appropriate to the various types of plants and special requirements of each.
2. Trees shall be pruned using accepted standard horticultural practice by an arborist by removing all dead wood, all surplus, badly formed and interfering limbs. In general, 1/5 of the branches shall be removed but the proportion shall, in all cases, be subject to the approval of the City Representative. Broken, damaged and unsymmetrical branches shall be removed or cut back to insure healthy and symmetrical growth of new wood. Surrounding top branches shall be cut back to conform to the leader. Branches to be cut back shall be cut off at the point beyond a lateral shoot or bud a distance of not less than 1/2 the diameter of the supporting branch. The cut shall be made on an angle slopping in the direction of the lateral shoot and in no case shall stubs be left. All cut surfaces over one inch in diameter shall be painted with tree wound dressing.
3. All pruning shall be done by workmen experienced in this type of work, conformance with the details shown on the drawings or as directed by the City Representative.
4. Evergreens shall be pruned only to the extent of removing dead or broken branches. In no case will under trimming or heading back be permitted.

F. Wrapping Trees

1. Immediately after planting, the trunks of smooth bark deciduous trees and the lower part of large branches over three inches in diameter shall be carefully wrapped. Wrapping shall be applied in a special manner without the overlap equal to one-half of the width of wrapping. The wrapping shall start with the second or third branch and wind downward to below grade at the top of the roots. A length of binder twine around the tree shall securely tie the wrapping.

G. Guying Trees

1. All deciduous trees shall be carefully and adequately anchored in at least three directions per the detail drawing. To anchor the new trees use "Tree

Staples” specified earth anchors, in accordance with the manufacturer’s recommendations and procedures.

H. Mulch

1. Apply four (4) full inches of planting bed mulch over all plant bed areas except annual, perennial or ground cover beds which shall only have 1 to 2-inches of mulch material maximum. The finish grade shall be approximately 1/2 inch below the grade of adjacent lawn or hard surface areas.
2. Apply not less than six (6) full inches of the planting bed bark mulch in all tree saucer areas. The finish grade shall be approximately 2 inches above the grade of adjacent lawn or hard surface areas.
3. Thoroughly soak all mulched areas. After watering, all mulched areas shall be raked if necessary and left in a complete, clean and finished manner.

I. Plant bed edging shall be installed to the lines and grades for the plant beds if and as maybe called for on the drawings.

J. Annuals, Perennials and Ornamental Grasses

1. Remove container-grown plants from their pots and slash the sides of the root ball to prevent root girdling per good horticultural practices.
2. The annuals, perennials and ornamental grasses shall be planted as called for:
 - a. So that the roots of the plant are surrounded by soil below the mulch. The plants shall be set so that the top of the root system is even with the required finish grade.
 - b. Plants shall be spaced apart as called for on the drawings and specified specify distances apart -on center - for each plant.
 - c. Following the proper placement of the plants they shall be watered in as needed.
3. Add additional mulch as necessary to maintain a uniform thickness. Smooth and level out surface of bed to have a uniform appearance.
4. All beds shall have a clean and defined edge. Any mulch or topsoil shall be cleaned from adjacent lawn areas.
5. Treat the plant bed areas to be mulched with a pre-emergent (soil applied) herbicide such as Preen and applied at the time and rates as called for by manufactures instructions.
6. Water - refer to the watering section below.

3.6 TOPSOIL INSTALLATION

- A. Prior to a 1-inch placement of topsoil on berm areas and any other disturbed or adjacent lawn areas to walks, trails, etc., the contractor shall apply a weed killer over any lawn weed areas, in strict accordance with manufacturer's recommendations, as required by City Representative.

- B. Preparation: The contractor shall scarify and prepare a smooth uniform subgrade parallel to finish grades for all lawn areas.
- C. Prior to any topsoil placement, remove stones over 3/4-inch in any dimension, sticks, rubbish and other extraneous matter from the subgrade.
- D. In all areas where there has been construction traffic and the subgrade has been compacted to any extent due to construction and traffic, the top 3-inches in the compacted areas must be thoroughly loosened and or aerated if necessary to allow penetration of air and moisture.
- E. Any new berm area (s) and disturbed lawn areas that have been prepared shall be inspected by the City Representative for proper sub grades.
- F. Once approved, the prepared lawn areas shall be covered with the approved topsoil material. It shall be placed at a depth and thickness sufficient to meet finish grade requirements after compaction and settling to a level of natural soil compaction of not less than 4-inches for new lawn areas and 1-inch in any areas that have been stripped and is called to be re-sodded on the drawings, with topsoil after compaction at plus or minus 3/8-inch maximum, at 70% density.
- G. Topsoil shall be stockpiled in the area (s) designated by the City Representative.
- H. Refer to the Measurements & Payment section 01025 for quantities of topsoil to be provided.

3.7 FINE GRADING

- A. Fine Grading: The contractor shall include the raking and leveling of the existing topsoil to a subsurface suitable for the laying of sod or installation of lawn seeding operations, parallel to the required finished grade.
 - 1. Uniformly distribute topsoil on lawn areas in quantity sufficient to provide full depth of soil after compaction of not less than 4-inches for new work and 1-inch over disturbed and repair areas where suitable topsoil materials have been used.
 - 2. Topsoil shall be spread, cultivated, compacted to prevent future settlement, dragged, and graded to proper finish grades. Do not place topsoil when the subgrade is frozen, excessively wet, extremely dry, or in a condition otherwise detrimental to proper grading or lawn preparation operations.
 - 3. Finished grades shall slope to drain, be free of depressions or other irregularities after thorough settlement and compaction of soil, and shall be uniform in slope between grading controls and elevations indicated.
 - 4. Final grade shall not vary more than one-tenth of a foot from elevations shown on drawings. At the edge of walks and paved areas the topsoil sub base shall be graded off approximately 1-inch below the top of adjacent paved surfaces such that when the sod turf has been placed the finish surface is slightly below and uniform to the paved surface to which it abuts to insure

drainage off the paved surface and to prevent "scalping" of grass during the cutting operation. For seeded lawn areas at the edge of paved surfaces the finish grade shall be graded off approximately ¼-inch below the top of the adjacent surfaces.

5. Fine Grading: Shall include the fine grading by hand, raking the surface with a landscapers rake and leveling of the existing topsoil and existing finish grade materials to a surface suitable for the installation of the lawn turf operation, parallel to the required finished grade.
6. After the fine grading of sod and/or seedbed is complete, the contractor shall notify the City Representative at phone and receive field inspection and approval of the fine grading work before the turf work is commenced.

3.8 GENERAL LAWN REQUIREMENTS

- A. It is the responsibility of the contractor to establish a dense, first quality lawn of permanent grasses, free from lumps and impressions. Any part of the area that fails to show a uniform germination shall be reseeded and such reseeded shall continue until a dense lawn area is established.
- B. The contractor shall provide all maintenance of the lawn areas as described above until final acceptance. The lawn shall be mowed as necessary, keeping the lawn height to a maximum of three (3) inches until final acceptance.
- C. The contractor shall repair damage to seeded areas resulting from erosion. Scattered bare spots over more than 3% of the lawn areas will not be acceptable.
- D. The contractor shall erect "Keep Off" signs or rope off the sodded areas as required during the turf establishment period. The contractor shall take all means and methods necessary to keep people off of the newly laid sod areas until the sub base tightens up sufficiently to prevent unwanted depressions when walked across. Any damage during the establishment period and up to and until accepted by the City shall immediately be carefully corrected by the contractor, at the contractor's sole cost, to the satisfaction of the City.
- E. When all of the above turf establishment requirements of the specification have been fulfilled, the contractor shall call the City Representative, and request an inspection for final acceptance of the lawn work.

3.9 SOD INSTALLATION

- A. Refer to the provisions stated above under 3.6 Topsoil Installation, 3.7 Fine Grading and 3.8 General Lawn Requirements specifications applicable to this work.
- B. Fertilization: Apply commercial fertilizer by mechanical means to insure an even overall distribution. Fertilizer shall not be applied earlier than one week's time prior to sodding nor later than 24 hours before sodding unless an organic or other non-burning fertilizer shall be applied at 20 pounds per (1000) square feet or at 870 lbs. per acre and worked into the top one (1) inch of topsoil, care being taken to insure even distribution.

C. Laying of the Sod

1. Sod shall be moist and laid on moist topsoil preferably within no later than 24-hours after cutting. It shall be carefully laid by hand, butting tightly all joints and crossing all transverse joints with a minimum of 8-inches of overlap. Sod is required on all lawn areas as indicated on drawings, or other areas disturbed by the contractor's operations.
2. Sod shall not be placed during a drought, or during a period from June 1st to August 15th, unless previously authorized in writing by the City Representative.
3. Sod laid in place shall be tamped / or rolled to insure firm contact between the sod and the base upon which it is being layed upon. Tamping shall be done by hand in limited areas and by roller in larger areas. The roller shall be filled with water to the approximate weight of three hundred (300) lbs. Excessive tamping or rolling to the extent of forming a hard base or when soil is overly wet shall be avoided.
4. Watering: This operation is to settle the stolen root system of the grass into close union with the base soil and should not be carried on to the extent of making a soft, muddy base when walked upon. Watering should take place immediately after the sod is in place and if on a heavy base soil, water lightly prior to tamping or rolling.

3.10 HYDRO-SEEDING

- A. Refer to the provisions stated above under 3.6 – Topsoil Installation, 3.7 Fine Grading and 3.8 General Lawn Requirements specifications applicable to this work.
- B. Lawn area preparation:
 1. Turf Weed Killer Application: Shall take place well in advance of the application of the turf restoration blanket materials in accordance with the manufactures recommendations.
- C. Mixing
 1. The water, seed, fertilizer, mulch and mulch tie down tackafier material shall be added in the specified quantities to hydroseeding tank.
 2. All ingredients shall be thoroughly mixed by agitation until the ingredients form a uniform suspension.
- D. Protection
 1. Prior to commencement of spraying operations, the contractor shall protect all road, walks and walking trails, fencing, play areas or other existing features from the hydroseeding spray with polyethylene or other suitable materials and means. Any spray material, which should come in contact with one of the aforesaid items shall be thoroughly cleaned of the item as soon as possible that day, preferably while still wet.
- E. Hydroseed Seeding Operation
 1. The thoroughly mixed ingredients shall be carefully sprayed “heavily” onto the areas to be hydroseeded and onto any other areas damaged by the

contractor's operation at a minimum rate of 2200 lbs. per acre, in the presence of the City Representative. All debris shall be removed from the site upon completion.

3.11 TURF RESTORATION BLANKET INSTALLATION

- A. Refer to the provisions stated above under 3.6 – Topsoil Installation, 3.7 Fine Grading and 3.8 General Lawn Requirements specifications applicable to this work.
- B. The compost shall be evenly distributed at an average depth of 3 to 3 1/4-inches throughout the surface area, or equal to 435 cubic yards per one acre of area.
 - 1. Provide certified weight or load slips from composter to the City Representative.
- C. Lawn area preparation:
 - 1. Turf Weed Killer Application: Shall take place well in advance of the application of the turf restoration blanket materials in accordance with the manufactures recommendations.
- D. Execution of turf restoration blanket operation:
 - 1. Inspection of fine graded lawn areas shall be as called for prior to installation of the turf restoration blanket.
 - 2. The “Compost Blanket” shall be applied, via a pneumatic conveyance vehicle. Seeding for the compost blanket shall be simultaneous to the compost application, via a calibrated seeder, evenly distributing the seed through the compost layer.
- E. Protection:
 - 1. Prior to commencement of spraying operations, the contractor shall protect all roads, walks fencing, private property, or other existing features from the hydro-mulch seeding spray with polyethylene or other suitable materials and means. Any spray material, which should come in contact with one of the aforesaid items, shall be thoroughly cleaned of the item immediately.

3.12 GUARANTEE, MAINTENANCE AND ACCEPTANCE

Plant Materials:

- A. All contractor supplied tree plant materials shall be fully guaranteed to be living and in a thriving, good health condition until two calendar years after planting or until the final inspection meeting and final acceptance takes place, with acceptance issued in writing by the City.
- B. All contractor supplied other plant materials and/or lawn areas shall be fully guaranteed to be living and in a thriving, good health condition for at least one full calendar year after planting, or until the final inspection meeting and final acceptance takes place, with acceptance being issued in writing by the City.
- C. Any plant materials, which do not survive winter or show definite signs of dying or poor health (in the sole opinion and determination by the City Representative) shall

be replaced by the contractor each following spring with new plants of equal size, variety and quality as originally specified, unless substitutions are approved in advance in writing by the City.

- D. The contractor shall provide all replacements at no additional cost to the City on plant materials he provides. Replacements shall be made on all contractor-supplied materials in the spring.
- E. If vandalism is the cause of the plant failure as determined by the City Representative, the contractor will not be held responsible to replace the vandalized plant(s).
- F. The contractor shall call and arrange for inspection around the mid-May time of the year to determine if any plants need to be replaced, with the City Representative. The guarantee will terminate after written final acceptance by the City.
- G. The replacement guarantee shall not apply to plant materials, which die due to animal damage, vandalism, injury by fire or acts of God.
- H. At the end of the first year the contractor shall call for his final inspection of other plant materials having already made any replacements during spring as called for. Any punch list work shall be fully completed by this time following the initial planting and prior to this inspection meeting with the City.
- I. Two years after the initial tree planting, the contractor shall call for his final inspection having already made any replacements during spring as called for. Any punch list work and/or final tree replacements shall be fully completed prior to calling for this final inspection meeting with the City.
- J. During the maintenance warranty period following the installation of all plant materials, which are installed under this contract, the contractor shall perform services for contractor-supplied materials as specified elsewhere in this specification.
- K. Remove all plant tree wrapping during the spring work season and prior to the final acceptance meeting, unless directed otherwise by the City Representative.

Lawn Area Maintenance:

- A. The lawn areas shall be maintained by watering, weed control application, fertilizing, and through (at least three mowings) and to final acceptance and any other maintenance necessary to produce a first quality lawn. The contractor is responsible for performing regular and routine maintenance as required to produce a full and health growing lawn

General Park Maintenance:

- A. The work to maintain the park shall start with the commencement of the contractors first day of work on the site and shall continue un-abated until the contract work is all completed, accepted and the park is then turned back over the City. The contractor shall have full responsibility to fully maintain the entire park lawn areas throughout the construction period to completion and acceptance. All work applicable as described below shall be performed during the construction period up to acceptance and turn over.
1. The Construction Period activities shall conclude once the City has accepted the park construction work including completion of all punch list items, in its entirety. Plant Material maintenance shall however continue through the warrantee periods specified herein.
 2. NOTE: The contractor will not be responsible for any further mowing or normal trash pick-up and related work operations in the park once the City has accepted the work.
- B. The contractor shall apply one application of a weed and feed type of fertilizer application to eliminate weeds to the extent possible; so as to provide a basically weed free existing park lawn areas including any areas between the fence lines and the street curbs. Notify the City Representative prior to application of exact time and date for this work to occur.
- C. The work includes mowing of entire park lawn areas as stated above generally at no greater than a seven-day intervals between mowings. If the weather conditions dictate longer periods between scheduled mowings, the contractor shall obtain written approval prior to any change in the mowing schedule. The lawn shall also be mowed to keep the grass at an approximately 3-inch height. The mowing operation includes trimming around all obstacles and other site items, removal of excessive grass clippings and removing debris from all paved walks, curbs and other areas. CAUTION: Weed eaters shall not be used around trees in the trunk areas.
- D. Walk and other hard surface areas shall be blown cleaning or sweep.
- E. Edge walks and curbs monthly.
- F. Water the lawn and plant materials as frequently as necessary as described below.
- G. The contractor is expected to perform all other work necessary to provide and maintain a healthy green park turf free of weeds, bare spots or other damaged spots until accepted and turned back over to the City.
- H. During the construction period the contractor is responsible for the removal of trash regardless of its source or amounts, at least weekly or more often if necessary to keep the site basically clean.

- I. Keep all existing trees detailed neatly around the base of the trees with clean wood chip mulch, taking care to keep the mulch away from the tree trunks, per standard horticultural practices, if originally called for on the drawings.
- J. Prior to each mowing, all trash, liter, sticks and other unwanted debris shall be removed from lawns, and paved areas and disposed of off site by the contractor regardless of its source.

3.13 WATERING

A. General – Water:

- 1. The contractor shall furnish the means of watering required for the execution and maintenance of all work until contract completion and acceptance by the City. Water will be available to the contractor at no cost if pulled from an existing site drinking fountain hose bib, should one be available in working condition. Otherwise, the contractor may provide his/her own water truck or water can be obtained from a City fire hydrant, as long as the contractor secures and pays for any associated costs for the hydrant permit and/or water usage, and any other fees required under the permit as maybe required from the DWSD.

B. Trees, Shrubs, Evergreens & Plant Beds Materials:

- 1. Water the planted beds and other plant materials thoroughly at time of planting and thereafter daily or as needed until establishment occurs and the City gives written acceptance.

C. Lawn Areas:

- 1. Following the initial watering at the time the lawn area materials have been installed, the turf areas shall be watered as soil moisture conditions dictate and on a regular basis and until the new turf areas have been accepted by the City Representative.
- 2. The contractor shall keep the freshly applied seeded areas moist through daily watering as necessary to accelerate germination of the grass seeds and until the new lawn turf becomes fully established.

3.14 CLEANING

- A. The contractor shall perform all necessary cleaning and removal of excess soil, debris, equipment, etc., during installation and upon completion of the work. The contractor shall immediately repair any damage resulting from planting operations without cost to the City.

*** END OF LANDSCAPING WORK SECTION ***

SECTION 02920
TURF RESTORATION BLANKET & MAINTENANCE

PART 1: GENERAL

1.1 DESCRIPTION

- A. The work included under this Section provides all necessary materials, labor, equipment, tools and supervision required for: seed bed preparation, fine grading, installation of topsoil and execution of hydro-mulch seeding for all areas to be put to lawn as shown on the Drawings as noted in these Specifications, and that become disturbed due to construction.

1.2 MATERIALS AND INSPECTION

- A. All turf restoration blanket materials shall be subject to inspection and approval at the Contractor's yard or upon delivery to the job site for quality, condition, and overall appearance by the City Representative. At no time shall any approval impair the right of further inspection and rejection at the park site during the progress of the work or contract life for failure to conform to the listed condition requirements. The Contractor shall promptly remove rejected turf restoration blanket / hydro-mulch seed materials from the site.

1.3 MAINTENANCE AND ACCEPTANCE OF HYDRO-MULCH SEEDED LAWN AREAS

- A. The Contractor shall keep the freshly applied seeded areas moist through daily watering as necessary to accelerate germination of the grass seeds. The lawn areas shall be maintained by watering, weed control application, fertilizing, and through at least three mowings and any other maintenance necessary to produce a first quality lawn.
- B. It is the responsibility of the Contractor to establish a dense, first quality lawn of permanent grasses, free from lumps and impressions. Any part of the area that fails to show a uniform germination shall be reseeded and such reseeded shall continue until a dense lawn area is established. The Contractor shall provide all maintenance of the lawn areas as described above until final acceptance. The lawn shall be mowed as necessary, keeping the lawn height to a maximum of three (3) inches until acceptance. The Contractor shall repair damage to seeded areas resulting from erosion. Scattered bare spots over more than 3% of the lawn areas will not be acceptable. When the above requirements of the specification have been fulfilled, the Contractor shall call the City Representative (phone: 224-1108), and request an inspection for acceptance of the lawn work.

1.4 CONTRACTOR QUALIFICATIONS

- A. The Contractor shall have the following current licenses:
1. Nurseryman, State of Michigan Dealers License.
 2. Economic Poison Application License (State of Michigan)
 3. City of Detroit Landscape License.

PART 2: MATERIALS

2.1 SEED

- A. 200 lbs. of seed per acre for hydro-mulch seed seeding shall consist of the following:

Kentucky Bluegrass "Poa Trivialis"	32 lbs.
Rough Kentucky Bluegrass "Poa Pratensis"	24 lbs.
Creeping Red Fescue	24 lbs.
Perennial Ryegrass	20 lbs.

All seed shall be of the highest quality and purity, and the weed/seed content shall not exceed 0.03 of 1%. All grass seed shall be fresh, clean, new-crop seed.

2.2 FERTILIZER

- A. The fertilizer shall be applied prior to the installation of the new compost blanket mulch. 700 to 750 lbs. Per acre shall be applied. The fertilizer shall be a standard commercial fertilizer blend with an analysis of 12-12-12. The fertilizer shall be kept dry in storage prior to be used.

2.3 COMPOST BLANKET MULCH

- A. The compost shall be evenly distributed at an average depth of 3" throughout the surface area, or equal to 435 cubic yards per one acre of area. Compost shall be certified to be weed and disease free and meet the following criteria in accordance with CFR503 regulations. Test methods for the following criteria should follow USCC TMECC guidelines for laboratory procedures.
1. PH – 5.0 – 8.0 in accordance with TMECC 04:11-A, "Electrometric pH determinations for compost"
 2. Particle size: 100% passing a 2" sieve, 99% passing a 1" sieve, minimum of 60% passing ½" sieve.
 3. Moisture content of less than 60% in accordance with standardized test methods for moisture determination.
 4. Material shall be relatively free (<1% by dry weight) of inert, foreign, or man made materials

2.4 WETTING AGENT

- A. The wetting agent used shall be potable water.

2.5 WEED KILLER

- A. An approved weed killer shall be applied to the entire lawn area at least 30-days prior (to prevent any residual effect) to turf restoration blanket installation, as required by the City Representative. The weed killer shall be "Casorn" or an approved equal with a maximum three (3) day residual effect. The rate of application shall be in strict accordance with the manufacturer directions as to use.

PART 3: EXECUTION

3.1 SEED BED PREPARATION

- A. Weed Killer Application: Shall take place well in advance of the application of the turf blanket materials in accordance with the manufactures recommendations.
 - 1. The entire lawn area of the park shall have the weed killer applied. It is the intent of this specification, that the parks turf areas be weed free and to allow the new seed the greatest opportunity for success.
- B. Prior to the turf restoration blanket placement the Contractor shall rake out "fine grade" by hand all lawn areas to be seeded with a landscapers rake expressly designed for that purpose. All twigs, stone and other materials, other than topsoil, shall be removed from the seedbed in all areas to receive the turf restoration blanket to smooth and uniform grades.
- C. Seed Bed Preparation: The Contractor shall further as necessary or as required by the City Representative and at no additional costs, scarify and otherwise prepare a smooth, loose uniform seedbed for all lawn areas to receive the turf restoration blanket. Prior to any turf restoration blanket material placement, remove stones over one half (1/2") inches in any dimension, sticks, rubbish and other extraneous matter from the seedbed. In all areas where there has been construction traffic and the seedbed has been compacted to any extent due to construction traffic, the top 3" must be thoroughly loosened to allow penetration of air and moisture.

3.2 FINE GRADING

- A. Fine Grading: shall include the raking with a landscapers rake and leveling of the existing topsoil and existing finish grade materials to a surface suitable for the installation of the turf restoration blanket operation parallel to the required finished grade.

1. Finished grades shall slope to drain, be free of depressions or other irregularities after thorough settlement and compaction of soil, and shall be uniform in slope between disturbed and non-disturbed areas.

B. After fine grading of seedbed is complete, the Contractor shall notify the City Representative and receive field inspection and approval before the turf restoration blanket application work is commenced.

3.3 EXECUTION OF TURF RESTORATION BLANKET OPERATION

A. Inspection of fine graded lawn areas shall be as called for prior to installation of the turf restoration blanket.

B. The "Compost Blanket" shall be applied, via a pneumatic conveyance vehicle. Seeding for the compost blanket shall be simultaneous to the compost application, via a calibrated seeder, evenly distributing the seed through the compost layer.

C. Protection:
Prior to commencement of spraying operations, the Contractor shall protect all roads, walks fencing, private property, or other existing features from the hydro-mulch seeding spray with polyethylene or other suitable materials and means. Any spray material, which should come in contact with one of the aforesaid items, shall be thoroughly cleaned of the item immediately.

3.4 WATERING

A. Contractor shall keep all freshly seeded areas moist through daily watering with fresh clean water until seed germinates and continue watering as required until the new lawn turf becomes established.

3.5 CLEANING

A. The Contractor shall perform all necessary cleaning and removal of excess soil, debris, equipment, etc., during installation and upon completion of the work. The Contractor shall immediately repair any damage resulting from seeding operations without any additional cost to the City.

3.6 LANDSCAPE MAINTENANCE WORK

The Contractor shall be responsible for performing regular and routine maintenance as required by the detail specifications in this section, and falling within the general requirements specific to seasonal maintenance indicated by the Season below: The work under this Section of the Specifications shall be line item (s) with in the Schedule of Values.

- A. Maintenance Period:
The work to Maintain the Park shall start with the commencement of the contractors work on the site. The Contractor shall have full responsibility to fully maintain the Park throughout the Construction Period to completion and acceptance. All work applicable as described below shall be preformed during the Construction Period.
The Construction Period activities shall conclude once the Park Work including completion of all Punch List items of Work and has been accepted in its entirety by the City. NOTE: the Contractor will not be responsible for any further mowing or normal trash pick-up operations of the park once the City has accepted the Work.
- B. The watering of the newly installed lawn areas shall be by the Contractors' water truck, or if a City Fire Hydrant is used it must be via all required City Permits issued by both the Detroit Water & Sewerage Dept. & Detroit Fire Department issued Permits and hydrants shall be pumped out upon completion of usage. All cost for the Permit (s) and or water shall be at the contractor's expense. The contractor shall supply all equipment and accessories to fully water all lawn areas requiring water.
- C. The Contractor shall apply one application a weed and feed type of fertilizer application to eliminate any weeds; so as to provide a basically weed free existing park lawn areas including the areas between the fence lines and the street curbs.
- D. The work includes mowing of entire park lawn areas until the fully completed contract work has been completed and accepted by the city, generally on no greater than a seven-day intervals. If the weather conditions dictate longer periods between scheduled mowings, the Contractor shall obtain written approval prior to any change in the mowing schedule. The existing lawn shall also be mowed at regular scheduled intervals to entire park lawn area to keep the grass at a 3-inch height. The mowing operation includes trimming around all obstacles, removal of excessive grass clippings and removing debris from all paved walks, curbs and other areas. CAUTION: weed eaters shall not be used around trees in the trunk areas.
- E. Also included are the applications of fertilizing and weed controls, blow cleaning or sweeping of all paved surfaces,
- F. Edge walks and curbs monthly.
- G. Water the lawn when and as frequently as dictated by the weather as necessary to fully maintain and establish the new turf areas as described within this specification.

- H. Apply a total week killer to the weeds growing in any alley directly adjacent to the park site or along existing fence lines to remain, and once dead, remove them and clean up all paving surfaces, broom clean.
- I. During the Construction Period the Contractor is responsible for the removal of trash regardless of its source or amounts, at least weekly or more often if necessary to keep the site basically clean.
- J. Detail all existing trees around the base of all trees with 3 to 4" of clean wood chip mulch, taking care to keep the mulch away from the tree trunks, per standard horticultural practices.
- K. The Contractor shall be expected to perform all work necessary to provide and maintain a healthy green park turf free of weeds, bare spots or other damaged spots.
- L. Prior to each mowing, all trash, liter, sticks and other unwanted debris shall be removed from lawns, and paved areas and disposed of off site by the contractor regardless of its source.
- M. Weed and Feed type of fertilizer shall be applied to lawn areas based on existing turf varieties. Notify the City Representative prior to application of exact time and date for this work to occur. The following applications shall act as standard for bidding purposes.
 - 1. A pre-emergent (soil applied) herbicide shall be applied in early spring (before weed growth) to further control the growth of weeds.
 - 2. A post-emergent (foliar applied) herbicide shall be applied if and as needed.Selection and proper use of herbicides shall be the Contractor's responsibility.

END OF SECTION 02920

SECTION 02932

SITE RESTORATION

PART 1: GENERAL

1.1 DESCRIPTION

- A. The work included under this Section provides all necessary materials, labor, equipment, tools and supervision required for: topsoil furnishing and placement, finish fine grading of the lawn surfaces as specified, seed bed preparation, fine grading, execution of the actual hydroseeding and fertilization of the prepared turf lawn areas, protection of all fixed site improvements like fencing, trees, play structures, walk and other paved surfaces from any over-spray, clean up following installation work, watering as necessary to provide adequate moisture to assist the grass seeds germination, weed control application, fertilizing, and any other maintenance and care necessary to produce a first quality lawn including scarifying and re-application of any bare areas as required until the new turf is fully established and accepted by the City, for all disturbed lawn areas to be put back into lawn as required by the work shown on the Drawings, as noted in these Specifications and that become disturbed due to construction.

1.2 MATERIALS AND INSPECTION

- A. All hydroseeding materials shall be subject to inspection and approval at the Contractor's yard or upon delivery to the job site for quality, condition, and overall appearance by the City Representative. At no time shall any approval impair the right of further inspection and rejection at the park site during the progress of the work or contract life for failure to conform to the listed condition requirements. The Contractor shall promptly remove any rejected hydroseed materials from the site.

1.3 MAINTENANCE & ACCEPTANCE OF HYDROSEED SEEDED LAWN AREAS

- A. The Contractor shall keep the freshly applied seeded areas moist through watering as necessary to accelerate germination of the grass seeds. The contractor shall make all allowance deemed necessary for the costs related to the as necessary lawn watering until a healthy turf has been established and accepted by the City in the costs of the Bid Proposal. The lawn areas shall be maintained by watering, weed control application, fertilizing, and any other maintenance necessary to produce a first quality lawn.
- B. It is the responsibility of the Contractor to establish a dense, first quality lawn of permanent grasses, free from lumps and impressions. Any part of the area that fails to show a uniform germination or that is not weed free shall be scarified, raked, reseeded and such reseeded shall continue until a dense weed free lawn area is established. The Contractor shall provide all maintenance of the lawn areas as described above until final acceptance.

1.4 CONTRACTOR QUALIFICATION

- A. The Contractor shall have the following current licenses:

1. Nurseryman, State of Michigan Dealers License
2. Economic Poison Application License (State of Michigan)
3. City of Detroit Landscape License

1.5 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 01000
- B. Measurement & Payment, Section 01025

1.6 STANDARDS

- A. Trained personnel using current, acceptable horticultural practices shall perform all landscape maintenance services.
- B. All work shall be performed in a manner, which maintains the original intent of the landscape design.
- C. All chemical applications shall be performed in accordance with current county, state, and federal law, utilizing EPA-approved materials and methods of application. These applications shall be performed under the supervision of a Licensed Certified Applicator.
- D. The Contractor shall ensure that employees are dressed in uniforms with company identification. All vehicles and equipment used to perform the site maintenance for this contract shall be clearly marked with company identification.
- E. The City Representative shall have full authority to coordinate Contractor's responsibilities and interface with the Contractor in the regular performance of the contract work under this specification Section.
- F. The City Representative shall monitor the Contractor's performance under this contract using quality assurance procedures as may be necessary to ascertain contractor compliance with this contract.
- G. The Contractor shall give notice of their intended schedule in writing of the days and time when maintenance work will be going on and what is to be done for each day of work. A general schedule shall be submitted for this Section of work for City approval.

1.7 SAFETY

- A. The Contractor shall maintain the work site free of hazards to persons and/or property resulting from his/her operations. Any hazardous condition noted by the Contractor, which is not a result of his operations, shall be immediately reported to the City's Representative.
 1. All operations shall be restricted to limits of work for this Contract.
 2. The Contractor shall not enter upon any adjacent property for the purpose of conducting any operations required under this contract.

3. The Contractor shall so conduct his operations so as to offer the least possible obstruction and inconvenience to the public to include disruption of the noise levels within the areas. Work shall be conducted during normal business hours.

1.8 GENERAL SITE OBSERVATION

- A. The Contractor shall immediately report any damage, which has occurred to any site items such as pavement areas, walks, signage, play equipment or surfacing, fencing, site amenities and plant materials, etc.
- B. In addition, the Contractor shall immediately notify the owner's representative of any damage due to vandalism and any other facilities not necessarily described herein, during his regular site visits to perform maintenance work.

1.9 APPROVALS

- A. Any work performed beyond these specifications, which is outlined herein shall only be done upon written approval by the owner or owner's representative. Work performed without written authorization, will be at the Contractors sole expense and done so at no additional costs to the City.

1.10 WORKMANSHIP

- A. During landscape maintenance operations, all areas shall be kept neat and clean. Precautions shall be taken to avoid damage to existing site elements. All work shall be performed in a safe manner to the operators, the occupants and any pedestrians.
- B. Upon completion of each site visit maintenance operations, all debris and waste materials shall be cleaned up and removed from the site, on site trash receptacles shall not be used to dispose of debris materials.
- C. The Contractor shall repair any damage to the landscape, paving, utilities caused by the Contractor without charge to the owner.

1.11 WARRANTY

- A. The Contractor shall make every effort to maintain the health and growth of all turf areas. The Contractor shall be responsible to guarantee for one year the hydro-seeded turf areas that were installed as part of the work.

PART 2: MATERIALS

2.1 TOPSOIL

- A. Topsoil shall be fertile, friable natural topsoil of clay loam character obtained from a well-drained arable site. It shall contain at least 5% but not more than 20% by weight of organic matter determined by ignition after being dried to a constant weight at 221⁰ F. It shall be

reasonably free from heavy clay, lumps, coarse sand, stones, plant roots, sticks or other foreign material and shall not be delivered in frozen or muddy condition. It shall be the Contractor's responsibility to supply topsoil for all lawn areas with a pH range from 6.0 to 7.0 either natural or corrected for deficiency. Topsoil tests shall yield the following results to be acceptable or be modified at no additional costs to the City per recommendations by the Testing Laboratory: Nitrogen (N), Medium Range; Potassium (K), 180 pounds per acre; and Phosphorus (p), 30 pounds per acre. Submit small sample in a gallon zip lock type bag.

2.2 SEED

A. 200 lbs. of seed per acre for hydroseed seeding shall consist of the following:

Kentucky Bluegrass "Poa Trivialis"	64 lbs.
Rough Kentucky Bluegrass "Poa Pratensis"	48 lbs.
Creeping Red Fescue	48 lbs.
Perennial Ryegrass	40 lbs.

B. All seed shall be of the highest quality and purity, and the weed/seed content shall not exceed 0.03 of 1%. All grass seed shall be fresh, clean, new-crop seed.

2.3 FERTILIZER FOR HYDROSEED SEEDING

A. 700 to 750 lbs. per acre shall be used. The fertilizer shall be of a standard commercial fertilizer blend with an analysis of 12-12-12. Fertilizer shall be kept dry in storage prior to being used.

2.4 MULCH FOR HYDROSEED SEEDING

A. 2200 lbs. per acre of mulch shall be used. Mulch used shall be a natural wood fiber product equal to that known as "Silva-Fiber" produced by the Weyerhaeuser Company; or "Conwed" produced by Agronomy Products, Inc., hay or straw is unacceptable.

B. Mulch shall be produced from clean whole woodchips and shall contain a water-soluble, non-toxic green dye and a non-toxic dispersing agent. The mulch shall contain no growth or germination inhibiting factors.

C. The fiber mulch shall have the following physical and chemical properties:

(1)	Percent Moisture	90%	3%
(2)	Percent Organic Matter (O.D. Basis)	99.2%	0.8%
(3)	Percent Ash Content	0.6%	0.2%
(4)	Ph	4.8%	0.5%
(5)	Water Holding Capacity	1080 Minimum	

2.5 WETTING AGENT

A. The wetting agent used shall be potable water.

2.6 MULCH TIE DOWN FOR HYDROSEED SEEDING

- A. The mulch tie down shall consist of a standard tie down material as approved by the City during the material submittal process. The use of straw or hay is not permitted.

2.7 WEED KILLER

- A. The weed killer used shall be up to the Contractor and shall have as minimum of a residual time frame as possible. The rate of application shall be in strict accordance with the manufacturer directions as to use. Submittal required.

2.8 OTHER MATERIALS

- A. Landscape maintenance items and materials shall be furnished by the Contractor as required to complete the work of the specifications for normal maintenance requirements work items indicated.
- B. All products used in the performance of landscape maintenance operations shall meet industry standards for appropriateness and labeled by the EPA for its proposed use.
- C. All materials used for the repair, replacement or maintenance of site items (i.e. soil, fertilizers, tree base mulch, turf, etc.) shall conform to the quality and specifications of the original installation and these specifications.

PART 3: EXECUTION

3.1 TOPSOIL

- A. Prior to a 1-inch placement of topsoil on berm areas and any other disturbed or adjacent work areas to walks, trails, etc., apply a weed killer over any weed areas that maybe remaining, in strict accordance with manufacturer's recommendations, as required by City Representative.
- B. Seed Bed Preparation: The Contractor shall scarify and prepare a smooth uniform seedbed for all lawn areas. Prior to any topsoil placement, remove stones over one (1") inch in any dimension, sticks, rubbish and other extraneous matter from the seedbed. In all areas where there has been construction traffic and the seedbed has been compacted to any extent due to construction traffic, the top surface must be thoroughly loosened to allow penetration of air and moisture.
- C. The berm and disturbed lawn areas that have been prepared and shall be inspected by the City Representative as to proper sub grades. Once approved, the prepared lawn areas shall be covered with topsoil as called for in "Materials" of these Specifications, and the topsoil material shall be placed at a depth and thickness sufficient to meet finish grade requirements after compaction and settling to a level of natural soil compaction.

3.2 FINE GRADING

- A. Fine Grading: shall include the raking and leveling of the topsoil to a surface suitable for the installation of hydroseed seeding parallel to the required finished grade.
- B. Finished grades shall slope to drain, be free of depressions or other irregularities after thorough settlement and compaction of soil, and shall be uniform in slope between disturbed and non-disturbed areas.
- C. After fine grading of lawn area seedbed is complete, the Contractor shall notify City Representative at (628-2683) and receive field inspection and approval before hydroseeding is commenced.

3.3 EXECUTION OF HYDROSEED SEEDING OPERATION

- A. Inspection of fine graded lawn areas shall be as called for prior to installation of hydroseeding.
- B. Mixing
 - 1. The water, seed, fertilizer, mulch and mulch tie down material shall be added in the specified quantities to hydroseeding tank.
 - 2. All ingredients shall be thoroughly mixed by agitation until the ingredients form a uniform suspension.
- C. Protection: Prior to commencement of spraying operations, the Contractor shall protect all road, walks and walking trails, fencing, play areas or other existing features from the hydroseeding spray with polyethylene or other suitable materials and means. Any spray material, which should come in contact with one of the aforesaid items shall be thoroughly cleaned of the item as soon as possible preferably while still wet.
- D. Hydroseed Seeding Operation: The thoroughly mixed ingredients shall be carefully sprayed "heavily" onto the areas to be hydroseeded and onto any other areas damaged by the Contractor's operation at a minimum rate of 2200 lbs. per acre, in the presence of the City Representative. All debris shall be removed from the site upon completion.

3.4 LANDSCAPE MAINTENANCE WORK

The Contractor shall be responsible for performing regular and routine maintenance as required by the detail specifications in this section, and falling within the general requirements specific to seasonal maintenance indicated by the Season below: The work under this Section of the Specifications shall be line item (s) with in the Schedule of Values.

- A. Construction Period: The work to maintain the park shall start with the commencement of the contractors work on the site. The Contractor shall have full responsibility to fully maintain the portion of the park under construction throughout the Construction Period. All work applicable as described below shall be performed during the Construction Period.

The Construction Period activities shall conclude once the park work including the completion of all Punch List items of work and has been accepted in its entirety by the City.

- B. The watering of the hydro-seeded lawn area shall be by the Contractor's water truck, or if a City Fire Hydrant is used it must be via a all required City Permits issued by either the Detroit Water & Sewerage Dept. or Fire Department issued Permit and pumped out upon completion of its use. All cost for the Permit (s) shall be at the contractor's expense. The contractor shall supply all equipment and accessories to fully water all lawn areas requiring water.
- C. The Contractor, shall apply as necessary to eliminate weeds a weed and feed type of fertilizer application(s) so as to provide a basically weed free park lawn.
- D. Also included are the applications of fertilizing and weed controls, blow cleaning or sweeping of all paved surfaces,
- E. Water the lawn when and as frequently as dictated by the weather as necessary to fully maintain and establish the new turf areas as described within this specification.
- F. The Contractor shall perform all work necessary to provide and maintain healthy green new turf areas of the park free of weeds, bare spots or other damaged spots.
- G. A post-emergent (foliar applied) herbicide shall be applied if and as needed. Selection and proper use of herbicides shall be the Contractor's responsibility.

3.5 CLEANING

- A. The Contractor shall perform all necessary cleaning and removal of excess soil, debris, equipment, etc., during installation and upon completion of the work. Any damage resulting from seeding operations shall be immediately repaired by the Contractor without cost to the City.

* END OF SITE RESTORATION SECTION *

SECTION 02941

DEWATERING BEST MANAGEMENT PRACTICES

PART 1: GENERAL

1.1 DESCRIPTION

- A. The work included under this Section provides all necessary materials, labor, equipment, tools and supervision required for: meeting all MDEQ and ACOE Permit Requirements, preparing the dewatering location, placement of tarp, straw bales, rain event covering, removal and transportation to Class II Landfill, and documentation as noted on the Drawings and as noted in these Specifications.

1.2 MATERIALS AND INSPECTION

- A. All dewatering materials shall be subject to inspection and approval at the Contractor's yard or upon delivery to the job site for quality, condition, and overall appearance by the City Representative. At no time shall any approval impair the right of further inspection and rejection at the site during the progress of the work or contract life for failure to conform to the listed condition requirements. The Contractor shall promptly remove any rejected dewatering materials from the site.

1.3 MAINTENANCE OF DEWATERING SOILS

- A. The Contractor shall keep the dewatering soils as noted on the Drawings and as noted in these Specifications. The contractor shall make all allowance deemed necessary for the costs related to covering the soils when a rain event is expected in excess of one half inch.
- B. It is the responsibility of the Contractor to maintain the straw bales until their disposal.

1.4 CONTRACTOR QUALIFICATION

- 1. The Contractor shall have all appropriate Federal, State and local licenses to complete the dewatering and disposal of the soils to a Class II Landfill.

1.5 RELATED WORK SPECIFIED ELSEWHERE

- A. Scope of Work

1.6 STANDARDS

- A. Trained personnel using current, acceptable best management practices for dewatering shall perform all dewatering and transportation services.
- B. All work shall be performed in a manner, which maintains the original intent of the MDEQ/ACOE Permit(s), Drawings and Specifications.

- C. The Contractor shall ensure that employees are dressed in uniforms with company identification. All vehicles and equipment used to perform the dewatering for this contract shall be clearly marked with company identification.
- D. The City Representative shall have full authority to coordinate Contractor's responsibilities and interface with the Contractor in the regular performance of the contract work under this specification Section.
- E. The City Representative shall monitor the Contractor's performance under this contract using quality assurance procedures as may be necessary to ascertain contractor compliance with this contract.
- F. The Contractor shall give notice of their intended schedule in writing of the days and time when dewatering work will be going on and what is to be done for each day of work. A general schedule shall be submitted for this Section of work for City approval.
 - a. Dewatering site must be reviewed and approved one day prior to the dredging start date. Dewatering is to continue for six weeks. Following this date a meeting will be held on site to determine the condition of the soils as it relates to transportation to a Class II Landfill. If additional time is required than a new review date will be set.

1.7 SAFETY

- A. The Contractor shall maintain the work site free of hazards to persons and/or property resulting from his/her operations. Any hazardous condition noted by the Contractor, which is not a result of his operations, shall be immediately reported to the City's Representative.
 - 1. All operations shall be restricted to limits of work for this Contract.
 - 2. The Contractor shall not enter upon any adjacent property for the purpose of conducting any operations required under this contract.
 - 3. The Contractor shall so conduct his operations so as to offer the least possible obstruction and inconvenience to the public to include disruption of the noise levels within the areas. Work shall be conducted during normal business hours.

1.8 GENERAL SITE OBSERVATION

- A. The Contractor shall immediately report any damage, which has occurred to any site items such as pavement areas, walks, signage, surfacing, fencing, site amenities and plant materials, etc.
- B. In addition, the Contractor shall immediately notify the owner's representative of any damage due to vandalism and any other facilities not necessarily described herein, during his regular site visits to perform maintenance work.

1.9 APPROVALS

- A. Any work performed beyond these specifications, which is outlined herein shall only be done upon written approval by the owner or owner's representative. Work performed without written authorization, will be at the Contractors sole expense and done so at no additional costs to the City.

1.10 WORKMANSHIP

- A. During landscape maintenance operations, all areas shall be kept neat and clean. Precautions shall be taken to avoid damage to existing site elements. All work shall be performed in a safe manner to the operators, the occupants and any pedestrians.
- B. Upon completion of each site visit maintenance operations, all debris and waste materials shall be cleaned up and removed from the site, on site trash receptacles shall not be used to dispose of debris materials.
- C. The Contractor shall repair any damage to the landscape, paving, utilities caused by the Contractor without charge to the owner.

1.11 WARRANTY

- A. The Contractor shall make every effort to maintain dewatering areas. If any deviation from the MDEQ/ACOE Permit Requirements, the Drawings and/or as noted in these Specifications is noticed the contractor has 24 hours, regardless the time of the week, to make the repairs.

PART 2: MATERIALS

2.1 POLYPROPYLENE TARP

- A. The polypropylene tarp is to be approved nonporous heavy duty polypropylene tarp or approved equal.

2.2 STRAW BALE

- A. Approved standard straw bales are to be used.

PART 3: EXECUTION

3.1 GRADING

- A. The dewatering area is to be grading to provide a concaved area for the dredged soils to be placed. The low point of the area is to be approximately six inches. The location is to smooth so that the tarp cannot be punctured.

3.2 POLYPROPYLENE TRAP AND STRAW BALES

- A. Polypropylene trap is to be place so that there is at least two feet of tarp that can be placed between the two straw bales.
- B. Care must be taken not to cut, tear, or puncture the tarp. If there is any hole placed in the tarp the tarp is to be replaced at no additional cost to the City.
- C. The straw bales are to be placed as noted with the exterior one being watered down to allow it to swell and gain weight.
- D. After straw bales are completely installed, the Contractor shall notify City Representative at (313-475-5223) and receive field inspection and approval before dredging is commenced.
- E. Following approval placement of dredged soils can commence. However, care must be taken not to soils to build up more than one third the height of the straw bale.

3.3 RAIN EVENT COVERING

- A. The entire dewatering area is to be covered prior to an expected rain fall over one half inch. Following the rain fall event the covering is to be folded in half and rolled so that there will not be any contact of dredged soils to an individual or site. Store tarp off if it is appropriate to reuse or dispose of to a Class II Type Landfill for disposal. If tarp is disposed of, the contractor is responsible to supply new one(s) at no additional cost to the City.

3.4 PERIODIC INSPECTIONS

- A. The contractor is responsible for weekly inspections and inspections 24 hours after a quarter inch rain fall event. The area is to remain fenced off from the public. The contractor is to notify the City inspector of all visits and finding of those visits. The contractor must make all corrections within a 24 hour period or before the next expected rainfall, whichever comes first.

3.5 REMOVAL AND TRANSPORTATION

- A. The Contractor shall host an onsite meeting with the City Representative to review the site prior to soil removal. Following the approval, the contractor can, with extreme care not to puncture the tarp or have any dredged soils come in contact with the site, remove the soils, tarps, and straw bales and transport them to a Class II Type Landfill. Documentation is required from the Landfill to verify the proper disposal.

*** END OF DEWATERING BMP SECTION ***

SECTION 02990
LANDSCAPE GUARANTEE MAINTENANCE PERIOD

PART 1: GENERAL

1.1 SCOPE OF SERVICES

- A. The landscape work to be performed by the Contractor shall consist of furnishing all necessary materials, labor, equipment, tools and supervision required to properly execute the general maintenance of all plant materials or sod lawn replacements required for a period that will end not later than June 30, 2005.
- B. The Contractor shall be familiar with the project premises and how the existing conditions will affect the work.
- C. The work shall include in general, but not be limited to, the following Work:
 - 1. Construction Period Maintenance while Park is under construction,
 - 2. Plant Material Guarantee and Plant Bed Maintenance,
 - 3. Initial Lawn Maintenance and trash pick up,
 - 4. Lawn Watering and repairing, as required for turf establishment,
 - 5. Tree Staking, spraying, fertilization and pruning Maintenance,
 - 6. Fall and Spring Clean-up of plant beds
 - 7. Spring Plant Material replacements under the guarantee provisions,
 - 8. Call for final Inspection and acceptance.

1.2 STANDARDS

- A. Trained personnel using current, acceptable horticultural practices shall perform all landscape maintenance services.
- B. All work shall be performed in a manner, which maintains the original intent of the landscape design.
- C. All chemical applications shall be performed in accordance with current county, state, and federal law, utilizing EPA-approved materials and methods of application. These applications shall be performed under the supervision of a Licensed Certified Applicator.
- D. The Contractor shall ensure that employees are dressed in uniforms with company identification. All vehicles and equipment used to perform the site maintenance for this contract shall be clearly marked with company identification.

- E. The City Representative shall have full authority to coordinate Contractor's responsibilities and interface with the Contractor in the regular performance of the contract work under this specification Section.
- F. The City Representative shall monitor the Contractor's performance under this contract using quality assurance procedures as may be necessary to ascertain contractor compliance with this contract. The Contractor shall give notice of days and time when maintenance work will be going on and what is to be done for each day of work. A general schedule shall be submitted for this Section of work for City approval.

1.3 SAFETY

- A. The Contractor shall maintain all work sites free of hazards to persons and/or property resulting from his/her operations. Any hazardous condition noted by the Contractor, which is not a result of his operations, shall be immediately reported to the City's Representative.
 - 1. All operations shall be restricted to limits of work for this Contract.
 - 2. The Contractor shall not enter upon any adjacent property for the purpose of conducting any operations required under this contract unless the Contractor has obtained written permission from the City.
 - 3. The Contractor shall so conduct his operations so as to offer the least possible obstruction and inconvenience to the public to include disruption of the noise levels within the areas.

1.4 GENERAL SITE OBSERVATION

- A. The Contractor shall report any damage, which has occurred to any site items such as Shelter Building, pavement areas, walks, signage, play equipment or surfacing, fencing, site amenities and plant materials, etc.
- B. In addition, the Contractor shall immediately notify the owner's representative of any damage due to vandalism and any other facilities not necessarily described herein, during his regular site visits to perform maintenance work.

1.5 APPROVALS

- A. Any work performed beyond these specifications, which is outlined herein shall only be done upon written approval by the owner or owner's representative. Work performed without written authorization, will be at the Contractor's sole expense and done so at no additional costs to the City.
- B. All seasonal color selections, if not originally specified by the City Representative, shall be approved by the owner or owner's representative prior to ordering and installation.

1.6 WORKMANSHIP

- A. During landscape maintenance operations, all areas shall be kept neat and clean. Precautions shall be taken to avoid damage to existing site elements. All work shall be performed in a safe manner to the operators, the occupants and any pedestrians.
- B. Upon completion of each site visit maintenance operations, all debris and waste materials shall be cleaned up and removed from the site, on site trash receptacles shall not be used to dispose of debris materials. The sidewalk shall be edged monthly.
- C. Any damage to the landscape, paving or structures, utilities caused by the Contractor shall be repaired by the Contractor without charge to the owner.

1.7 WARRANTY

The Contractor shall make every effort to maintain the health and growth of all plant material and turf areas. The Contractor shall be responsible to guarantee for one year the plant materials and sod turf areas that were installed as part of the work.

PART 2: PRODUCTS

2.1 MATERIALS

- A. Landscape maintenance items and materials shall be furnished by the Contractor when called for in the specifications for normal maintenance requirements work items indicated below.
- B. All products used in the performance of landscape maintenance operations shall meet industry standards for appropriateness and labeled by the EPA for its proposed use.
- C. All materials used for the repair, replacement or maintenance of site items (i.e. plants, mulch, soil, fertilizers, sod turf, etc.) shall conform to the quality and specifications of the original installation.
- D. Refer to the Landscape Work Section of these specifications for the specification of various products not otherwise specified in this Section of the Work.

PART 3: EXECUTION

The Contractor shall be responsible for performing regular and routine maintenance as required by the detail specifications in this section, and falling within the general requirements specific to seasonal maintenance indicated by the Season below: The work under this Section of the Specifications shall be line item (s) with in the Schedule of Values.

3.1 CONSTRUCTION PERIOD

The work to Maintain the Park shall start with the commencement of the contractors work. The Contractor shall have full responsibility to fully maintain the Park throughout the Construction Period. All work applicable as described below under Spring D & E shall be preformed during the Construction Period. The Construction Period activities shall conclude once the Park Work including completion of all Punch List items of Work and has been accepted in its entirety by the City.

The watering of lawn area and plant material shall be by the. Contractors water truck, or. If the City Fire Hydrant is used it must be via a all required City Permits issued by either the Detroit Water & Sewerage Dept. or Fire Department issued Permit and pumped out upon completion of its use. All cost for the Permit (s) shall be at the contractor's expense.

A. Summer

1. Apply lawn fertilization of weed & feed type fertilizer to entire park lawn area
2. Selectively prune plants as needed
3. Eradicate weeds from planting beds as needed and apply Preen
4. Edge beds, walks and curbs monthly
5. Apply insect & disease Tree & Shrub application to all new plants
6. Selectively water the lawn where and as necessary to fully maintain and establish the new turf areas.

B. Fall

1. Apply lawn fertilization with early fall type fertilize to entire Park lawn area
2. Remove fallen leaves from site, as required in mid to late fall
3. Edge beds, walks and curbs once mid fall
4. Plant spring flowering bulbs as specified
5. Remove spent foliage on the following perennials (after first killing frost):
 - a. Hostas, Daylilies, Black Eyed Susan's etc.
6. Apply lawn fertilization with late fall type fertilize to entire Park lawn area

- #### **C. Winter - Monitor condition of site throughout winter for storm damage (for safety and aesthetics). Keep site clear of broken or unsafe branches, and other unsafe conditions.**

D. Early Spring

1. Rake/clean-out planting beds
2. Cut back all perennials left standing over winter
3. Selectively prune all winter damaged trees and shrubs
4. Apply a slow release fertilizer in early Spring to entire park lawn area
5. Edge beds, sidewalks and at curbs,
6. Apply weed killer to any areas at safety surfacing that require a treatment
7. Begin spot weed control in lawn area as needed
8. Mulch or Re mulch planting beds and trees per specifications

E. Late Spring

1. Apply a weed & feed type fertilizer in late Spring to entire park lawn area
2. Eradicate weeds from all planting beds
3. Edge beds as necessary
4. Plant seasonal annuals as specified
5. Fertilize plans as specified.

Note: Allow all other perennials to remain.

3.2 LAWN MAINTENANCE

- A. The work under this section includes mowing of entire park lawn areas until the fully completed contract work has been completed and accepted by the city, on no greater than a seven-day intervals. Also included are the applications of fertilizing and weed controls, blow cleaning or sweeping of all paved surfaces, lawn, plant bed and curb edging and trimming, and plant bed cultivation until at least the date of the dedication ceremony and park construction work has been completed and accepted by the City, which ever happens last.
- B. NOTE: the contract will not be responsible for any further mowing or normal trash pick-up operations of the park once the City has accepted the Work.
- C. The Contractor shall be expected to perform all work necessary to provide and maintain a healthy green park turf free of weeds, bare spots or other damaged spots.
- D. Prior to each mowing, all trash, liter, sticks and other unwanted debris shall be removed from lawns, plant beds and paved areas and disposed of off site by the contractor regardless of its source. Edge walks monthly.
- E. Lawn areas shall be maintained at a height of 2" to 2-1/2" throughout the mowing period described above. To insure a high quality cut, all mower blades shall be sharpened no less than once a week during the mowing period. Mowing heights shall be adjusted as necessary to adapt to seasonal and growth conditions.
- F. During the mowing period, all lawn areas shall be mowed every five to seven days or as weather conditions dictate, and as maybe approved in writing by the City.

- G. The mowing operation includes trimming around all obstacles, removal of excessive grass clippings and removing debris from all paved walks, curbs and other areas. **CAUTION:** weed eaters shall not be used around trees in the trunk areas. All trees smaller than 4" in caliper shall be outfitted with a 4" section of black perforated drain pipe to protect the tree bank from damage at its base.
- H. Edging of all sidewalks, curbs, and other paved areas shall be performed once every other mowing or monthly as needed. Debris from edging operations shall be removed and areas swept clean. Caution shall be used to avoid any flying debris.
- I. Fertilizer shall be applied to lawn areas based on existing turf varieties and if necessary a soil test to determine nutrient deficiencies (Contractor is responsible for soil testing). Fertilizer shall be a slow-release, granular form. The following applications shall act as standard for bidding purposes:
- | | | | |
|----|---------------------------------|----------|--------------|
| 1. | Early spring (Mar 15- April 15) | 28- 3- 3 | See I below: |
| 2. | Late spring (May 15 - June 15) | 12- 3- 3 | |
| 3. | Early fall (Sept. 15 -Oct. 15) | 25- 5- 5 | |
| 4. | Late fall (Nov. 15 - Dec. 15) | 10-18-10 | |
- J. A pre-emergent (soil applied) herbicide shall be applied in early spring (before weed growth) to control the growth of weeds.
- K. A post-emergent (foliar applied) herbicide shall be applied as needed. Selection and proper use of herbicides shall be the Contractor's responsibility.

3.3 IRRIGATION SYSTEM – See Irrigation section

3.4 PRUNING

- A. All ornamental trees, shrubs and perennials and or ground cover shall be pruned when appropriate to remove dead or damaged branches, develop the natural form of the plant and create the effect intended by the City Representative. All pruning and thinning of plants shall be done to retain their natural shapes, unless otherwise directed. (Do not prune shrubs into balls or other unnatural shapes).
- B. Branches and limbs obstructing the walks and paths, or causing an unsafe condition, shall be pruned.
- C. Existing Shade trees over 6-inch caliper are not part of this contract Work. Small berm shade trees are included as part of this contract maintenance work. The pruning work shall be performed by a Licensed Arborist.

3.5 FERTILIZING

- A. Contractor shall conduct regular soil tests and plant analysis to determine needs for plant fertilization.
- B. Trees - shall be fertilized with a slow-release, 10-6-4 analysis fertilizer at the rate of 3 lbs. per inch of trunk caliper once during the fall scheduled maintenance. In limited areas (where topdressing trees in lawn areas might over stimulate the turf), trees may be liquid fed by injecting fertilizer into the soil, following manufacturer's recommendations, in late fall or early winter (once/year).
- C. Shrubs and Ground Cover - shall be fertilized with a slow-release, 10-6-4 analysis fertilizer at the rate of 3 lbs. per 100 sq. ft. of bed area once in April.

3.6 INSECT AND DISEASE CONTROL

- A. The Contractor shall be responsible to monitor the site conditions on each visit to determine if any insect or disease problems exist on any plant material. The City's Representative must be informed promptly of any problems.
- B. The inspection for and any necessary chemical applications to control insects and diseases shall be included in the contract price.
- C. All chemical applications shall be performed in accordance with current county, state, and federal law, utilizing EPA-approved materials and methods of application, these applications shall be performed under the supervision of a licensed certified applicator.

3.7 MULCHING

- A. All tree and shrub beds will be prepared and mulched to a depth of 1-1/2 - 2" once in spring with top-quality mulch (required to meet original specifications). Bed preparation shall include removing all weeds, cultivating the soil or removing existing mulch, edging and applying a pre-emergent (soil applied) herbicide to inhibit the growth of future weeds. Mulch in excess of 2" to be removed from bed areas. Special care shall be taken in the mulching operation not to over-mulch or cover base of trees or shrubs.

3.8. WEEDING

- A. All beds shall be weeded on a continuous basis throughout the growing season to maintain a neat appearance at all times.
- B. Pre-emergent (soil applied) and post-emergent (foliar applied) herbicides shall be used where and when applicable.

3.8 TRASH REMOVAL

- A. The Contractor shall remove trash and debris from all areas of the site with each visit, ONLY during the Construction Period.

3.10 LEAF REMOVAL

- A. All fallen leaves shall be removed from the site in the fall. Fallen and blown leaves shall be removed from the site as necessary with final leaf removal during spring clean-up as necessary.

3.11 WINTER MAINTENANCE

- A. The site shall receive a general clean-up at least once during each of the winter months (January, February and March), clean-up includes, but is not limited to:
 1. Cleaning of walks and pavements of any debris. Snow removal is not included.
 2. Removing all trash and unwanted debris
 3. Raking mulch where necessary
 4. Inspection of grounds
 5. Pruning of trees and shrubs when needed from storm damage

3.12 PERENNIAL MAINTENANCE

- A. Cut all deciduous perennials flush to ground by the end of March (if not done the previous fall) to allow new growth to develop freely.
Note: Leave dried perennials shall be left standing all winter for their ornamental effect except, where specified, and as directed by City Representative.
- B. Starting May 1, fertilize monthly through July with a liquid fertilizer (i.e., Miracle-Gro, etc.) at manufacturer's recommended rate as required.
- C. Mulch perennials once in late spring (1" deep) and again in fall (1" deep).
- D. Inspect perennials on a regular basis for insect or disease problems.
- E. Keep perennial bed free of weeds.
- D. Pinch back perennials as necessary to make bushier plants.

3.13 MISCELLANEOUS

- A. All trees shall be mulched, both near time of Park re dedication day, and in the Spring of the following year.
- B. All dead or unhealthy plant material shall be replaced with like plant variety(s) as part of the plant guarantee, specified under the Landscape Section of these specifications.

3.14 UNIT OF MEASUREMENT

The unit of measurement and basis of payment for all work performed in this division shall be as called for in the approved Schedule of Values.

END OF LANDSCAPE GUARANTEE PERIOD SCOPE OF WORK

SECTION 03300
CONCRETE WORK

PART 1: GENERAL

1.1 DESCRIPTION

- A. In general, the work under this section consists of, but is not limited to the following items:
 - 1. Installation of indicated public sidewalks, park concrete walks, play area concrete curbing and fence line footings and maintenance strips as maybe called for on the drawings.
 - 2. Installation of called for concrete footings, pads for site amenities, horseshoe courts or prefabricated park shelter.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Summary of Work, Section 0100
- B. Measurement & Payment, Section 01025
- C. Alternates, Section 01100
- D. Clearing & Demolition, Section 02100
- E. Backstop Construction, Section 02811
- F. Chain Link Fencing & Gate, Section 02821
- G. Site Amenities, Section 02830
- H. Horseshoe Courts, Section 02875
- I. Prefabricated Park Shelter, Section 02875

1.3 REFERENCE SPECIFICATIONS

- A. City of Detroit "Standard Specifications for Paving and Related Construction," as amended to date, is incorporated by reference to applicable articles.
- B. The contractor shall maintain a copy of the above referenced document on the job site at all times.

1.4 TEST REQUIREMENTS

- A. The contractor shall obtain and pay for the services of a qualified independent testing laboratory, satisfactory to the City Representative.
- B. Two (2) test concrete cylinders shall be taken for each days pour on the footings and tested at 7 days and 28 days. Test cylinders shall be taken at the rate of 2 per 1500 square feet on the flatwork or 2 per day's pour which ever is greater.
- C. Test results shall be forwarded from the testing laboratory directly to City Representative and the contractor's (1 each, unless otherwise requested).

- D. Should any test results prove unsatisfactory, the Contractor shall provide at least two cores from the area, which failed to comply with the specifications at his cost.
- E. Failure of core results will require removal and replacement of areas failing to meet specifications entirely at the contractors cost including all associated delay costs.
- F. All testing costs are the contractor's responsibility and shall be included in the bid Proposal and as a line item within the Schedule of Values, billing breakdown.
- G. The contractor shall notify the City Representative and testing services 3 days prior to starting the various phases of the concrete work.

1.5 SUBMITTALS

- A. Submit concrete mix design and test results to be attained.
- B. Submit name of the independent Testing Company to be used on the project.
- C. Submit manufacturers literature for the curing compound and other accessories to be used.

PART II: MATERIALS (per City of Detroit Standard Specifications)

2.1 WATER, CEMENT, FINE AGGREGATE, COURSE AGGREGATE, ADMIXTURES

- A. Shall be as specified in Article 4.11 and 4.111 of the City of Detroit Standard Specifications.

2.2 CEMENT CONTENT

- A. Concrete strength shall be 4,000 psi at 28 days, with 6 percent \pm entrained air where exposed to weather. Mix designs shall have not less than 6.25 sacks of cement per cubic yard.

2.3 CURING MATERIALS

- A. Curing compound for all flatwork shall be per the City of Detroit Standard Specifications for clear compound.

2.4 EXPANSION JOINT MATERIAL

- A. Provide resilient and non-extruding type premolded bituminous impregnated fiberboard units complying with ASTM D1751, FS HH-F-341, Type 1 and AASHO M 213.

A. Provide one of the following products or approved equal:

1. Flexcell: Celotex Corporation.
2. Sonoflex Cane Fiber, Contec/Sonneborn
3. Crane Fiber 1390, A.C. Horn Company
4. Flex-lite, J & P Petroleum Products, Inc.
5. Fiber, W.R. Meadows, Inc
6. Flex-JT and Gray-Flex, Old North Mfg. Co., Inc.

2.5 CONTROL JOINTS

A. Shall be ¼-inch in width x 2-inches deep and saw cut within 24 hours of pour.

2.6 FORM RELEASE AGENTS

A. Shall be non-oil based materials, which will not stain or cause imperfections on the concrete surface.

2.7 FORMWORK

A. Shall be wood or steel of sufficient strength to resist springing during concrete placing operations and shall comply with ACI-347.

B. Shall be straight and free of warp. A form, which varies more than 1/8" in 10 feet in either vertical or horizontal directions, will not be permitted.

C. Wood forms shall be No. 2 common or better lumber, dressed on one side not less than 3" minimal thickness, and a width equal to not less than full depth of the concrete at the edge. Plywood shall not be less than 5-ply, 5/8-inch thick.

2.8 REINFORCEMENT

A. Re-steel: All reinforcing bars, and ties shall conform to ASTM A-615, Grade 60 as called for on the drawings. Steel wire shall comply with ASTM A-82.

B. Supports for reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcement in place shall be as indicated below:

1. Use of wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.
2. For slabs on grade use supports with sand plates or horizontal runners where base material will not support chair legs.

C. Welded wire fabric shall comply with ASTM A-185, and shall be in the sizes as called for on the drawings.

PART 3: EXECUTION

3.1 GENERAL

- A. Concrete shall not be placed during rain, sleet or snow. Surfaces shall be protected from damage from rain, sleet or snow.
- B. The contractor shall contact the City Representative prior to concrete installation. The City Representative will check the locations and staking or other marks for all concrete pad locations with contractor, in the field, prior to any excavation
- C. Cold Weather Requirements: These shall conform to ACI 306 and to the following:
 - 1. When air temperature is, or is expected to fall, below 40 degrees Fahrenheit, all water and aggregates shall be heated before mixing as necessary to obtain a mixture temperature of at least 60 degrees Fahrenheit, but not over 80 degrees Fahrenheit.
 - 2. Use of anti-freeze agents and chemical admixtures to accelerate setting during cold weather is not permitted.
 - 3. Frozen materials or materials containing ice shall not be used. All concrete, reinforcement, forms, fillers, and ground against which new concrete will be placed shall be free from frost.
 - 4. When air temperature is, or is expected to fall, below 40 degrees Fahrenheit, adequate means shall be provided for maintaining a temperature of not less than 70 degrees Fahrenheit for three (3) days or 50 degrees Fahrenheit for five (5) days in the area where concrete is being placed and after placing.
 - 5. Heating devices shall be oil-fired or butane blower-type with diffusers to spread heat uniformly. Temperature of air at surfaces of concrete shall not exceed 80 degrees Fahrenheit. Start heating units a sufficient time before placing concrete to warm forms and space. Heaters, if used, shall be attended at all times by the contractor.
 - 6. Rapid dry out of concrete due to overheating and sudden changes in temperature shall be avoided.
- D. Hot Weather Requirements: These shall conform to ACI 305 and to the following.
 - 1. Ingredients shall be cooled before mixing to maintain concrete temperature below 90 degrees Fahrenheit at time of placement.
 - 2. Wet forms thoroughly before placing concrete.

3. Concrete delivered to the site and allowed to overheat in the truck prior to placement are grounds for the loads rejection and shall be removed from the site at no cost to the City.
4. Concrete must be placed within one hour's time from point of batching at the concrete plant. Contractor shall schedule his pours accordingly.

3.2 REINFORCEMENT

- A. Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.
- B. Comply with the specified standards for details and methods or reinforcement placement and supports and as herein specified.
- C. Clean reinforcement to remove loose rust and mill scale, earth, and other materials, which reduce or destroy bond with concrete.
- D. Position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, and spacers as required. Placing, spacing tolerances and protection shall comply with the ACI-318.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh.
- F. Splices: Provide standard reinforcement splices by lapping ends, placing bars in contact and tightly wire tying.
- G. Examine the substrate, formwork and the conditions under which concrete reinforcement is to be placed, and correct conditions, which would prevent proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.3 INSTALLING FORMWORK

- A. Forms and screens shall be accurately set to the lines shown on the drawings and the contractor shall call the City Representative for review and approval, before proceeding.
- B. Securely stake formwork to prevent settlement or movement during placement of concrete.

- C. Forms shall remain in place until the concrete is safely self-supporting and shall be sufficiently strong and rigid to maintain the position, lines and planes shown on the drawings.
- D. Forms shall be thoroughly cleaned and oiled, as necessary, with non-staining oil before concrete is placed against them.
- E. Forms may be re-used provided strength is unimpaired during removal and all surfaces are thoroughly cleaned and reconditioned and all edges are true.
- F. Provide temporary bracing or shoring as required to fully insure the stability of the structure until the need no longer exists for their presence.

3.4 PREPARATION FOR CONCRETE PAVING

- A. Ensure surfaces against which concrete is to be placed are free from debris, loose materials, standing water, snow, ice and other deleterious substances.
- B. Remove standing water without washing over freshly deposited concrete.
- C. Formwork shall be complete, reinforcement placed and secured; embedded items installed, and work by other trades finished.
- D. Remove hardened concrete, debris, and foreign materials from the interior of formwork and form conveying equipment.
- E. Ensure that reinforcement and other embedded items are secured in position.
- F. Where concrete is placed on ground, all loose earth shall be removed and excavation shall be level. Concrete shall not be placed in water or on frozen or loosened ground.
- G. When the subgrade material is semi-porous and dry, immediately prior to placing concrete, sprinkle subgrade with water as required to eliminate suction.
- H. When the subgrade material is porous, seal the subgrade surface by covering the surface with either waterproof paper or polyethylene sheet of 4-mil thickness; this may also be used over semi-porous and dry subgrade surface in lieu of water sprinkling.

3.5 HANDLING AND STORAGE OF CONCRETE MATERIALS

- A. Shall be in accordance with Article 4.111.1 City of Detroit Standards.

3.6 CONCRETE PROPORTIONING AND MIXING

- A. Water per sack of cement, including moisture in the aggregate shall not exceed six gallons.
- B. The concrete mix designs shall have a minimum compressive strength of 4,000 psi at 28 days.
- C. The minimum cement content of this concrete shall be 6 1/4 standard 94-pound sacks of cement per cubic yard of concrete.
- D. Materials shall be accurately measured and thoroughly mixed until there is uniform distribution of materials and mass is uniform in color and homogeneous.
- E. The slump shall not exceed 3 1/2-inch.
- F. Air entraining shall comprise not less than 5% or more than 7% of its total concrete volume.
- G. Retempering is not accepted.
- H. Ready-mixed concrete may be used provided it is mixed and delivered in accordance with "Specifications for Ready Mixed Concrete," ASTM C-94 and provided it meets the requirements for air entrainment set forth herein.
- I. No frozen, cubed, or lump materials shall be used.

3.7 CONVEYING CONCRETE

- A. Concrete shall be handled from the mixer to the place of final deposit as rapidly and as practicable as possible by methods which will prevent separation, or loss of the ingredients, and in a manner which will assure that required quality of concrete is obtained.
- B. Conveying equipment and operations shall conform to applicable recommendations of ACI 304.
- C. Chutes shall be metal or metal lined. Maximum drop from chutes shall be three (3) feet. Minimum chute slope shall be 1:2 (vertical/horizontal).

3.8 PLACING CONCRETE

- A. Prior to placement, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work.
- B. Coordinate the installation of joint material with placement of forms and reinforcing steel.

- C. Comply with ACI 304.
- D. Deposit concrete continuously and as rapidly as practicable until the unit of operation is complete.
- E. Placing shall be so regulated that pressures of wet concrete shall not exceed those used in formwork design.
- F. Fill forms completely and take all precautions to prevent voids and surface defects. During and immediately after depositing the concrete, vibrate with suitable tools and equipment, and work it around the reinforcement, inserts, and into corners of forms to prevent voids, pockets or honeycombs. Tapping or other external vibration will not be allowed.

3.9 JOINTS

A. Expansion Joints

- 1. Shall be provided where required.
- 2. Shall be 1/2" thickness in general and run the full length of slab. Joint material shall be kept 1/2" below finish surface to allow for caulking.

B. Construction Joints

- 1. Provide construction joints as required to terminate pour.
- 2. Locate and install construction joints which are not shown on the drawings, so as not to impair the strength and appearance of the structure.
- 3. Provide keyways at least 1/2" deep in all construction joints in slabs.
- 4. Reinforcement shall continue through the joint.
- 5. A minimum of 24 hours shall elapse between previously placed and fresh concrete at construction joints.
- 6. Immediately before continuing concrete placing at a construction joint, concrete shall be roughened, thoroughly cleaned, dampened and spread with neat Portland cement grout.

C. Control Joints in Slabs

- 1. Control joints are to be saw cut as required after slab has been placed and should be at least a minimum of 1/3 the depth of the concrete slab and as indicated under 2.6 above for all 4-inch walks and other concrete work..
- 2. All sawed joints MUST BE SAWED within 24 hours of the pour, without exception.

3.10 FINISHING

- A. Concrete walking surfaces shall have a uniform broom finish in one direction.
- B. Edges shall be rounded with 1/4" radius. Such edging shall be carefully done to reduce an evenly round edge, true to both line and grade. Neat cement shall not be used as dryer to facilitate the surface finishing.

3.11 REMOVAL OF FORMS

- A. Formwork may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations and requirements of the item on Curing and protection and met.

3.12 REPAIR OF SURFACE DEFECTS

- A. Concrete work, which has not been installed as indicated on drawings or which is out of line or level, or has defective surfaces such as birdbaths, shall be considered not to conform to the intent of these Specifications and shall be promptly removed, unless the City Representative grants permission to otherwise repair defective areas. Permission to repair any special area shall not be considered a waiver of the City's right to require complete removal of the defective work if repairs do not satisfactorily restore quality and appearance of surface.
- B. Immediately after stripping forms, inspect surfaces, cut ties, remove fins or projections, fill tie holes and patch any honeycombed spots.
- C. Patching shall be done before concrete is thoroughly dry. Patching shall be with the same materials and proportions, as the concrete except coarse aggregate shall be omitted. On exposed work, white Portland cement shall be substituted for a part of grey cement to produce a color matching that of the surrounding concrete, as determined by a trial patch. Dampen the area to be patched. Add only enough water to permit working mortar into defects, strike off, and allow to set. Rub with Carborundum to bring surface to same texture, color, etc. as adjacent surfaces.

3.13 CURING

- A. All freshly placed concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for hydration and proper hardening.
- B. Horizontal flat surfaces and ramps shall have the curing compound material applied while the "green" concrete is still wet, yet hard enough to walk on. Contractor shall apply material in strict conformance to the manufacturer's specifications and time frame so as to keep concrete surface from prematurely drying out in accordance with the manufacturer's recommendations.

- C. Formed Surfaces: Steel forms heated by the sun and all wood forms shall be kept wet. If forms are to be removed during curing period, one of the above curing applications shall be employed immediately.
- D. Duration of Curing: Curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50 degrees Fahrenheit has totaled seven

(7) days. For high early-strength concrete, this total shall be three (3) days. Rapid drying at the end of the curing period shall be prevented.

3.14 PROTECTION

- A. During the curing period, concrete shall be protected from damage, particularly vandalism, load stress, shock, and excessive vibration.
- B. All surfaces shall be protected from damage caused by construction equipment, materials or methods, and by rain, water or defacement.
- C. All placed concrete shall be protected from damage from all causes. Sufficient covering material shall be kept available to protect the fresh concrete from pitting and washing in case of rain. No one shall be allowed to work on or otherwise disturb the concrete until it has thoroughly set. It is recommended that the contractor include all necessary costs to guard over freshly placed concrete for at least the first night. Defaced concrete must be replaced.
- D. Barricades and lights shall be provided to prevent traffic upon the concrete until it has developed sufficient strength to avoid damage.
- E. Any settlement, damages defacement or defects occurring in any portion of the work shall be repaired or that portion of the work replaced, as directed by City Representative prior to and as a condition of final acceptance.
- F. Protect concrete paving from pedestrian and construction traffic for a period of three (3) days after pouring, or until sufficiently strong enough to use.

3.15 GUARANTEE

- A. The contractor shall guarantee the concrete work for a period of two winters after installation. Any concrete work, which shows signs of spaulding, cracking or other defects, shall be repaired or replaced to the satisfaction of the City Representative at no cost to the City.
- B. The contractor shall provide a written warrantee letter dated on date of final acceptance by the City of the complete project work.

END OF CONCRETE WORK SECTION