Contract Documents

for

SAFETY RAILING AROUND TANKS

Calumet Water Reclamation Plant

Chicago, Illinois

Contract 15-265-3D

Metropolitan Water Reclamation District of Greater Chicago

Room 508, 100 East Erie Street

Chicago, Illinois 60611

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2016

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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

GENERAL CONDITIONS

Water Reclamation District Law

Article 1. The Contractor hereby agrees to carry on all the work provided for in this Contract in strict conformity with the requirements of the law under which the Metropolitan Water Reclamation District of Greater Chicago is organized, entitled "An Act to create Sanitary Districts and to remove obstructions from the Des Plaines and Illinois Rivers," approved May 29, 1889, in force July 1, 1889, and all acts amendatory thereof and supplementary thereto (70 ILCS 2605). The Contractor shall comply with the Illinois Human Rights Act, Art.2, 775 ILCS 5/2-101-5/2-105.

Laws, Ordinances, Permits and Taxes.

Article 2. The Contractor shall obtain all permits and certificates required by the municipalities within which the work is being performed, or which may be required by any governmental agency having proper jurisdiction, without additional expense to the Water Reclamation District, and shall strictly comply with all ordinances, statutes and regulations of the Water Reclamation District, the municipalities within which the work is being carried on, the State of Illinois, and the United States Government, and any governmental agency having proper jurisdiction, in any manner affecting the work hereunder or controlling or limiting in any way the actions of those engaged on work pertaining to this Contract.

The Contractor shall save and keep the Water Reclamation District harmless from any liability or expense incurred because of said permits, ordinances, statutes or regulations or violations thereto.

At the pre-construction meeting the Contractor will provide the Engineer with copies of all regulatory and environmental permits, approvals, certificates, and inspection fee receipts relative to the Illinois Environmental Protection Act. (415 ILCS 5/). Thereafter, new copies of these documents will be given to the Engineer within 24 hours of receipt.

As part of each monthly pay request an affidavit must be submitted to the Engineer attesting that all regulatory and environmental permits and licenses necessary to the Work are in place and being complied with. This submittal is a condition precedent to payment. Any citation or notice of an environmental violation will be forwarded to the Engineer by the most expeditious method possible.

The Water Reclamation District is not liable for the Illinois Retailer's Occupational Tax, the Service Occupation Tax, the Service Use Tax, or Transportation Tax. The Illinois Exemption Identification Number is indicated on the Proposal form of the Contract Document. No payment will be made for taxes from which the Water Reclamation District is exempt.

The parties agree that any lawsuit concerning this contract, its breach, or work done hereunder, shall be brought in the Circuit Court of Cook County, Illinois. The Contract (also referred to as "Agreement") will be construed under Illinois law, which will prevail in the event of any conflict of law.

Wage Rates/Employment

Article 3a. The Contractor shall comply with the Prevailing Wage Act, 820 ILCS 130/0.01 et. seq. Current prevailing wage rates for Cook County and/or Fulton County are determined by the Illinois Department of Labor. It is the responsibility of the Contractor to obtain and comply with any revisions to the rates should they change during the duration of the Contract.

Article 3b. The Contractor shall comply with Employment of Illinois Workers on Public Works Act, 30 ILCS 570/0.01 et. seq. The Act indicates that the level of unemployment in the State of Illinois is measured by the United States Bureau of Labor Statistics in its monthly publication of employment and unemployment figures. It is the responsibility of the Contractor to determine the level of unemployment in the State of Illinois, and to employ only Illinois laborers when required by the Act.

No additional compensation will be allowed the Contractor because of any delays or additional costs to the Contractor, or any subcontractor of the Contractor, in any way arising from or caused by appealing any decision of the Water Reclamation District or any

hearing in Court, or for any other delays or costs, any of which may have been occasioned by compliance on the part of the Water Reclamation District, the Contractor or any subcontractor of the Contractor, with the provisions of Acts, laws. Or statutes.

Approximate Quantities.

Article 4. It is expressly understood and agreed by the parties hereto that where quantities of various classes of work to be done and material to be furnished under this Contract have been established and stated in the approximate statement of quantities in the "Form of Proposal" attached hereto, said quantities are only approximate and are to be used solely for the purpose of comparing, on a uniform basis, the proposals offered for the work under this Contract. And the Contractor further agrees that the Water Reclamation District will not be held responsible if any of said quantities shall be found incorrect; and the Contractor will not make any claim for damages or for loss of profits or for an extension of time because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission, or misstatement shall be discovered in the said estimated quantities, the same shall not invalidate this Contract or release the Contractor from the execution and completion of the whole or any part of the work herein specified, to the satisfaction of the Engineer and in accordance with the specifications and plans and for the price or prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damages or compensation other than as specified in this Contract, except for such extra work as may be required, for the performance of which written orders must be given and received as herein specified.

Changes in Plans and Specifications.

Article 5. The Water Reclamation District reserves the right to make any changes in the specifications and plans which may be deemed necessary either before or after beginning any work under this Contract, without invalidating this Contract; provided that if alterations are made, the general character of the work as a whole is not changed thereby.

If such alterations increase the quantity of work to be done, where unit prices are specified, such increase shall be paid for according to the quantity of work actually done at the unit price specified under this Contract for each class of work performed. If such alterations diminish the quantity of work to be done, where unit prices are specified, they shall not constitute a claim for damages or for loss of profit on the work that may be dispensed with, and the Water Reclamation District shall not be required to pay for work or material omitted.

If such alterations increase the amount of work to be done, where lump sum prices are specified, such increase shall be paid for as an extra as provided in Articles 7 and 8. If such alterations or omissions diminish the amount of work to be done, where lump sum prices are specified, such alterations or omissions shall not constitute a claim for damages or for loss of profits on the work dispensed with, and the Water Reclamation District shall not be required to pay for work or material, omitted nor for any loss of anticipated profits on such omitted work. The value of any such work or material omitted will be determined by the Engineer from the balance statement submitted under Article 33, "Progress Payments and Reserves," or from an independent estimate prepared by the Engineer in accordance with Article 8, "Estimating Change Orders."

Where, however, such alterations involve the addition or omission of work to items where lump sum prices are specified, which can be properly classified and measured under appropriate unit price items of this Contract, the extra cost or the credit to be allowed will be based on said appropriate unit price items.

Construction conditions may require that minor changes be made in the location and installation of the work and equipment to be furnished and other work to be performed hereunder, and the Contractor, when ordered by the Engineer, shall make such adjustments and changes in said locations and work as may be necessary without additional charge, provided such adjustments and changes do not substantially alter the character, quantity or cost of the work as a whole, and provided further that plans and specifications showing such adjustments and changes are furnished the Contractor by the Water Reclamation District within a reasonable time before any work involving such adjustments and changes is begun. The Engineer shall be the sole judge of what constitutes a minor change for which no additional compensation shall be allowed.

In the event that any material is omitted, by order of the Engineer, which has been called for and furnished in accordance with the accompanying plans and specifications for use in the work under any item hereof, and has been delivered to or has been partially worked upon by the Contractor and for any reason will not be available at its full value for any purpose other than for use under this Contract, then, in that event, the Contractor shall be paid for only the actual cost of such omitted material, as so delivered, furnished or worked

upon, with fifteen (15) per cent of such cost added thereto, less the fair market value of such material as so delivered, furnished or worked upon, all as shall be determined by the Engineer.

Federal Regulations.

Article 6. For grant funded projects, all Federal regulations including labor standards, Copeland "Anti-Kickback" Act (18U.S.C.874), equal employment opportunity and access to work shall be in effect. These regulations appear in Appendix B in the contract documents and form a part thereof. In the event of a conflict between these Federal regulations and any other requirements in the Contract Documents, the Federal regulation shall apply, and the Contractor shall abide by their provisions.

In the event that a grant funded contract exceeds Ten Thousand Dollars ($10,000.00), then all the terms and conditions of the Affirmative Action Requirements shall be in effect. These requirements are included in the Contract Documents as APPENDIX C and form a part thereof.

Contingency- Engineering Capital Improvement Construction Projects-No Change in Scope

Article 6.5. A contingency allotment of up to 5% of the bid price for work to be performed on the Engineering Department's Capital Improvement Construction Projects may be added into the total Contract award. This contingency shall not be used for any change in the project scope contemplated by this Contract. This contingency will be used for unforeseen conditions and any additional work required to complete the original project scope described in this Contract. For work done within each such contingency, the Director of Engineering may authorize work in one or more occurrences, without approval of the Board of Commissioners, in an amount not to exceed One Hundred Thousand Dollars ($100,000.00) per occurrence. However, for all such work, the Contractor shall follow and be bound by the procedures, requirements, and conditions set forth below in Articles 7 and 8. Once the contingency is exhausted, only the Board of Commissioners may approve additional or extra work.

Change Orders - Extra Work.

Article 7. On all non-Engineering Department Capital Improvement Construction Project Contracts ,the Contractor shall perform such extra work as the Engineer may direct in his written order, provided that no extra work, the total price or cost of which is in excess of Ten Thousand Dollars ($10,000.00), shall be performed by the Contractor until the Engineer is authorized by the Board of Commissioners of said Water Reclamation District to issue a written order therefore, and shall have issued such written order.

All extra work shall be performed at such time as the Engineer directs. All claims for extra labor, rental of equipment or material furnished by the Contractor or for damages from any cause whatsoever, must be reported to the Engineer in writing within a reasonable time after such labor, equipment or material is furnished or such damages occur and they must in any event be presented to the Engineer in writing within thirty (30) days after the end of the month during which such extra work was performed or such damages occurred. Whenever so required, the Contractor shall deliver to the Engineer each day a signed statement of the claimed extra labor, equipment and material furnished during that day. The written order of the Engineer to the Contractor to perform any extra work therein mentioned, and the written notices and statements of the work performed herein above and hereinafter required from said Contractor, are conditions precedent to any recovery on the part of said Contractor for any extra work performed.

Whenever work is required to be done other than that which is now contemplated, and covered by the prices herein specified, the Engineer shall fix such prices for the work as he shall consider just and equitable, and the Contractor shall abide by such prices, provided he enters upon such work with a full knowledge of the prices so fixed by said Engineer; and if extra work, or other work than that provided for in this Contract, is performed by the Contractor before prices have been fixed for such work, then the Engineer shall estimate the same at such prices as he shall deem just and reasonable, and his decision shall be final and binding upon both parties to this Contract and the said Contractor shall accept such prices in full satisfaction of all demands against the Water Reclamation District for said extra work; provided, that, if the extra work done under this Contract is of such a nature, being distinct from other work being done by said Contractor, that the Engineer can determine the actual cost of the same, then the Contractor shall receive and the District shall pay, in full satisfaction for the same, the actual cost of the work as determined by the Engineer plus an amount not to exceed fifteen (15) percent added to labor items and ten (10) percent to material items to cover superintendence, overhead, and for profit, except as hereinafter provided in Article 8; provided further, that nothing shall be deemed extra work which in the opinion of the Engineer can be classified and measured or estimated under the provisions of this Contract, and

paid for at unit prices herein provided. No percentage shall be added to any unit or lump sum price specified or to any unit or lump sum price fixed by the Engineer for extra work performed by the Contractor.

Estimating Change Orders.

Article 8. It is further agreed that in all cases of question or dispute arising or growing out of this Contract in any way regarding the cost or value of extras, variations, allowances or deductions, or the amount of damages in any manner growing out of the violation of any of the provisions of this contract, or as to whether any materials furnished or work performed shall be classified and paid for as extra work, or shall be covered by the specified lump sum price, the decision of the Engineer shall be final and binding on both parties hereto.

In estimating the actual cost of either extra or deleted work, the cost of the labor, material and rental of equipment shall be included.

The Contractor, when so requested by the Engineer shall provide a detailed cost proposal for extra or deleted work conforming to the provisions of Articles 7 and 8 within fifteen calendar days of receipt of such request unless such period of time is extended in writing by the Engineer.

The cost of labor shall be taken as the amount paid for labor and foremen employed directly on the work as shown by the payrolls of the Contractor with the cost of Workmen's Compensation and Commercial General Liability insurance added when such can be shown to have been paid. To this total shall be added an amount not to exceed fifteen (15) per cent for superintendence, overhead and profit. The rates charged for labor shall in no case, however, exceed the rates paid by the Contractor for the same class of labor employed by him to perform work under the regular items of the Contract, plus such other additional and directly related costs as are actually and immediately incurred as a result of contractual, legal and/or State and Federal government requirements, and are a direct result of the work performed and pay calculations. No reimbursement shall be made for clerical expenses or the cost of preparation of payrolls or future payments or reserves.

The cost of material shall be actual cost delivered at the site of the work. To this cost shall be added an amount not to exceed ten (10) per cent for overhead and profit.

The rentals charged for equipment employed on extra work shall not exceed the usual rentals charged for the use of similar equipment of the same size and capacity in the region of work as determined by the Engineer. Such rental charges shall include the cost of necessary supplies and repairs for the proper operation and maintenance of such equipment.

Should equipment used on any extra work be located at or adjacent to the site of the work hereunder so as to be available for use on such extra work, no charge against the Water Reclamation District shall be made for any part of the cost of transporting such equipment either to or from the site of the work. If such equipment is not at the site of the work and is required for use for such extra work only, the cost of transporting such equipment to and from the site of the work, at the usual rates charged therefore in the region of work, shall be considered a part of the cost of such extra work. No allowance or any percentage will, however, be added to rental charges for equipment or to transportation charges on same.

No charge for the cost of administration, office overhead, field superintendence, bidding expense, bond or miscellaneous risk insurance will be allowed except as covered by the not-to-exceed allowances of fifteen (15) per cent added to labor items and (10) per cent to material items for superintendence, overhead and profit.

The cost of all credits to the Contract shall be estimated in the same manner as extra work and shall be computed in accordance with the methods herein specified.

If the extra work is being performed by a subcontractor, the Contractor shall be allowed an amount not to exceed ten (10) per cent of that subcontractor's expense to cover the overhead, supervision and profit of the Contractor hereunder. No allowance in excess of this ten (10) per cent shall be made for intermediate tier subcontractors. Said subcontractor's expense for the cost of labor, material and equipment employed by him on the extra work shall be based on rates not in excess of the rates paid for work of a similar character under regular items of the Contract and the cost shall be charged in complete accordance with methods herein specified.

The Contractor, if requested by the Engineer, shall exhibit to the Engineer and shall permit reproductions to be made by the Water Reclamation District of the actual bills for all materials used and the payrolls of all labor furnished and of all equipment used in performing such extra work, and, if requested by the Engineer, shall certify by his affidavit to the correctness of the amounts paid for material, labor and insurance, and rentals

shown on any extra bills presented by him to the Water Reclamation District.

Cost of Work.

Article 9. All books and accounts kept by the Contractor in connection with this Contract shall be open to the inspection of the Engineer or his authorized representative.

The Contractor shall furnish the Engineer reasonable facilities for obtaining such information as he may desire regarding the progress and execution of the work and the character of the materials including all information necessary to determine the cost of the work, such as the number of men employed, their pay, the time during which they have worked on the various classes of construction, the cost of repairs to machinery, and other information required by the Engineer. The Contractor shall, on request, furnish the Engineer with copies of receipts for transportation charges of all machinery, material and supplies shipped to or from work under this Contract.

The Contractor shall furnish daily to the Engineer a true copy of the daily record of his and his subcontractor's records of labor, material and equipment. This record shall be presented on a form approved by the Engineer and shall indicate a detailed breakdown for each item included in this Contract.

Night, Saturday, Sunday and Holiday Work.

Article 10. Whenever the Contractor shall be permitted or directed to perform work at night, or on Saturdays, Sundays or a holiday, or to vary the period of hours during which any work is carried on each day, he shall give at least 24 hours written notice to the Engineer so that proper inspection may be provided. Such work shall be done under regulations to be furnished in writing by the Engineer, and no extra compensation shall be allowed therefore, unless expressly provided for in the Detail Specifications.

Precautions.

Article 11. The Contractor shall take any precautions that may be necessary to render any portion of the work secure in every respect or to decrease the probability of accidents from any cause, or to avoid contingencies which are liable to delay the completion of the work. The Contractor shall furnish and install, subject to the approval of the Engineer, all necessary facilities to provide safe means of access to all points where work is being performed hereunder and make all necessary provisions to insure the safety of all persons during the performance of said work. The Contractor will be required to conduct his work so as not to obstruct or render dangerous public highways, bridges, railroads and navigable waterways.

Superintendence.

Article 12. The Contractor shall at all times have a competent foreman, superintendent or other representative on the work who shall have full authority to act for the Contractor and to receive and execute orders from the Engineer, who shall receive shipments of material to the Contractor, and who shall see that the work is executed in accordance with the specifications and plans and the orders of the Engineer hereunder.

Personnel.

Article 13. The Contractor shall employ competent forepersons and laborers, and shall remove from the Project, at the request of the Engineer, any incompetent or unfaithful persons in his employ. Only persons expert in their respective branches of work shall be employed where special skill is required; No person shall be employed on this contract unless they are a citizen of the United States, a national of the United States under Section 1401 of Title 8 of the United States Code, an alien lawfully admitted for permanent residence under Section 1101 of Title 8 of the United States Code, an individual who has been granted asylum under Section 1158 of Title 8 of the United States Code.(70 ILCS 2605/11.15), or an individual who is otherwise legally authorized to work in the United States.

Employees of any Contractor or subcontractor performing work on any of the premises of any of the facilities of the Water Reclamation District shall, at all times while so engaged, wear attached to their outer garment, so as to be promptly distinguishable, a colored button or badge bearing the name of the Contractor or subcontractor and the number assigned by the employer to each such employee.

Before starting work on any project on the premises of the Water Reclamation District, the employer shall furnish to the Engineer of the Water Reclamation District a list of the employees to be engaged on such work, with their respective assigned number. The color and size of said button or badge shall be approved by the Engineer.

The Contractor will actively co-operate with the District's Police in security efforts as the Department of Homeland Security's threat level may indicate. As a minimum the Contractor will provide the District Police

office with copies of all employee's and subcontractor's employee's drivers licenses.

Sanitation.

Article 14. The Contractor shall enforce among his employees such regulations in regard to cleanliness and the disposal of garbage and wastes as shall be conducive to their health, and tend to prevent the inception and spread of contagious and infectious disease among them, and shall provide an ample supply of suitable pure drinking water, and shall take such means as the Engineer may direct to effectively prevent the creation of a nuisance on any part of the site or adjacent streets or property. Necessary sanitary conveniences for the use of the laborers on the work, properly secluded from public observation, shall be constructed and maintained by the Contractor in such manner and at such points as shall be approved, and their use shall be strictly enforced.

Patents.

Article 15. Contractor hereby agrees to defend, at his own expense, the Water Reclamation District, and indemnify and hold and save it harmless in any suit or action brought against the Water Reclamation District for alleged infringement of any patents relating to any material, machinery, devices, equipment, apparatus, or processes furnished, used or installed by said Contractor, and the Contractor shall pay any and all expenses including attorneys' fees, costs, damages, judgments or awards, and satisfy any and all liabilities which may arise against said Water Reclamation District on account thereof.

The Water Reclamation District shall promptly notify the Contractor in writing of the filing of any such suit or action and give such needed information and assistance as may be within its control.

The Contractor agrees that in the event he shall fail or refuse to so defend the Water Reclamation District as herein provided, the Water Reclamation District may do so and collect from the Contractor any and all attorneys' fees, costs and other expenses, including any judgments and awards, and in such case the Water Reclamation District shall have the right to retain, from any sums of money due or to become due to the Contractor, sufficient funds to so reimburse it.

If the Contractor utilized any material, machinery, device, equipment, apparatus or process covered by a patent, the Contractor shall submit to the District written proof of a valid, current license under the patent prior to commencing work.

It is understood that the obligations imposed on said Contractor by this Article 15 shall not apply to claims for infringements of patents on the processes of treatment of sewage and sludge generally used in the project for which the work under this Contract is a part.

Damages and Indemnity.

Article 16. The Contractor covenants and agrees that he shall be solely responsible for and will pay for injuries, deaths, loss, damages, claims, patent claims, suits, liabilities, judgments, costs and expenses, which may in anywise accrue against the Water Reclamation District, its commissioners, officers, agents and employees, arising out of or in consequences of the performance of this work by the Contractor, or which may in anywise result therefrom.

The Contractor hereby agrees to defend, indemnify and hold harmless the Water Reclamation District, its commissioners, officers, agents and employees, against all injuries, deaths, loss, damages, claims, patent claims, suits, liabilities, judgments, costs and expenses, which may in anywise accrue against the Water Reclamation District, its commissioners, officers, agents and employees, arising out of or in consequence of the performance of this work by the Contractor, or which may in anywise result therefrom, and the Contractor shall, at his own expense, appear, defend and pay all charges of attorneys and all costs and other expenses arising therefrom or incurred in connection therewith, and, if any judgment shall be rendered against the Water Reclamation District, its commissioners, officers, agents and employees, in any such action, the Contractor shall, at his own expense, satisfy and discharge the same. The Contractor expressly understands and agrees that any performance bond or insurance protection required by this Contract or otherwise provided by Contractor shall in no way limit this responsibility to indemnify, keep and save harmless and defend the Water Reclamation District, its commissioners, officers, agents and employees, as herein provided.

The Contractor further agrees that so much of the money due him under and by virtue of this Contract, as shall be considered necessary by the Board of Commissioners of the Water Reclamation District, may be retained by the Water Reclamation District to protect itself against loss until such claims, suits or judgments shall have been settled, and evidence to that effect shall

have been furnished to the satisfaction of the Board of Commissioners of the Water Reclamation District.

Insurance.

Article 17. The Contractor, at his sole expense and prior to engaging upon the work agreed to be done, shall procure, maintain and keep in force during the entire term of the Contract such required insurance as specified below. The specific type(s) and amount(s) of coverage for this Contract are specified in the Detail Specifications.

(A) Completed Value Builder's Risk in the sum of 100% of the amount of the Contract, including subsequent modifications thereto. Such insurance shall be provided on an "all risk" (including flood and earthquake) and replacement cost basis. This insurance shall be maintained until final acceptance of the work by the Water Reclamation District. The Metropolitan Water Reclamation District of Greater Chicago shall be designated as the named insured.

(B) Statutory coverage as provided for in the Workmen's Compensation Act and Occupational Diseases Act of the State of Illinois, and Employers' Liability coverage, in the minimal acceptable limits indicated in the Detail Specifications.

(C) Commercial General Liability on an "occurrence form" in which the Contractor is the named insured. Such insurance shall provide coverage for bodily injury, personal injury, property damage, premises and operations, explosion, collapse and underground hazards, products and completed operations, contractual liability, independent contractors, broad form property damage (including products and completed operations), and liability arising from the "Illinois Structural Work Act." and its successors The Metropolitan Water Reclamation District of Greater Chicago, its commissioners, officers, agents and employees shall be included as additional insureds, with coverage no more restrictive than Insurance Services Office (ISO) Form Number CG 2009.

(D) Business Auto Liability in which the Contractor is the named insured for liability arising from the ownership, maintenance or use of owned, hired and non-owned vehicles, including coverage for contractual liability. The Metropolitan Water Reclamation District of Greater Chicago, its commissioners, officers, agents and employees shall be included as additional insureds.

(E) Professional Liability Errors and Omissions Liability in which the Contractor is a named insured for liability arising from acts, errors or omissions of the Contractor and its subcontractors.

(F) Environmental Impairment Liability in which the Contractor is a named insured for liability arising from bodily injury, property damage and environmental clean-up. If the Contractor uses vehicles to transport hazardous materials, such insurance shall also apply to accidents during transportation. The Metropolitan Water Reclamation District of Greater Chicago, its commissioners, officers, agents and employees shall be included as additional insureds.

The insurance required herein shall be maintained during the entire course of the Contract, except Commercial General Liability, Professional Errors and Omissions Liability, and Environmental Impairment Liability insurance (if required) which shall be maintained for one (1) year following final acceptance.

Any deductibles or other forms of retention set forth in Contractor's insurance policies are the responsibility of the Contractor. All deductibles and self-insured retentions are subject to the approval of the Water Reclamation District.

Prior to being permitted to engage upon the work, the Contractor shall furnish unto the Water Reclamation District certificates which evidence the required insurance, original insurance policies or certified copies of the insurance policies. If coverage is evidenced by certificates of insurance, the Contractor must provide the actual insurance policies or certified copies thereof within sixty (60) days after the starting date of the Contract. Unless otherwise agreed to in writing by the District, the insurer(s) providing the required insurance shall be licensed in Illinois and shall be rated A-, Class VII or better in the most recent edition of Best's Key Rating Guide.

Not less than two weeks before the expiration of any insurance coverage required by the Contract, the Contractor must provide certificates which evidence renewal or continuation of the required insurance policies or certified copies of such insurance policies. If renewal of coverage is evidenced by certificates of insurance, the Contractor must provide the actual insurance polices or certified copies thereof within (60) days of the expiration of coverage.

Upon failure to provide such evidence of coverage and/or policies or certified copies of insurance within the time periods required, the District may direct the Contractor to cease all operations until the required documents have been provided to the District. Such certificates of insurance and insurance policies must be accompanied by any required additional insured

endorsements, and provide that coverage may not be canceled, non-renewed, or materially reduced without providing thirty (30) days advance written notice by the insurer(s) to the Water Reclamation District. All certificates of insurance, insurance policies and the insurance companies providing the coverage required herein are subject to the approval of the Water Reclamation District.

Responsibility of Contractor and Execution of Work.

Article 18. The Contractor shall be responsible for the entire work until completed and accepted by the Water Reclamation District. The Contractor shall give his personal attention to the fulfillment of this Contract and to the execution of the work. He shall keep the same under his control, and shall not sublet any part of it, except as hereinafter specified. The Water Reclamation District will not recognize any parties engaged on the work covered by this Contract other than the Contractor and his employees.

No assignment by the Contractor of any construction contract, or any part or rights thereof, or of the funds to be received by the Contractor, will be recognized by the Water Reclamation District unless such assignment has had the prior approval of the Director of Procurement and Materials Management and the consent of the Surety.

No assignment will receive approval unless the instrument of assignment contains a clause to the effect that it is agreed that the funds to be paid the assignee under the assignment are subject to a prior lien for services rendered or materials supplied for the performance of the work called for in said Contract in favor of all persons, firms or corporations rendering such services or supplying such materials.

In case the Contractor, by his own acts or the acts of any person or persons in his employ shall unnecessarily delay, in the opinion of the Engineer, the work of the Water Reclamation District or other contractors by not properly cooperating with them, or affording them sufficient opportunity or facilities to perform work, as hereinbefore specified, the Contractor shall, in that case, pay all costs and expenses incurred by such parties, due to any such delays, and hereby authorizes the Water Reclamation District to deduct the amount of such costs and expenses from any sums of money due or to become due the Contractor under this Contract. The Engineer shall decide the extent of such delay or delays and amount of such costs and expenses and his decision shall be final and binding upon both parties to this Contract. Nothing contained in the paragraph shall, however, relieve the Contractor from any liability or damages resulting to the Water Reclamation District on account of such delay or delays.

Subletting Work.

Article 19. The Contractor shall not sublet any part of said work to any entity that is not competent, experienced and financially able to properly carry out and execute the same. The Contractor will not exceed the limits on the portion of the Work sublet, either in aggregate or individually, as identified in the bid documents and Contract It is further agreed that such subletting shall not directly or indirectly release or modify the responsibility of the Contractor for the satisfactory completion of all said work, and that the Water Reclamation District shall not be liable to any subcontractor for any lien on the sums of money due or to become due to the Contractor or for any other lien, claim or damages whatsoever. In case any party or parties, to whom any work under this Contract shall have been sublet, shall disregard the directions of the Engineer or his duly authorized representatives, or shall furnish any unsatisfactory work, or shall fail or refuse in any way to conform to any of the conditions of this Contract, then in that case, upon the written order of the Engineer, the Contractor shall require said party or parties in default to discontinue work under this Contract. Any defective work done by any such subcontractor shall be replaced by work which is satisfactory to the Engineer.

Liens.

Article 20. If at any time during the progress of said work the Contractor shall fail or neglect to pay for any labor performed, material furnished, or tools, machinery, appliances, fuel, provisions or supplies of any sort or kind used or consumed in, upon, or on account of said work, for ten (10) days after payment for same shall become due, then the Water Reclamation District shall have the power to pay such indebtedness, and the amount so paid shall be retained out of the money due or to become due the Contractor. The Water Reclamation District may refuse to make the payment hereinafter specified to the extent of such indebtedness until satisfactory evidence in writing has been furnished that said indebtedness has been discharged. In any such case the Director of Procurement and Materials Management is hereby authorized and empowered by said Contractor to ascertain the amount due or owing from the Contractor to any laborer or laborers, or to any person or persons, or corporations, for labor, equipment, material, tools, machinery, appliances, fuel, provisions or supplies of any sort or kind consumed upon, in or on account of the

work covered by this Contract in such manner and upon such proofs as Director of Procurement and Materials Management may deem sufficient.

Cooperation.

Article 21. It is understood and agreed that all work shall be executed in such manner and in such order as will permit the commencement and carrying on of work of the Water Reclamation District and of other contractors engaged in work on the same site, which may be prosecuted at the same time, with the least interference possible under a reasonable procedure whenever it is necessary or desirable to prosecute said work, either simultaneously with the work under this Contract or otherwise. To this end the Contractor shall cooperate with and assist the Water Reclamation District and other contractors engaged in work on the same site in every reasonable way and shall interfere as little as possible with their work. The Contractor shall so arrange his work, plant (stationary construction equipment directly used in the prosecution of the Work) and equipment that work of the Water Reclamation District and of other contractors for the Water Reclamation District shall be kept accessible at any time and can be performed without unnecessary or unreasonable expense on account of the work, plant or equipment of the Contractor hereunder. The Contractor shall move, free of charge, his plant and equipment or any part of the same whenever the Engineer shall consider it reasonable and necessary for the work of the Water Reclamation District or other contractors. The Contractor, when requested by the Engineer, shall also furnish the Water Reclamation District and other contractors with material and with the use of plant and equipment of the Contractor at reasonable rates therefore, whenever, in the opinion of the Engineer, such use of such plant and equipment will not unreasonably delay or interfere with the work under this Contract.

The Contractor shall not be entitled to any damages or anticipated profits on work deleted or extra compensation from the Water Reclamation District on account of any work performed by the Water Reclamation District, or other contractors, that is contemplated in the specifications or on the plans or that is necessary for carrying on or completing or that in any way affects the work under this Contract, provided that such work of the Water Reclamation District and other contractors, in the opinion of the Engineer, is performed in a proper and expeditious, or a necessary manner. The Engineer shall decide all questions between the Contractor and the Water Reclamation District or other contractors, and the order of carrying on the work shall always be subject to the Engineer's direction and approval.

Time and Progress Requirements.

Article 22. It is understood and agreed that TIME is of the essence in this Contract. The Contractor agrees to begin the work covered by this Contract on the day after approval of the Contractor's bond, unless specifically specified otherwise, to prosecute the work with all due diligence, and to complete the work within the time(s) stated in the Agreement. The Contractor shall provide sufficient labor, material and equipment as may be necessary to fulfill the Contractor's obligations with respect to these time and progress requirements.

If the rate of progress of the Contractor is less than necessary to insure completion of the work to the extent specified within the time or times specified in the Agreement, then the Water Reclamation District may withhold the monthly payments herein specified, until such time as the rate of progress is such, in the opinion of the Engineer, as to comply with the requirements of said Agreement.

The word "deliver" as used in this Contract shall be understood to mean delivery f.o.b. cars or trucks at the specified job site, including unloading, unless otherwise specified.

Work Schedule and Execution of Work.

Article 23. The computer generated “As-Planned” Work Schedule and Quarterly Revisions to the Work Schedule shall be submitted on a computer disk in the appropriate format. For Engineering Department contracts, the Contractor's planning, scheduling and execution of the work shall be disclosed to the District, unless otherwise directed by the Engineer, by submittal of a computer generated "As-Planned" Work Schedule prepared by the critical path method, quarterly computer generated revisions to the Work Schedule, and Monthly Work Plans. The Contractor shall utilize Primavera Project Planer P3, or Primavera for all Work Schedule preparation and submittals unless otherwise allowed by the Engineer.

The Work Schedule shall be comprised of CPM diagrams, activity reports and schedule narratives. The Work Schedule shall at all times be consistent with the Contractor's overall approach and plan for completing the work. The Work Schedule shall be employed to report progress or schedule recovery actions, to evaluate requests for partial payments, and to justify requests for extensions of time.

The Work Schedule shall: a) show the sequencing of Activities with which the Contractor intends to accomplish the work or work remaining; b) anticipate events or site conditions that may in any manner affect the schedule; c) reflect the means, methods, techniques, sequences, and procedures of construction chosen by the Contractor; d) divide the work into Activities such that the progression from commencement to completion of the work is clearly defined and separable by site-related work; e) indicate items of materials or equipment, including allowances for the resubmittal and re-review of complex shop drawings; f) indicate items of interface with work performed by other parties; g) indicate specified construction start-up, training, operation tests, punchlist activities and final clean-up; and h) highlight all significant activities related to performance that must be reviewed, and approved, or executed by the District.

Site-related activities shall not combine work located in separate structures or distinct areas or differing elevations within a structure, work corresponding to different Sections of the Specifications, work performed by different subcontractors (first and second tiers), or rough-in and finish work of the same trade. Unless otherwise specified, a site-related activity shall span forty (40) working days or less. Other activities shall be at a level of detail compatible with that for site-related activities.

After checking and verifying that the Work Schedule is responsive to the requirements of this Article 23, the Contractor shall deliver to the Engineer two (2) copies signed by the Contractor and, when requested by the Engineer, a copy of the Work Schedule on a computer disk. Such submittal shall include a written representation to the District that the Contractor has determined and verified all data on that Work Schedule and assumes full responsibility for it, and that the Contractor, subcontractors and suppliers have reviewed and coordinated the activities and sequences in the Work Schedule with the requirements of the Contract Documents.

The Contractor's obligations to plan, schedule, or execute the work in accordance with the Contract Documents will not be changed by the Engineer's review of any Work Schedule submittals or his decision to raise or not to raise any objections about such submittals. Neither the Contractor, subcontractors, suppliers nor any other parties shall in any way become third-party beneficiaries of the Work Schedule reviews by the Engineer.

Maintenance of Schedule.

The Contractor shall promptly undertake appropriate action to get back on schedule whenever he fails to complete activities within the late dates or when his rate of progress is less than that necessary to complete the work within the time limits of the Contract when due to acts or events under his control. After falling behind his schedule, and unless otherwise directed by the Engineer, the Contractor shall submit a written recovery statement with the next payment request or on the date such pay request is due if a pay request is not being submitted at such time.

The recovery statement shall describe the cause for the delayed progress and the actions planned by the Contractor to recover schedule. Appropriate schedule recovery actions may include, but not be limited to, assignment of additional labor, subcontractors, or equipment, shift or overtime work, expediting of submittals or deliveries, or any combination of the foregoing.

Refusal, failure, or neglect by the Contractor to take appropriate recovery action or submit a recovery statement when required as specified herein shall constitute reasonable evidence that the Contractor is not prosecuting the work with all due diligence, and shall represent sufficient basis for the Engineer to increase retention monies by an amount equal to the amount of potential liquidated damages.

The Contractor shall not be entitled to any compensation or damages from the District on account of any action undertaken by the Contractor to prevent or mitigate any avoidable delay or by the District's determination to increase retention monies.

Use of Float.

Total Float and Contract Float, whether or not expressly disclosed in the Work Schedule, are not for the exclusive benefit of the Contractor or the District, and shall be available to both the District and the Contractor, to accommodate delays, however caused, which extend performance or completion of all or any part of the work, subject to the following paragraph.

Total Float and Contract Float will be available to the Engineer to effect proper interfacing of work performed by the District or other parties, to accommodate the performance of work added by change orders, or to mitigate any other unavoidable delays.

CPM Diagrams and Schedule Narratives.

The charts depicting the Work Schedule in graphic form shall be based on the precedence network (PDM)

format and shall be plotted on a time-scaled calendar on standard size drawings. CPM diagrams shall expressly identify all activities and restraints or relationships between activities, the Contract's start and completion dates, and the critical path(s). Activities shall be shown on their early dates with their Total Float times noted beside them. Activity descriptive data shall include activity code, activity description fully conveying the work included, and special codes. The use of start or finish restraint dates shall be annotated as to the basis for the chosen restraints. Connections or restraints between activities, whether on the same or different sheets, shall identify predecessor and successor work.

Schedule narratives shall summarize the Contractor's analysis of the Work Schedule being submitted and highlight important or key aspects regarding the Contract work. As a minimum, the schedule narratives shall, where applicable, a) compare current late dates to those in the "As-Planned" Work Schedule; b) discuss the progress accomplished since the previous Work Schedule submittal; c) identify any assumptions made in incorporating work activities for approved change orders; d) include any schedule recovery statements, when applicable; e) itemize separately those activities which have been completed, including actual durations, those activities which have been partially completed, those activities which have been added or deleted, and all additions/deletions or modifications to relationships between activities.

Activity Reports

The activity reports shall include for each activity: code; description; duration in work days; computed early and late dates, in calendar format; Total Float; and special codes. Additional data on incomplete or completed activities shall consist of actual start/completion dates, actual or remaining activity durations, and percent complete. The computations of early and late dates shall be based on a calendar recognizing legal holidays and the limitations of work during hours other than normal working hours. Completion of the Contract work within the time limits stated in the Agreement shall be set as a restrained late date. The date of commencement of work under the Contract shall be set as a restrained early date. Activity reports to be provided with each submittal of the Work Schedule shall include specific tabulations, as follows:

a) Activities in order of ascending activity codes;

b) Activities in order of ascending Total Float values and within the same Total Float values by ascending early start dates and by ascending codes within equal early start dates;

c) Activities in order of ascending early start dates, and by ascending codes within equal early start dates, and

d) Activities in ascending late finish dates, and by ascending codes within the same late finish dates.

If the CPM diagram is based on the precedence format, a report shall be provided showing for each activity a listing of its preceding and succeeding activities, the relationship type and the associated lead times.

"As-Planned" Work Schedule

The Contractor's first Work Schedule submittal is to be identified as the "As-Planned" Work Schedule and shall consist of charts (one copy on size D or E sheets, one copy on reproducible media when requested by the Engineer) highlighting the critical path(s) sequences of work, specific Activity reports, and a supporting schedule narrative. Also an electronic copy of the CPM files comprising the "As-Planned" scheduled capable of being fully restored by Primavera will be submitted. The "As-Planned" Work Schedule submittal shall become due within thirty (30) calendar days after the approval of the Contractor's bond.

The "As-Planned" Work Schedule submittal shall only reflect the work as awarded and shall exclude any substitute means, methods, techniques, sequences, or procedures of construction, even if the Contractor elects to pursue a substitution. Incorporation of any such substitutions into the Work Schedule shall not be made unless approved by the Engineer pursuant to the requirements in the contract documents and not before the "As-Planned" Work Schedule has been finalized.

If a resubmittal of the "As-Planned" Work Schedule is required, the Contractor shall respond within fifteen (15) calendar days. Once the Contractor is advised in writing that the "As-Planned" schedule submitted does not require further revision it will be considered as the official "As-Planned" Work Schedule and, as such, becomes the basis for (a) the monitoring of the Contractor's progress against the time limits of the Contract, and (b) the evaluation and reconciliation of extensions of time.

Revisions to the Work Schedule

Four (4) months after approval of the Contractor's bond and every three (3) months thereafter, the

Contractor shall submit a newly updated and revised work schedule submittal labeled as Revision 1, Revision 2, etc. Each quarterly submittal of the revised Work Schedule shall include, in addition to the information required for the "As-Planned" Work Schedule, the actual start/completion dates and actual activity durations for work completed to-date and actual start dates and/or remaining durations for uncompleted work. The Contractor shall also incorporate activities associated with approved change orders issued since the previous submittal. The Contractor is also required to submit a final "As-Built" Work Schedule upon completion of all work and prior to final payment.

Work Schedule Revisions shall include any changes in construction sequences, any prior errors and/or omissions, and any changes required to recover schedule, so that the Work Schedule stays current with the Contractor's newly updated chosen plan for performing and finishing the work remaining, or to recover schedule.

If a partial or complete resubmittal is required, the Contractor shall respond within fifteen (15) calendar days. Once the Contractor is advised in writing that the revised submittal or resubmittal does not require further revision, it shall represent the most current Work Schedule for the work as of the date of the submittal and shall be the basis for the monitoring, measurement and verification of the Contractor's performance and progress.

Monthly Work Plan Requirements

Each month, the Contractor's next month's scheduling of the work shall be disclosed in significant detail by means of a Monthly Work Plan (MWP). These submittals may be in CPM or barchart form and shall be submitted directly to the Resident Engineer.

The first MWP submittal shall become due prior to the start of field work. Subsequent submittals shall become due with the monthly pay request or on the date such pay request is due if a pay request is not being submitted at such time.

The MWP shall break down the related Work Schedule activities into more detailed activities as necessary to clearly identify all individual parts of the work involved and activities or events which may in any manner affect the progress of the Contractor for the period covered by the plan. The activities represented on the MWP shall indicate to which Work Schedule activity they are related, indicate all manpower requirements with specific crews (whether engaged in erection, installation, testing, or punchlist activities) planned per activity, and planned major equipment usage. MWP submittals shall not combine work of different subcontractors, nor work associated with different Sections of the General and Detailed Specifications. MWP submittals shall also include at a level of detail correlated to the site-related activities, items related to the preparation, submittal, fabrication, delivery, receipt and inspection, and storage of materials and equipment. All site-related activities represented on the plan shall span fifteen (15) working days or less. If resubmittals are required, the Contractor shall respond within five (5) calendar days thereafter.

Compliance with Submittal Requirements

It is understood and agreed that the Contractor has included in the price or prices stated in the Agreement all costs in connection with the responsibilities and obligations specified in this Article, however incurred. It is further understood and agreed that the specified mobilization amount will not be released until a responsive "As-Planned" Work Schedule is submitted.

Failure of the Contractor to provide timely submittals of responsive Quarterly Work Schedules and responsive Monthly Work Plans, as specified in this Article 23, will indicate the Contractor's lack of planning of his work and will constitute reasonable evidence that the Contractor is not prosecuting the work with all due diligence to complete the work within the time specified. Such failure to provide these timely submittals will result in added expense, loss and damage to the District. Because of the peculiar nature of such expense, loss and damage, it is difficult, if not impossible, to accurately ascertain and definitely determine the amount thereof.

It is therefore agreed that in case the Contractor shall fail to provide any of said submittals in accordance with the schedules set forth in this Article 23, then the Contractor shall and will pay to the District the sum specified for liquidated damages in the Agreement for the days that the Contractor is not in compliance during each such failure.

Liquidated Damages

Article 24. It is understood and agreed that TIME is of the essence in this Contract, and that a failure on the part of said Contractor to complete the work herein specified within the time or times specified will result in added expense, loss and damage to said Water Reclamation District, and that on account of the peculiar nature of such loss or damage it is difficult, if not impossible, to accurately ascertain and definitely

determine the amount thereof.

It is therefore agreed that in case the said Contractor shall fail or neglect to complete the work included in this Contract within the time or times specified in the Agreement, said Contractor, even though he is allowed to complete his work, shall and will pay to said Water Reclamation District the sum specified for liquidated damages in said Agreement for each and every day said Contractor shall be in default of the time or times of completing such work.

Said sum is hereby agreed upon, fixed and determined by the parties hereto, as the liquidated damages that the said Water Reclamation District will suffer by reason of such default, and not by way of a penalty.

In case the said Contractor does not complete the work under this Contract within the specified time or times for such completion, or within said time or times as extended by the Engineer, said Engineer shall determine the number of days the said Contractor is in default, and the decision of said Engineer shall be final and binding on both parties hereto.

It is further agreed that if said Water Reclamation District shall accept any work or make any payment or payments under this Contract after any such default or defaults, such acceptance, payment or payments shall not in any respect constitute a waiver or modification of any of the provisions of this Contract and particularly of the provisions in regard to TIME and LIQUIDATED DAMAGES for delays.

Alterations or Additions and Time Extensions.

Article 25. In the event that any material alterations or additions are made as herein specified, which, in the opinion of the Engineer, will require additional time for the execution of any work under this Contract, then in that case the time for the completion of the work shall be extended by such a period of time as may be fixed by the Engineer, and his decision shall be final and binding upon both parties hereto, provided that in such case the Contractor, within thirty (30) days after being notified in writing of such alterations or additions, shall request in writing an extension of time, but no extension of time shall be given for any minor alterations or additions, and the Contractor shall not be entitled to any damages or compensation from the Water Reclamation District on account of such additional time required for the execution of the work or due to any delay related to such work. All claims for time extensions shall be based upon and include the results of all analyses of the Work Schedule.

Notice to Suspend Work.

Article 26. The Contractor shall delay or suspend the progress of the work, or any part thereof, whenever he shall be so required by written order of the Engineer, and for such periods of time as the Engineer may order, provided that in the event of such delay or delays or of such suspension or suspensions of the progress of the work or any part thereof, the time for the completion of the work so suspended or of work delayed by such suspension or suspensions, shall be extended for a period equivalent to the time lost by reason of such suspension or suspensions, but such order of the Engineer shall not otherwise modify or invalidate in any way any of the provisions of the Contract and the Contractor shall not be entitled to any damages or compensation, except as mentioned in Article 27, from the Water Reclamation District on account of such delay or delays, suspension or suspensions.

Unavoidable Delay.

Article 27. Should the Contractor be obstructed or delayed in the commencement, prosecution or completion of the work hereunder by any act or delay of the District, or by inability, with the exercise of due diligence, to obtain necessary railroad and transportation facilities, or by unavoidable acts or delays on the part of transportation companies in transporting, switching or delivering material for said work, or by any act or delay of the agencies of the Federal Government, or by acts of public authorities, or by riot, insurrection, war, pestilence, fire, lightning, earthquake, cyclone, strikes, or through any delays or defaults of other parties under contract with said District or due to unavoidable delays in obtaining the specified materials or equipment for said work due to strikes, or by delays hereinbefore specified which result in performing work under abnormal weather conditions beyond such as usually occur during the times specified herein that cause unavoidable delays in performing said work, or to other causes, which causes and delays mentioned in this Article 27, the Engineer shall determine to be entirely beyond the control of the Contractor, then the times fixed in the Agreement for the completion of said work to the extent specified shall be extended for a period equivalent to the time lost by reason of any of the aforesaid causes mentioned in this Article 27. No such allowance of time shall be made, however, unless notice in writing of a claim therefore is presented to the Engineer before the last day of each succeeding month of all delays occurring within the preceding month, and the Contractor shall satisfy the Engineer that the delays so claimed are unavoidable and

substantial and could not be reasonably anticipated or adequately guarded against. All claims for time extensions shall be based upon and include the results of an analysis of the Work Schedule.

It is expressly understood and agreed that the Contractor shall not be entitled to any damages or compensation from the District except on account of any delay or delays resulting from any act or delay of the District or other parties under contract with the Water Reclamation District, and such damages shall be limited solely to additional premiums actually paid by the Contractor on his bond and insurance and for wages and salaries of employees and other extra expenses of the Contractor that are necessary only for the proper maintenance of the work and equipment of the Contractor at the site during the delay caused by the District, or other contractors working for the District and only when such delay results in a complete stoppage of contract work on the job site. The Engineer shall determine the number of days, if any, that the Contractor has been so delayed and the amount of such extra costs to the Contractor due to said delay or delays and the amount of extra compensation to be paid to the Contractor therefore, and his decision shall be final and binding upon both parties to this contract. It is further expressly understood and agreed that any damages or compensation allowed under this Article 27 shall specifically exclude any anticipated lost profits and all costs for home office overhead.

The provisions of the preceding paragraph notwithstanding, it is further expressly understood and agreed that the Contractor shall not be entitled to any damages or compensation from the District under this Article 27 if the Contractor is concurrently delayed by any of the aforesaid causes mentioned in this Article 27 or by any act or event within the control or due to the fault or negligence of the Contractor.

It is further expressly understood and agreed that the Contractor shall not be entitled to any compensation or damages from the District on account of any delay or delays resulting from any act or delay caused by agencies of the Federal Government, or by acts of other public authorities or by inability, with the exercise of due diligence, to obtain necessary railroad and transportation facilities or by unavoidable acts or delays on the part of transportation companies in transporting, switching or delivering material for said work or by riot, insurrection, war, pestilence, fire, lightning, earthquake, cyclone, or due to strikes or by delays which result in performing work under abnormal weather conditions beyond such as usually occur during the time of performance specified in the Agreement that cause unavoidable delays in performing the work.

Forfeiture of Contract

Article 28. It is further agreed by and between the parties hereto that if the Contractor fails financially, or abandons this Contract, or fails, refuses or neglects to prosecute the work hereunder, so as to achieve the progress necessary to complete said work within the time or times specified, or as extended under the terms of this Contract, or if in the opinion of the Engineer said work has been or is being delayed by the Contractor so that said work cannot be completed within the time or times specified, or as so extended, or if from any other cause, whatsoever, the Contractor is unable to carry out the terms and conditions of this Contract and complete said work within the time or times specified or if the Contractor shall sublet, in whole or in part, the work under this Contract in violation of Article 19 herein, then the Water Reclamation District may declare this Contract forfeited either as to a portion of the same or the whole thereof.

Upon the happening of any of the conditions hereinbefore specified in this article, the Water Reclamation District shall have a lien upon all the buildings, materials, supplies, machinery, implements and tools of the Contractor for the purpose hereinafter specified; and the Water Reclamation District may thereupon immediately take possession of all said buildings, materials, supplies, machinery, implements and tools, for the use and purpose hereinafter set forth; thereupon the Water Reclamation District shall have the power to, and may at the cost of the Contractor, complete the said work by letting a new contract, and in completing the said work by contract, the Water Reclamation District may use such buildings, materials, supplies, machinery, implements, tools and plant as may be the property of the Contractor, and make the necessary repairs and replacements thereto.

The cost of fully completing all the work provided for under any new contract shall include the sum or sums of money paid by the Water Reclamation District to other contractors, all administrative costs and all cost of repairs and replacements upon machinery, implements, tools and plant of the Contractor hereunder and also all sums of money paid by the Water Reclamation District for first aid, medical, surgical, and hospital services and compensation for occupational diseases, accidental injuries or death suffered by the employees of any new contractor in the course of their employment in completing said work under the Workman's Occupational Disease Act and the Workmen's Compensation Acts of the State of Illinois now in force.

The cost and expense of fully completing said work, as aforesaid, shall be charged to the Contractor and the amount of such cost or expense so charged shall be deducted from any sums of money that may be due or may thereafter become due to the Contractor under and by virtue of this Contract, as far as the same may suffice therefore.

Should the amount remaining unpaid of the original Contract price be insufficient to reimburse the Water Reclamation District for the cost and expense of fully completing said work, then the Water Reclamation District may sell all buildings, sheds, materials, supplies, machinery, implements and tools obtained from the Contractor then on hand, at public sale on giving said Contractor twenty (20) days notice of the time and place of such sale, and the proceeds derived from the sale of said property at such sale, less expenses incurred thereby, shall be credited to the Contractor, and should the amount received from said sale be then insufficient to pay such deficiency, the Contractor and his bondsmen shall be liable to pay the amount of said deficiency; and at any such sale of said property, the Water Reclamation District may bid and become a purchaser of any or all of said property. It is further understood and agreed that the terms and provisions of this Article 28 shall apply to and be binding upon all subcontractors of the Contractor hereunder.

Contractor's Bond.

Article 29. The Contractor shall furnish a bond in the sum of one hundred (100) per cent of the awarded amount of this Contract as security for the performance of the work under this Contract and for the payment of all persons performing labor and furnishing materials and equipment in connection with the Contract unless otherwise specified in the Agreement.

The payment bond and performance bond shall remain in full force and effect for a period of one year from and after the final acceptance of the entire completed work by the Water Reclamation District.

The above bond shall be underwritten with a good and sufficient surety or sureties, the same to be satisfactory to the Director of Procurement and Materials Management of the Water Reclamation District, conditioned upon the faithful performance of all the terms and conditions of this Contract; and should the sureties on said bond at any time fail financially or be, in the opinion of the said Director of Procurement and Materials Management, insufficient security for the penalty of said bond, then in that case said Director of Procurement and Materials Management may, on giving ten (10) days notice thereof in writing, require the Contractor to furnish a new and additional bond in place of the bond so having become insufficient, with such sureties thereon as shall be satisfactory to said Director of Procurement and Materials Management.

If the Contract is considered "Non-Construction" type and the required Contractor's bond is less than $100,000.00, it is permissible to substitute cash, a certified bank instrument, or certificate of deposit. If a certificate of deposit is furnished, it must have a fixed rate and fixed amount from a financial institution acceptable to the Director of Procurement and Materials Management. The maturity date shall be later than the Contract completion date and must be accompanied by an "Assignment of Certificate of Deposit" or "Assignment of Savings Account" in the name of the Water Reclamation District on forms to be supplied by the District.

Maintenance Bond.

Article 30. For Engineering Department contracts, the Contractor shall furnish the maintenance bond or bonds, when called for under the Contract, in the amount and for the term specified in the Detail Specifications, to make good at his own expense any excessive wear to any parts or any defects in or damages to any equipment or work specified which may arise from faulty materials, contractor design or construction, or from the inability of the equipment or work to successfully perform all the requirements of the specification.

Said bonds shall be furnished with good and sufficient surety, the same to be satisfactory to the Director of Procurement and Materials Management of the Water Reclamation District and the approval of same shall be a condition precedent to the final payment specified in Article 35.

Should any item, for which the maintenance bond is required, be taken over for permanent operation by the Water Reclamation District in accordance with Article 34, a separate maintenance bond shall be furnished, and the term of the maintenance bond shall begin on the date when said item of work is placed in permanent operation by the Water Reclamation District.

The cost of furnishing the maintenance bond or bonds shall be included in the price or prices specified in the Agreement.

Prices.

Article 31. The Contractor agrees to accept and the Water Reclamation District agrees to pay the price or prices stated in the Agreement as full

compensation for furnishing all the labor, tools, materials and appurtenances necessary to make full and faithful performance and completion of all the work, free of all claims, liens and charges whatsoever and in full compliance with the plans and specifications and the requirements of the Engineer. Said Contractor further agrees that he is not entitled to any money for losses or consequential damages arising out of the nature of the work, the action of the elements, any unforeseen obstructions or difficulties encountered in the prosecution of the work and any risks, of every kind, nature and description, connected therewith.

The specified price or prices shall cover the cost of all machinery, plant and tools and all work, labor and materials of whatsoever kind that shall be furnished or needed to complete the entire work for the purposes for which it is intended. Said prices shall also cover all royalties for patents, and patented materials, appliances and processes used in the work, except as hereinbefore specified in Article 15. Before final payment is made the Contractor shall furnish a satisfactory guarantee against all claims on account of work performed, tools and plant employed, and material and labor furnished hereunder, and against all claims for patents, patented materials, appliances and processes, except as hereinbefore specified in Article 15, used in or on account of the work under this Contract.

Progress Payments.

Article 32. Once each month the Contractor may submit to the Engineer a request for partial payment for work completed. Payments will be made by the District on or about the 2nd or the 4th Friday of the month and the Contractor must submit payment requests at least 15 working days prior to either of these dates in order to receive payment on that date. Such payment requests shall be submitted on partial payment voucher forms furnished by the Water Reclamation District and in the number specified. These forms shall be prepared by the Contractor including the completion of the affidavit on the back of the original form. The work completed as shown on these forms shall be subject to approval by the Engineer and may be revised by the Engineer if necessary.

Cash Flow Estimate Schedule

With each invoice for payment, the Contractor shall submit an estimate of all future monthly progress payment amounts anticipated for the duration of the contract. This estimate is a required portion of all payment request submittals, and no payment request will be considered complete without such an estimate. The Contractor's estimate will not be binding upon his or her actual future progress payment requests, but will be used solely by the District to estimate monthly disbursements and cash flow requirements.

For other than Engineering Department contracts, the Water Reclamation District agrees to pay the Contractor the sum or sums stated in the Agreement in partial installments from time to time as the work progresses upon certificates signed by the Engineer, but said certificates shall in no way lessen the total and final responsibility of the Contractor. Whenever practicable, partial payments will be made monthly.

Progress payments for all contracts shall be made in accordance with Article 33 and the final payment shall be made in accordance with Article 35. Payment of any sums shall in no way lessen the total and final responsibility of the Contractor. It is further expressly agreed that the payment of any monies hereunder shall in no way lessen the liability of the Contractor to replace defective equipment, material and work, though the same may not have been detected at the time such payment was given or acted upon. All progress payments being made merely upon approximate estimates shall be subject to correction on the final estimate voucher.

The Contractor shall also submit separate payment request forms for all extra work performed in accordance with Articles 7 and 8.

Progress Payments and Reserves.

Article 33. For Engineering Department contracts, as the work progresses, a reserve shall be withheld from the amount to be paid on the progress payment vouchers. If the Contract value is $10,000,000 or less, an amount shall be withheld of 10 percent of the payment requested until work is 50 percent complete. When work is 50 percent complete, the withholding shall be reduced to 5 percent of the dollar value of all work satisfactorily completed to date until the work is 90 percent complete. When the work is 90 percent complete, the withholding shall be reduced to 4 percent of all work satisfactorily completed to date. The Water Reclamation District may reinstate up to 10 percent withholding if the Engineer determines that the Contractor is not making satisfactory progress or there is any other specific cause for such withholding.

If the Contract value is more than $10,000,000 an amount shall be withheld of 7.5 percent of the payment requested until the work is 50 percent complete. When work is 50 percent complete, the withholding shall be reduced to 5 percent of the dollar value of all work satisfactorily completed to date until the work is 75

percent complete. When the work is 75 percent complete, the withholding shall be reduced to 4 percent of the dollar value of all work satisfactorily completed to date until the work is 90 percent complete. When the work is 90 percent complete, the withholding shall be reduced to 3 percent of all work satisfactorily completed to date. The Water Reclamation District may reinstate up to 7.5 percent withholding if the Engineer determines that the Contractor is not making satisfactory progress or there is other specific cause for such withholding.

For all contracts, when the dollar value of the work satisfactorily completed has reached 95 percent and the Engineer determines that the work under the contract is substantially complete, the Water Reclamation District may further reduce the reserves to 2 percent of the dollar value of the work completed.

It shall be the decision of the Engineer as to the dollar value of the work completed, the percentage of completion, and whether or not the work is substantially complete, and that decision shall be final and binding on both parties.

All sums withheld shall be reserved by the Water Reclamation District as part security for the faithful performance hereof. The final payment voucher shall not become due the Contractor until the expiration of forty-five (45) days after the completion of all work and approval of the Engineer, and after payment by the Contractor on all claims for labor and material furnished in the performance of work under this Contract and as covered under Article 35.

The release of any portion or all of the sums withheld provided for under this Article 33 shall not be construed as a waiver by the Water Reclamation District of its right to hold the Contractor and his Surety liable for any and all obligations under the terms of the Contract and bond.

For each pay item the Contractor, unless otherwise directed, shall furnish the Engineer with a balance statement showing in detail the breakdown of the price into proper sub-items including labor and material. Such statements, if presented on computer generated spreadsheets, shall conform to the standard American Institute of Architects document format. Such statements, if approved or revised by the Engineer, will be used in determining the value of the work performed under that item.

Taking Over Completed Work.

Article 34. Upon the completion of any part of the work specified prior to the final completion of the entire work, on or before the time specified in the Agreement, the Water Reclamation District shall have the right to take over for operation or use the said completed part of the work upon written notice to the Contractor from the Engineer that such action will be taken.

Final Payment.

Article 35. The Contractor further agrees that he shall not be entitled to demand or receive final payment for any portion of the work or materials, except in the manner set forth herein, nor until all the stipulations, provisions and conditions hereinbefore mentioned are complied with; whereupon the Water Reclamation District, after the expiration of forty-five (45) days after such completion, will pay, and hereby binds itself to pay, the Contractor the whole amount of money accruing to said Contractor under this Contract, except such sum or sums of money as may have been already paid, and as may be lawfully retained under any of the provisions of this Contract.

If at any time it shall appear that the Water Reclamation District has made any illegal, improper, or excess payments to the Contractor which may have been included in a progress estimate or in the final estimate of the Engineer, then the Contractor hereby agrees to repay on demand to the Water Reclamation District the amount or amounts so paid.

Upon satisfactory completion of the work performed under this Contract, as a condition before final payment under this Contract, or as a termination settlement under this Contract, the Contractor shall execute and deliver to the Water Reclamation District a release of all claims against the Water Reclamation District arising under or by virtue of this Contract, except claims which are specifically exempted by the Contractor to be set forth therein. Unless otherwise expressly agreed to by the parties to this Contract, final payment under this Contract or settlement upon termination of this Contract shall not constitute a waiver of the Water Reclamation District's claims against the Contractor or his sureties under this Contract or applicable performance and payment bonds.

Guarantees.

Article 36. The Contractor guarantees all work performed and all material and equipment furnished and installed under the Contract against defects in materials and workmanship for a period of one year from the date of completion of all work including successful completion of the 60 day operation test, all

punchlist items, and final clean-up and formal acceptance of the completed work by the Water Reclamation District.

The Contractor shall, within a reasonable time after receipt of written notice thereof, make good any defects in materials, equipment, and workmanship which may develop within periods for which said materials, equipment, and workmanship are guaranteed and also make good any damage to other work caused by the repairing of such defects at his own expense and without cost to the Water Reclamation District.

Financial Interest Provisions.

Article 37. The provisions of the Purchasing Act, 70 ILCS 2605/11.1-11.24 are applicable to this Contract.

The Contractor's attention is specifically directed to Section 11.18 thereof, which provision, in part, states:

"**No officer or employee of a sanitary district organized pursuant to this Act shall be financially interested, directly or indirectly, in any bid, purchase order, lease or contract to which such sanitary district is a party. For purposes of the Section, an officer or employee of the sanitary district is deemed to have a direct financial interest in a bid, purchase order, lease or contract with the district if the officer or employee is employed by the district and is simultaneously employed by a person or corporation that is a party to any bid, purchase order, lease or contract with the sanitary district.

Any officer or employee convicted of a violation of this section shall forfeit his office or employment and in addition shall be guilty of a Class 4 felony.**"

The Contractor shall comply with each and every section of said Act which may be applicable to this Contract.

The provisions of said Act shall be included in, and be applicable to any subcontract made by the Contractor.

The Contractor will also comply with the Water Reclamation District's ethic's ordinance (MWRDGC Ord. 04-001, April 22, 2004) in all dealings with all District employees. The Contractor is responsible for insuring that all subcontractors receive copies of this ordinance with their subcontract and shall insure the compliance of subcontractors, at all levels on the project, with the ordinance.

This Contract, at the option of the Water Reclamation District, may be terminated and canceled in the event the Contractor or subcontractor breaches any of the provisions of said Act or Ordinance. Other actions the District may take for violations is banning of subcontractors or individuals from working on the project or the project site. The Contractor bears full responsibility and liability for the consequences of the District's response to ethics and purchasing violations

Ownership.

Article 38. It is understood and agreed by and between the parties hereto, that it is the intention of the parties hereto that the Water Reclamation District shall acquire exclusive ownership of the materials and work which have entered or are fabricated to enter into the material or equipment covered by this Contract upon the payment by the Water Reclamation District for any sum or sums of money specified in this Contract to be paid on itemized progress certificates, and the Contractor hereby agrees that he will, when such payments are made, execute and deliver, on demand, to the Water Reclamation District, a bill or bills of sale of the material or equipment or parts of equipment included on such certificate, whether in an uncompleted or fully completed condition, as evidence of such ownership.

The Contractor hereby further agrees to segregate the work intended for the Water Reclamation District from all other work and attach to the material or equipment appropriate signs, marks or evidence to the effect that the material or equipment, whether uncompleted or completed, is the exclusive property of the Water Reclamation District.

It is further understood and agreed, by and between the parties hereto, that the payment by the Water Reclamation District of any sum or sums of money herein specified to be paid on progress certificates and the acquired ownership of the material or equipment or parts thereof shall not operate as a bar to subsequent inspection and rejection of all or any portion of such materials and workmanship as may be unacceptable under the terms of this Contract in the judgment of the Engineer, and further, that such payments and acquired ownership shall not in any respect constitute a waiver or modification of any of the terms and provisions of this Contract and particularly shall not affect the provisions hereof in regard to time for delays.

Table of Statutes in General Conditions

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

GENERAL SPECIFICATIONS

Definitions

(1) Whenever the following terms in quotation appear in the Contract documents, they shall be interpreted as follows:

"Water Reclamation District" or "District" – The Metropolitan Water Reclamation District of Greater Chicago, party of the first part.

"Contractor" spelled with a capital "C" - The Contractor under this Contract, party of the second part.

"Engineer" - The Director of Engineering or Acting Director of Engineering, Director of Maintenance and Operations or Acting Director of Maintenance and Operations, any District Officer or Acting Officer, Director of Administrative Services or Acting Director of Administrative Services, of the Metropolitan Water Reclamation District of Greater Chicago, or any other Engineer or subordinate designated by the aforementioned who functions to administer the contract after it has been duly executed by the Director of Procurement and Materials Management.

"Director of Procurement and Materials Management" – The duly authorized Officer of the District, carrying out the functions assigned to him/her by the Purchasing Act (70 ILCS 2605/11.111.24) and the Board of Commissioners to bid and bind the District in contracts.

"He," "him," "she," "he," "it" or "it's" designating the "Contractor" - The individual, firm or corporation awarded the Contract for the work hereunder.

"The Work" - The work to be performed hereunder, including all material, labor, equipment, tools, and all appliances and appurtenances necessary to perform and complete everything specified or implied in the Contract or shown on the plans and specifications furnished by the Water Reclamation District, and the additional plans and information furnished by the Contractor, and accepted by the Engineer, in full compliance with all the terms and conditions hereof.

"Site" - The location(s) described in the Agreement where the work under this Contract is to be performed, or to which deliveries are to be made.

"Plans" – The contract listed in the Agreement and the additional plans, prints and drawings furnished by the Contractor in accordance with this Contract, and accepted by the Engineer.

“Written Order” - A written order signed by the Engineer, delivered by messenger to the Contractor or mailed to the Contractor at the address designated in his proposal or to such other address as he my designate in writing as his official place of business.

“Change Order” – A written order authorizing an addition, deletion or revision in the work and/or the time of completion of the executed Contract.

“ "Substantial Completion" - That point in time when, in the opinion of the Engineer, the work is sufficiently complete, in accordance with the contract documents, so that the work can be utilized for the purposes for which it was intended.

"Or equal" or "or equal thereto" - Wherever a particular process, material, device, detail or part is specified herein followed by these words or by similar or equivalent expressions, such words or expressions shall be understood to mean and permit the use of another process, material, device, detail or part that the Engineer shall determine is fully equal in suitability, quality, durability and in all other respects, to the process, material, device, detail or part herein specified for such use and shall approve for such use in the work hereunder.

"Designated," "ordered," "permitted," "approved"- These words or others of similar import, unless specifically modified, shall be taken to mean, designated, ordered, permitted or approved by the Engineer.

"Critical Path" - A sequence of directly dependent activities controlling achievement of the time(s) as specified in the Agreement.

"Activity" -An element in the Work Schedule or Monthly Work Plan representing the duration, schedule, and resources required for performing a part of the work, or a requisite step for a part of the work.

“Total Float” – Number of working days by which a part of the work in the Work Schedule may be delayed from its early dates without necessarily extending the time stated in the Agreement.

"Contract Float" - Number of working days between the Contractor's anticipated or forecasted date for completion of the work, or part thereof, and the corresponding time stated in the Agreement.

"Early (Late) Dates" - Early (Late) times of performances for start or completion of Activities identified on the Work Schedule.

Powers of the Engineer

(2) It is covenanted and agreed that the Engineer and his properly authorized agents shall measure and calculate the quantities and amounts of the several kinds of work performed under this Contract and on whose inspection all work shall be accepted or rejected. The Engineer, or other Agents designated by him, shall have full power to reject or condemn all materials furnished or work performed under this Contract, which in his opinion do not conform to the terms and conditions herein expressed.

To prevent all disputes and litigations, it is further agreed by and between the Water Reclamation District and the Contractor that the Engineer shall in all cases decide every question of an engineering character which may arise relative to the execution of the work under this Contract on the part of the Contractor, and his decision shall be final and conclusive on both parties hereto; and such decision, in case any question may arise, shall be a condition precedent to the right of the Contractor to receive any money or compensation for anything done or furnished under this Contract.

Material and Equipment, Contractor's Plans, Data and Samples

(3) Unless otherwise specified in the Contract Documents, within thirty days after the approval of the Contractor's bond by the Director of Procurement and Materials Management, the Contractor shall submit to the Engineer for approval, eight (8) sets of plans of the equipment, material and apparatus included under this Contract and the foundations for same (other than those for which details are given in the plans attached hereto by the Water Reclamation District), as listed under the Detail Specifications, together with all other information in such detail as may be necessary w permit the Engineer to inform himself whether the same will comply with the specifications, and to determine the character of the various equipment, material and apparatus which the Contractor proposes to use. The time for submitting Contractor's plans may be extended by the Engineer at his discretion, if in his opinion such extension will not delay the progress of work under the Contract. The drawings for equipment to be furnished under this Contract shall include the Water Reclamation District protective coating designation and the location where the protective coating will be applied.

All such plans shall be sizes to be designated or approved by the Engineer and shall be clearly identified by item number, if any, and location of the equipment, material and apparatus in the work. The general character and arrangement of the shop and working plans shall be subject to the approval of the Engineer and before submitting such plans the Contractor, if requested, shall confer with the Engineer regarding the character, scale, arrangement, and completeness of such plans. The detailed shop drawings shall give views, dimensions, instructions and references so that duplicate parts for repairs can be ordered and made from the drawings at any time in the future. The assembly and working drawings shall show all necessary details, including plans and elevations with dimensions, instruction and references for proper erection, installation and adjustment of the equipment. Approval given on data or shop drawings which subsequently are found to be deviations from the Contract Documents shall be considered null and void unless such deviations are specifically brought to the attention of the Engineer in writing and are acknowledged in writing to be acceptable. Any work that progresses based upon shop drawing or data which does not meet the requirements of the Contract Documents, and therefore is in nonconformity with the Contract requirements, the Contractor will be requited to remove or modify until it meets the full satisfaction of the Engineer.

Unless required by Detail Specifications or otherwise specifically instructed by the Engineer, the Contractor need not submit, for approval by the Engineer, copies of shop drawings, layouts, construction and installation procedures, calculations, catalogue data, samples and other required miscellaneous information and data which are identical in all respects to the respective items(s) described in the contract specifications or shown in the contract plans. In the event that the Contractor intends to submit an item or procedure which differs from the details and/or intent set forth in the contract documents, then the Contractor shall submit all necessary shop drawings, calculations, catalogue data, samples and such other information that the Engineer may require for the detailed review of and approval by the Engineer.

The Contractor shall submit to the Engineer a minimum of eight copies of each submittal. Such submittals shall be complete and show all parts of the relevant structures or equipment, and all parts connected therewith. All drawings related to the same or related components shall be submitted at the same time. After the plans have been examined by the Engineer, one print of each will be returned to the Contractor by the Engineer with the latter's approval indicated thereon, or marked with notations or corrections and changes that may be required. Any plans not approved by the Engineer shall be corrected or revised by the Contractor as the Engineer shall direct and shall be re-submitted in the same manner.

Nothing herein shall relieve the contractor of his responsibility to prepare, furnish and deliver any O & M manuals which may be required by the terms of this contract.

The Contractor shall furnish to the Engineer a tabulated list of the equipment for which plans may not be required, showing the name of the manufacturer and the catalog number and type of equipment proposed, together with such dimensions, specifications, samples, or other data, as may be required to permit intelligent judgement of the acceptability of the same.

Machinery, equipment, accessories or parts to be furnished under this Contract must be of current manufacture unless otherwise specified. Such material, whose manufacture has been discontinued or is scheduled to be discontinued within the life of the Contract or the duration of the maintenance bond, will not be accepted unless otherwise specified.

The Contractor shall upon request furnish a certified statement from the manufacturer that any equipment, accessories or parts being furnished under the Contract are in current production and that there are no present or near future plans to discontinue production of the item or items in question.

The Contractor warrants that, for the length of time following execution of this Contract, which is equal to the normal useful life of the equipment to be furnished hereunder, all supplies, replacement parts and technical service customarily needed for the proper operation and maintenance of such equipment will be made available at reasonable prices and within a reasonable time to the Water Reclamation District upon request. Nothing contained in the immediately preceding sentence relieves the Contractor from any obligations which he may have under other sections of the Contract regarding guarantees, defects, maintenance bonds, etc.

All equipment and materials and parts thereof furnished under the Contract shall, for purposes of interchangeability and general maintenance, comply with the most widely accepted standards currently in use in United States industry, unless such compliance would conflict with other specifications contained in the Contract.

In the event that the Contractor requests approval of a substitution for any requirement of this Contract, his change order request must be accompanied with the following information:

1. Technical data demonstrating the quality performance equivalency from that requirement which is specified.

2. A cost proposal indicating the price adjustment to the Contract if the substitution is approved.

3. A statement that the substitution, if approved, will be made with no change in the Contract time.

If the Contractor requests the approval of an “or equal” rather than the particular process, material, device, detail or part that is specified, then his request must include sufficient technical data to demonstrate the quality and performance equivalency of the proposed process, material, device detail or part. The Engineer reserves the right to require the Contractor to provide such testing and inspection as is necessary to verify the quality and performance equivalency, all at the Contractor’s own expense.

All structures to be provided by the Contractor (except those structures for which details are shown on the Contract plans) under the supervision of a structural engineer, licensed in the State of Illinois, acting for and retained by the Contractor. Drawings and calculations for such structures shall be prepared and stamped by the structural engineer and submitted to the Engineer for approval. A clear outline of the proposed construction procedure shall be shown on the drawings. A statement in writing by the structural engineer attesting that he has visited the site of the work, that the design does satisfy the conditions as actually encountered and that the actual construction conforms to the drawings and calculations as submitted and approved must be submitted to the Engineer before the work related to such structures will be considered complete.

All temporary structures, including sheeting and bracing for excavations, which affect the safety of the public, workmen, inspectors or Water Reclamation District personnel shall be regarded as structures which require structural design.

Approval of Contractor's Plans

(4) The plans submitted by the Contractor for approval, as specified in Section (3), will be examined by the Engineer and it is understood by the Contractor in submitting the plans, that a reasonable amount of time will be necessary for their examination by the Engineer before they can be approved by him or returned for correction.

Unless otherwise instructed, the Contractor shall submit to the Engineer for examination three prints of each plan, and, as far as possible, all plans of any particular part of the structures or equipment, and of parts connected therewith, shall be submitted at the same time. After the plans have been examined as above mentioned, one print of each plan will be returned to the Contractor by the Engineer with his approval thereon, or marked with notations or corrections and changes that may be required. All plans not approved by the Engineer shall be corrected or revised by the Contractor the Engineer shall direct and shall be re-submitted in the same routine as before.

No orders for any work, materials or equipment shown on any plans shall be given by the Contractor without the written consent of the Engineer prior to the time when such plans or equipment have been approved by him as specified. Plans, calculations, and procedures for all temporary structures, including sheeting and bracing for excavations, shall be approved prior to the start of related field work. Prior to the approval of any such plans, any work which the Contractor may do on the structures or equipment covered by the same shall be at his own risk, except that work on temporary structures and excavations requiring sheeting and bracing as specified above shall not be started without the written approval of the Engineer, as the Water Reclamation District will not be responsible for any expense incurred by the Contractor in changing structures or equipment to make the same conform to the plans as finally approved. No alterations of any plans shall be made by the Contractor after they have been approved except by the written consent of the Engineer.

The Contractor shall furnish the Water Reclamation District, as requested, and without extra charge therefor, such number of

complete sets of prints of all plans, as approved, as the Engineer shall request and in general not less than eight, for office files and for use in the field. Erection plans shall have all match marks shown thereon.

After the work has been completed, the tracings of all plans for any and all work hereunder, made by or for the Contractor, shall be corrected by him so as to show all work as actually completed.

The Contractor shall furnish to the Engineer record prints, in duplicate, of such drawing submitted by the Contractor, as the Engineer may request.

Upon approval of the plans, lists, samples and other data submitted by the Contractor, the same shall become a part of this Contract, and the equipment furnished shall be in conformity with the same; provided, that the approval of the above plans, lists, specifications, samples or other data shall in no way release the Contractor from his responsibility for the proper design, installation and performance of any material or equipment, or from his liability to replace the same should it prove defective.

Additional Water Reclamation District Plans

(5) The Water Reclamation District will, when specifically noted in the Detail Specifications, prepare working plans supplementary to the plans previously listed herein, showing such additional and revised details for construction purposes not shown on the Contract plans or which are shown as typical only and require revision and additions for construction purposes, as are required for furnishing and erecting the structures and equipment required under this Contract. These working plans will be furnished to the Contractor by the Water Reclamation District within a reasonable time after approval by the Director of Procurement and Materials Management of the bond of the Contractor, and as required from time to time for the prosecution of the work.

The Contractor shall advise the Engineer in writing sufficiently in advance of the time when such plans will be required far the orderly progress of various portions of the work to permit their preparation and shall make no claims for damages for delays that may result from his failure to so notify the Engineer. These plans will include such details as are not shown on the Contract plans and which the Contractor is not required to furnish.

Checking Plans

(6) The Contractor shall check all plans furnished by the Water Reclamation District and by himself for dimensions, quantities and coordination with other parts of the work under this Contract, and shall notify the Engineer of all errors or omissions which he may discover by examining and checking the same. He will not be allowed to take advantage of any error or omission on the plans, as full instructions will be furnished by the Engineer should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified. The work is to be made complete and to the satisfaction of the Engineer, not withstanding any minor omissions in the specifications or plans.

Keeping Plans and Specifications on the Work

(7) The Contractor shall keep on hand at each site of work for reference a complete copy of these specifications and a complete set of all plans of the work, and also copies of all plans furnished by the Contractor, all revised plans furnished by the Water Reclamation District and all orders issued to the Contractor by the Engineer that relate to the work under this Contract.

Lines and Grades

(8) A surface horizontal and vertical control system as required for the layout of the work under this Contract shall be given by the Engineer. This horizontal and vertical control system must be verified by the Contractor and the Contractor will be entirely responsible for its correctness. All other horizontal and vertical control required for the complete layout and performance of the work under this Contract shall be done by the Contractor at the Contractor's expense. The Contractor must verify and will be completely responsible for the correctness of all lines and grades including any given by the Engineer.

In tunnel construction, each shaft shall be "plumbed" (line and grade transferred from the surface into the tunnel section) by the Contractor. The Contractor shall inform the Engineer, a reasonable time in advance, of the times and places at which he intends to do work

The Engineer, at his discretion, will make occasional field checks of control work done by the Contractor. The Contractor shall correct any mistakes due to errors or omissions at his own cost and expense as ordered by the Engineer. Unless otherwise noted, all elevations shown on the plans and mentioned in the specifications are referred to Chicago City Datum (C.C.D.). The Water Reclamation District considers Chicago City Datum to be at Elevation 579.48 above New York Mean Sea Level, USC & GS 1929 adjustment (MSL 1929 adj.).

Inspection and Testing of Materials and Equipment

(9) Whenever the Contract Documents provide that the Contractor is to furnish test results, laboratory analyses, manufacturer's certifications, weight tickets, or similar evidence of quality, quantity, an/or Contract compliance, the Contractor shall bear the entire cost of same, unless such provisions specifically state otherwise.

All material and equipment furnished under this Contract shall be subjected at all times during manufacture, fabrication and erection to such inspection and tests by the Engineer or his authorized representatives, as will give due assurance that the

terms of the specifications are being complied with in all respects. Such inspection and tests shall be performed at the points of manufacture or fabrication, or in the field, as are herein specified therefor or as otherwise designated by the Engineer. Where inspection or tests are to be made at the point of the manufacture or fabrication, the Contractor shall in all cases give ample notice to the Engineer to permit such inspection and tests to be performed before painting is done and shipment is made and shall furnish to the Engineer copies, in triplicate, of mill test reports, material certifications, certified test reports and manufactures' letters of compliance to the specifications.

All inspecting and testing of materials furnished under this Contract will be performed by the Engineer or his duly authorized inspection engineers or inspection bureaus without cost to the Contractor unless otherwise expressly specified herein.

When inspection of materials and equipment is authorized in writing by the Engineer, it shall be the sole responsibility of the Contractor hereunder to keep the Engineer, or such duly authorized inspection engineers or inspection bureaus, fully informed as to when and where the material or equipment is to be inspected. All approved subcontractors shall be appropriately advised of this requirement. If any material or equipment is shipped to the site of the work without authorized inspection, it may be subject to rejection. Any additional expense to the Water Reclamation District for inspection of such material or equipment at the site of the work shall be done by the Contractor.

All machining and preparation of test samples, required by the ASTM or other specifications and cited as standard for this Contract, shall be done by the Contractor at his own expense.

All specifications of any society, institute or association hereafter referred to are hereby made a part of this Contract the same as if written in full.

The following societies, institutes and associations hereinafter designated, by their initials, as follows:

Name	Acronym
American Association of State Highway and Transportation Officials	AASHTO
American Concrete Institute	ACI
Institute of Electrical and Electronics Engineers	IEEE
American Institute of Steel Construction	AISC
Air Moving and Conditioning Association Inc.	AMACA
American Petroleum Institute	API
American National Standards Institute	ANSI
American Society of Mechanical Engineers	ASME
American Society for Testing Materials	ASTM
American Welding Society	AWS
American Water Works Association	AWWA
Edison Electric Institute	EEI
Standard Specifications for Road and Bridge Construction of the Department of Public Works and Buildings, Division of Highways, State of Illinois	IDOT
Illinois Environmental Protection Agency	IEPA
Insulated Power Cable Engineers Association	IPCEA
Manufacturer's Standardization Society of the Valve and Fitting Industry	MSS
Metropolitan Water Reclamation District of Greater Chicago	MWRD
National Electrical Manufacturer's Association	NEMA
Occupational Safety & Health Act	OSHA
Steel Structures Painting Council	SSPC
U.S. Environmental Protection Agency	USPA
Underwriters Laboratory	UL

Where reference is made to standard specifications of any of the above societies, institutes or association, these references refer to the latest Standards and Tentative Standards of said society, institute or association in force on the date when bids on this Contract were received; except that, if a revised specification is issued by said society, institute or association before completion of a part of the work affected by said specifications, the Contractor may, if approved by the Engineer, perform the part of the work affected in accordance with the revised specifications. In interpreting said standard specifications, the "Purchaser" shall be understood to mean the Water Reclamation District, and the "Manufacturer," the Contractor hereunder of any person or persons or corporation furnishing materials for or performing work under this Contract.

For any material not covered by the designed specification of some designated society, institute or association, appropriate methods of testing and inspection to be designated by the Engineer shall be followed.

All samples for analysis and tests shall be taken in such manner as to be truly representative of the entire lot under test and shall not be worked on in any way to alter the quality before testing. Where expressly permitted by the Engineer in the case of materials taken from stock or for use in minor parts, certified analysis and tests of the manufacturer, furnished in triplicate, may be accepted in lieu of the tests prescribed above. In case the records of physical and chemical tests of stock materials are not available, a reasonable number of tests shall be furnished to the Engineer free of charge as required by the Engineer to satisfy himself as to its quality.

Inspection and tests of fabricated parts and manufactured articles shall be made by such methods and at such times as to insure compliance with the specifications in all respects. Inspection of all metal work shall be made before painting.

The Contractor shall furnish, upon request of the Engineer, certifications for all materials and equipment not inspected, stating that they meet the requirements of the specifications.

Should the preparation of the material be at far distant or inaccessible points, or should it be divided into unreasonably small quantities, or widely distributed to an unreasonable extent, or should the percentage of rejected material be unreasonably large, the additional cost of extra inspection resulting therefrom shall be borne by the Contractor, the Engineer being sole judge of what is to be deemed extra inspection.

The Engineer or his authorized representative shall have full power to reject any and all material or equipment which fails to meet the terms of the specifications and such material or equipment shall be promptly removed from the work hereunder. All material or equipment which develops defects during the life of the Contract, either before or after erection, shall be removed and replaced, notwithstanding that it may have passed the prescribed inspection and tests.

This Contract shall be subject to all provisions of the "Steel Products Procurement Act", (30ILCS 565/1 et. seq.), as it may be amended from time to time.

Steel Products used or supplied in the performance of this Contract or any subcontract thereto shall be manufactured or produced in the United States.

For purposes of this Section "United States" means the United States and any place subject to the jurisdiction thereof and "steel products" means products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated, or otherwise similarly processed or processed by a combination of two or more such operations from steel made in the United States by the open hearth, basic oxygen, electric furnace, Bessemer or other steel making processes. Willful violation of this Section may result in the filing and prosecution of a complaint by the Attorney General of the State of Illinois and shall subject the violators to a fine of the greater of $5000.00 or the payment price received as a result of such violation.

Inspection and Tests of Workmanship

(10) It is the intent, under this Contract, to secure high class workmanship in all respects and that structures be substantially watertight. By substantially watertight is meant concrete structures with no appreciable leaks from cracks, porous places, holes, expansion or construction joints, and metal structures or pipe lines with no leaking or sweating joints or leaks through defective pipe materials.

Any imperfect work that may be discovered before the final acceptance of the work shall be corrected immediately. The inspection of any work shall not relieve the Contractor of any of his obligations to perform proper and satisfactory work, as herein specified, and all work, which, during its progress may become damaged from any cause, or fails for any reason to satisfy the requirements of the specifications shall be removed and replaced by the good and satisfactory work without extra charge therefore.

The Contractor shall perform all tests which are specified under the various items of the Contract. Any changes or repairs necessary to put all work and equipment in satisfactory adjustment and operating condition (except for repairs or adjustments of equipment furnished by the Water Reclamation District), at no additional expense to the Water Reclamation District other than that specified to be paid under the various unit and lump sum prices of the Contract. Power for testing equipment will be furnished by the Water Reclamation District, to the extent permitted by the Engineer, if Water Reclamation District power is available at the site of work.

Measurement for Payment

(11) When unit prices are specified, all measurements of quantities for payment under the unit price item or items of this Contract shall be made by the Engineer in the manner specified, and the price or prices paid shall include the furnishing, delivering, erecting and connecting up of all tools, materials, equipment, apparatus and appurtenances; the furnishing of all labor and performance of all work required for the installation; and all plans, testing, painting, Contractor's bond, maintenance bonds where required, and collateral work necessary to complete the work as specified in the Detail Specifications. The cost of performing all work specified in the General Specifications and General Conditions shall be included in the unit and/or lump sum price or prices specified in the Agreement (unless otherwise directly specified) and no additional payment will be made by the Water Reclamation District to the Contractor for performing said specified work. No "extra" or "customary" allowances for payment will be made under any item, unless directly specified therein, and no additional payment for work included under any item of this Contract will be made under other items unless directly so specified.

Where payment by scale weight is specified under certain items, the Contractor shall provide suitable weighing equipment which shall be kept in accurate adjustment at all times. The weighing of all material shall be performed by the Contractor in the presence and under the supervision of the Engineer of his authorized representative, unless otherwise specified.

Intent of Specifications and Plans

(12) The specifications and plans are intended to cover the complete installation. It is not the intent to give every detail in the specifications and plans. The Water Reclamation District will not be responsible for the absence of any detail the Contractor may require, or for any special construction work, equipment, material or labor which may be found necessary as the work progresses. No additional compensation will be allowed the Contractor for any such special construction work, equipment, material or labor which may be found necessary for performing or completing any work hereunder unless it can be clearly shown, to the satisfaction of the Engineer, that such special construction work, equipment, material or labor is beyond the intent and scope of the plans and specifications, or is not included under the lump sum or unit prices

specified in the Agreement. If this is shown, the payment for such special construction work, equipment, material or labor shall be made under Articles 7 and 8 of the General Conditions, after the additional cost has been agreed upon and a written change order by the Engineer has been issued.

Ground Surface and Underground Conditions

(13) Where existing ground conditions are shown on the plans hereto attached, the elevations are believed to be reasonably correct but are not guaranteed to be absolutely so, and, together with any schedule of quantities, are presented only as an approximation. The Contractor shall satisfy himself, however, by actual examination of the site of the work, as to the existing elevations and the amount of work required under this Contract.

Where test pits and borings have been dug, the results supplied to the District by the soils engineer may be given on the plans or are in file in the Engineer's office for the information of the Contractor. The District does not guarantee the accuracy or correctness of this information. If the Contractor desires any additional information relating to the soils investigation, he should contact the soils consultant to obtain such information. The District does not guarantee the accuracy or correctness of any such information supplied by the soils consultant to the prospective bidder. The Contractor must satisfy himself by making borings or test pits or by such other methods as be may prefer to determine the character, location and amounts of water, peat, clay, sand, quick sand, gravel, glacial drift, boulder, conglomerate, rock gas and other material to be encountered and work to be performed.

Existing and Future Structures

(14) Various underground and overhead utilities and other structures are shown on the plans hereto attached. The location, material and dimensions of such structures, where given, are believed to be reasonably correct, but do not purport to be absolutely so. All known structures both under and above ground, either existing or under construction, except Contractor's plants, are plotted on the plans and profiles for the information of the Contractor or are on file in the office of the Engineer, but information so given is not to be construed as a representation that such structures will be found or encountered as plotted, or that no other such structures will be found or encountered. Other structures may also be encountered which may be built under existing or future contracts, or by other parties, which are not shown on the plans. The plans may not show the location of existing underground or overhead utilities serving the properties adjacent to the work site, or highway drainage systems. The Contractor, therefore, shall satisfy himself, by such means as he may deem proper, as to the location of all structures that may be encountered in the construction or the work. All structures encountered shall be protected and supported, and if damaged, repaired by the Contractor without charge therefore to the Water Reclamation District. The Contractor shall arrange with the owners of said structures for the shifting, temporary removal and restoration and protection of same where necessary for the prosecution of work under this Contract, at no additional expense to the Water Reclamation District except as otherwise specified herein.

Where all or part of the site on which work is to be performed has been utilized under former contracts, the Contractor shall make no claim for extra cost of his work due to encountering debris or other obstructions resulting from such use.

Space for Material, Equipment and Plant

(15) The Contractor shall have the use of such available areas on unoccupied and unused property of the Water Reclamation District adjacent to or near the site of the work, for the storage of material and for field erection of plant and equipment as are not needed for other structures to be built under existing or future Contracts, or for delivery of material and equipment under existing or future Contracts, or for other purposes of the Water Reclamation District. All areas on Water Reclamation District property shall be used under conditions to be approved by the Engineer, and in no case will the Contractor be permitted to block access to other parts of the work under construction or to the treatment plant or other District facilities. The Contractor shall submit drawings showing the proposed layout of his plant to the Engineer for approval, if required. All other necessary or additional storage facilities shall be provided by the Contractor.

When considered necessary and ordered by the Engineer, the Contractor shall immediately remove or relocate any of his tracks, equipment, buildings or other structures which, in the opinion of the Engineer, constitute an obstruction or interfere with the proper carrying on of any other work, without additional charge to the Water Reclamation District.

Where the Water Reclamation District has prepared areas at the site of the work for use as parking spaces for the Contractor's forces, the parking of the cars of the Contractor's forces in locations other than in such parking areas will not be permitted.

The Contractor shall assume full responsibility for the security and safety of everything he may have on the property of the Water Reclamation District or other owners.

Cleaning Work Sites and Restoration

(16) The Contractor shall keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove from any portion of the site, if, in the opinion of the Engineer, such material, debris or rubbish that interferes with the operation of the existing plant or other contractors, constitutes a nuisance, or is objectionable in any way to the public. The Contractor further agrees to remove all machinery, materials, implements, barricades, staging, false work, debris and rubbish connected with or caused by said work

immediately upon the completion of the same and to clean all structures and work constructed under this Contract to the satisfaction of the Engineer, re-grade all areas which have been rutted or disturbed so that the areas will drain without pockets; and to leave the premises, upon completion of the Contract, in at least as good condition as when he entered upon them.

Restoration work shall follow construction as the work progresses and be completed as soon as possible. Restoration work shall not be delayed, and shall be completed no later than thirty (30) days after the work is in place, or as directed by the Engineer. Any testing or further inspection necessary for final completion and inspection of the work shall not be cause for any delay of restoration work required under this Contract. This provision for restoration shall include all public, private, and District property which was affected by the Contractor's construction operations. Such final restoration that cannot be performed within the thirty day period due to adverse weather conditions may, upon written request including a proposed procedure and time schedule, be performed as approved by the Engineer. Any delayed restoration will be contingent upon providing suitable safe temporary facilities without inconvenience or nuisance in the interim.

The Contractor shall maintain existing surface and subsurface drainage conditions in all areas along the line of the work, including highway ditches, storm sewers, culverts, natural terrain, field tile systems, etc.

Whenever public, private or District property is damaged or destroyed, the Contractor shall, at his own expense, restore such property to a condition equal to that existing before such damage or injury was done by repairing, rebuilding, or replacing it as may be directed, or he shall otherwise make good such damage or destruction in a manner acceptable to the Engineer. If he fails to do so, the Engineer may give the Contractor notice and after the expiration of a period of thirty (30) calendar days proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary. The cost thereof shall be deducted from any compensation due, or which may become due, the Contractor under this Contract.

This provision for restoration work shall apply to all work under this Contract.

Provisions for Delivery at Site

(17) The Contractor shall make his own arrangements for delivery of materials and equipment to the site, except as may be otherwise stated in the Contract Documents.

Where the Water Reclamation District has railroad connections serving the site, the Contractor will be permitted the use of such tracks only to the extent that it does not interfere with the Water Reclamation District's operations. Any damage to plant tracks due to the Contractor's use other than normal wear shall be promptly corrected by repair or replacement to the satisfaction of the Engineer.

The Contractor, subject to the approval of the Engineer, will be allowed reasonable use of any existing roadways that are under the jurisdiction of the Water Reclamation District. The Contractor will perform repairs or maintenance necessary to keep and return the roadway in its original condition to the District at no expense to the District. The Contractor's use of the roads shall be strictly in conformity with conditions to be prescribed by the Engineer and shall not interfere with their use by the Water Reclamation District or other contractors. The Contractor shall so conduct his work as to keep all existing roads in continuous service, except as otherwise specified.

The Contractor shall provide and maintain at his own expense such other roadways or other means to obtain access to the work as he may require. Such roadways and other means of access may also be used by the Water Reclamation District or other contractor now or hereafter engaged upon work on this site.

Procedure and Methods

(18) The attention of the Contractor is particularly called to the time allowed for the completion of the work included under this Contract. To avoid delay in the completion of work hereunder, he shall submit the names of all subcontractors and suppliers of material and equipment within 10 days after the date of approval of his bond and shall place all orders for material and equipment within 5 days after approval by the Engineer. The Contractor's attention is further called to the fact that the Water Reclamation District may take over certain parts of the work under this Contract for permanent operation as rapidly as completed in advance of the completion of the Contract as a whole.

The Contractor shall determine the procedure and methods and also design and furnish all temporary structures, sheeting, bracing, tools, machinery, implements and other equipment and plant to be employed in performing the work hereunder, and shall promptly submit layouts and schedules of his proposed methods of conducting the work to the Engineer for his approval. The use of inadequate or unsafe procedures, methods, structures or equipment will not be permitted, and the Engineer may disapprove and reject any of same which seem to him to be unsafe for the work hereunder, or for other work being carried on the vicinity or for work which has been completed or for the public or for any workmen, engineers and inspectors employed thereon, or that interferes with the work of the Water Reclamation District or other contractors, or that will not provide for the completion of the work within the specified time, or that is not in accordance with all the requirements herein specified.

The Contractor shall employ and assign to work only on this Contract a qualified technical engineer, satisfactory to the Engineer of the Water Reclamation District, to act as contact man with the Engineer.

Before starting construction, the Contractor shall submit his proposed order of procedure to the Engineer for approval. The construction of the various parts of the work shall be performed in such sequence that interference with operations of the Water Reclamation District or other contractors will be kept to a minimum.

The acceptance or approval of any order of procedure, methods, structures or equipment submitted or employed by the Contractor shall not in any manner relieve the Contractor or any responsibility for the safety, maintenance and repairs of any structure or work, or for construction, maintenance and safety of the work hereunder, or from any liability whatsoever on account of any procedure or methods employed by the Contractor, or due to any failure or movement of any structures or equipment furnished by him. When constructed, even though in accordance with the approval of the Engineer, should any structure or equipment installed hereunder afterwards prove insufficient in strength or fail on account of poor workmanship or any procedure or methods employed by the Contractor, such failure shall in no way form the basis of any claim for extra compensation for delay, or for damages or expenses caused by such failure, or for extension of time for completion of this Contract, or for material, labor or equipment required for repairing or rebuilding such structure or equipment, or for repairing or replacing any other work that may be damaged in any way by the failure or movement of any structure or equipment or by any other happening.

The Contractor shall, at his own expense, provide any necessary temporary blocking, supports or protection for all structures already constructed or to be constructed, with which his work comes in contact, to prevent injury to the same, and shall make good at his own expense any damage done by him to any part of said structures or their appurtenances in unloading and installing any of the work, materials, apparatus or equipment included under this Contract, or in removing plant or other property or in cleaning up.

The Contractor shall furnish such protection as may be necessary against damage in any way to the work, material, apparatus or the equipment included under this Contract before and after the same have been installed (including all necessary protection for structures and equipment which may be damaged by winter conditions), and shall be fully responsible for such equipment until its final acceptance.

Handling Water at Treatment Plant Sites

(19) The Contractor shall make all arrangement for handling and disposing of water entering the work to maintain safe, dry and satisfactory working conditions. The Contractor shall comply with the storm water permit requirements for the construction site and prepare an erosion control plan, as required by the IEPA. He will be permitted a reasonable use of existing drainage ditches and the drains and appurtenances constructed under various items of this Contract for the disposal of water under conditions satisfactory to the Engineer, except as otherwise specified. In using the drainage ditches and drains, the Contractor shall keep them free from concrete, clay or other deleterious substances, and if such substances area allowed to enter the drains, their use may be forbidden altogether by the Engineer. The discharge of water containing clay or other solid matter into the drainage system will under no circumstances be allowed. The Contractor shall be responsible for the care of all drains and appurtenances constructed under this Contract during its entire life, and just prior to its completion, all drains and appurtenances shall be thoroughly cleaned of all debris, deposits or other substances which will interfere with their proper operation and all broken or damaged parts shall be replaced or repaired without cost to the Water Reclamation District.

Openings and Cutting and Fitting

(20) The Contractor shall provide all openings and recesses in the concrete, brickwork and other parts of the work that may be required for any class or part of the work to be furnished or performed hereunder, or that are ordered by the Engineer. He shall do all drilling, cutting, fitting, patching and finishing that may be required to make the various classes and kinds of work hereunder go together in a proper, workmanlike and finished manner.

All such work shall be performed with proper and suitable tools in a workmanlike manner. No cutting will be allowed except by the permission of and subject to the direction or approval of the Engineer. Where holes are to be cut through concrete walls or floor slabs, a core drill or saw shall be used to prevent spalling of the concrete.

The Contractor shall cut all openings required for setting inserts in concrete or brick masonry placed under other contracts. All cutting shall be confined closely within the limits required for installing the inserts. Any concrete or brick masonry removed beyond the required limits and any damage to existing structures or equipment resulting from the cutting of concrete or brick masonry, shall be promptly replaced or repaired by the Contractor at his own expense in such a manner as ordered by the Engineer. Inserts shall be grouted in, and the cutting shall be done so that the grout can be thoroughly bounded and keyed to the existing structure. Grout shall be so placed as to make watertight joints and shall be neatly finished off flush with the surface of the adjoining structure. Reinforcement steel which may interfere with the setting of inserts shall be removed from all opening cut in the concrete, unless otherwise specified or ordered.

The cost of making all pipe connections to work performed under other contracts shall be included as part of the work under the appropriate unit and lump sum items of this Contract unless otherwise specified.

Water, Power and Water Reclamation District Equipment

(21) For Engineering Department contracts, the Contractor shall arrange for his own water supply, which shall be quality to be approved by the Engineer, free from contamination.

The Contractor, if he so desires, will be permitted to use water from the Water Reclamation District mains where it is available and does not interfere with the work of the Water Reclamation District or the requirement of other Contractors on the site. The Water Reclamation District, however, will not be responsible for any interruption of service, or possible inadequacy of the supply. The Contractor will be required to pay for the water so used from the Water Reclamation District to the various municipalities for purchase of water, and shall, at his own expense, install a meter or meters of approved typed for the measurements of the water so used. He will be required to make such temporary connections as he may need, subject to the approval of the Engineer, and to restore all existing facilities prior to the completion of the work at no additional expense to the Water Reclamation District.

The Contractor shall arrange for his own supply of power unless otherwise provided for in the Detail Specifications.

The Contractor will be permitted the use, without charge, of washrooms and toilets in existing Water Reclamation District buildings, as approved by the Engineer.

The Contractor shall provide, in total, his own field office and facilities therefore:

The Contractor will not be permitted to use any Water Reclamation District equipment or facilities except in case of emergency or as specified herein. If such equipment or facilities are used in case of emergency, the Engineer shall first give his permission and shall determine the cost of such use.

The cost for use of its facilities shall be paid to the Water Reclamation District on bills rendered monthly.

Safety

(22) The Contractor shall be responsible for the safety of the Contractor's employees, Water Reclamation District personnel and all other personnel at the site of work. The Contractor shall designate a responsible member of the Contractor's organization, knowledgeable of the site(s) and work being performed daily, as the safety representative. That person shall be provided with an appropriate office on the job site to maintain and keep available safety records and up-to-date copies of all pertinent safety rules and regulations.

The identity and resume of the qualifications of the safety representative must be submitted to the District prior to the start of any field work. This resume shall include such items as; experience, education, special safety and first aid courses completed, and safety conferences attended. The Contractor shall submit alternate safety representatives to insure compliance with the intent of these specifications.

The safety representative shall:

Have successfully completed and be currently certified in the American Red Cross Standard First Aid Course and the OSHA (Occupational Safety and Health Act) 10 Hour Construction Safety Course or their equivalents.

Be completely familiar with all applicable health and safety requirements of all governing legislation and ensure compliance with same.

Schedule and conduct safety meetings and safety training program as required by law.
Be present on the job at all times whenever work is being performed unless a safe work program is established and the safety representative is assured that workers are able to perform the work in accordance with the program.

Post appropriate notices regarding safety and health regulations at locations which afford maximum exposure to all personnel at the job site.

Post the name, address, and hours of the nearest medical doctor, name and address of nearby clinics and hospitals, and the local telephone numbers of the fire and police departments.

Post appropriate instructions and warning signs in regard to all hazardous areas or conditions.

Have proper safety and rescue equipment adequately maintained and readily available for any contingency. This equipment shall include such applicable items as proper fire extinguishers, first aid kits, safety ropes and harnesses, stretchers, life ring with standard rope lanyard, resuscitators, gas detectors, oxygen deficiency indicators, explosimeters, etc.

Make inspection to ensure that all machines, tools and equipment are in a safe operating condition; that all work methods are safe; and that will work areas are free of hazards and make available to the Engineer a daily report of all activities and findings.

Make available to the Engineer copies of all safety records and submit all safety inspection report and certifications from regulating agencies.

The Engineer shall be permitted to examine all reports, recommendations, and records of the safety representative and

upon request shall be given copies of any such reports, recommendations, and records.

The Contractor shall report to the Engineer all accidents involving injury to personnel or damage to equipment and structures. In addition, the Contractor shall furnish to the engineer a copy of all accident or health hazard reports prepared for OSHA as well as copies of all notices of apparent violations that may be issued by OSHA and all disposition reports on any hearings, appeals findings, etc.

All personnel employed by the Contractor or Sub-contractors whenever entering the job site, any shaft, or tunnel headings shall be required to wear approved safety hats.

The Contractor shall comply with all requirements relating to noise levels as specified in OSHA.

The Contractor shall comply with the latest provisions of "State of Illinois Manual of Uniform Traffic Control Devices" or other pertinent governing regulations for traffic control. When the Contractor shall provide all necessary traffic control for protection of the traveling public.

Where work is being performed in tunnels, sewers, pipe, underground structures or other confined spaces, the Contractor shall provide all necessary and appropriate safety equipment.

Atmospheric tests shall be taken as often as deemed necessary by the safety representative as required by applicable regulations.

In tunnel work an additional explosimeter shall be provided at the heading at all times which will continuously monitor for the presence of explosive gases. This explosimeter shall be the type that automatically provides both visual and audible alarms.

No employee will be allowed to work in areas where concentrations of airborne contaminants exceed 1992 American Conference of Governmental Industrial Hygienists (A.C.G.I.H.) threshold limits as amended. Respirators shall not be substituted for environmental control measures and shall be used only as prescribed by OSHA.

Internal combustion engines other than mobile diesel powered equipment shall not be used underground. All mobile diesel powered equipment used underground shall be certified by the Bureau of Mines as prescribed in OSHA.

All Internal combustion equipment shall be operated in such a manner as to prevent any health hazards to personnel from exhaust fumes.

All haulage equipment such as hoists, cages and elevators operating in excavations and shafts shall conform to all requirements described in OSHA.

Furthermore, Overhead Protection Part 1926, Subpart W, Section 1000,1001 and 1002, of OSHA is applicable to all skidsteer equipment and self-propelled compactor equipment. They shall be equipped with roll over protective structures as provided by part 1926.1000, and with seat belts as provided by part 1926.602 as designed and installed following the recommendations of the original equipment manufacturer. Any such equipment not meeting the above requirement shall not be allowed on the job site. Side boom pipe laying tractors are exempt.

Prior to the use of any materials, the Contractor shall provide the Engineer with an appropriate material safety data sheet for any material requiring one.

In addition to the safety requirements herein set forth, the Contractor shall comply with the health and safety laws, rules and regulations of federal, state and local governments, including but not limited to:

Safety Rules-Metropolitan Water Reclamation District of Greater Chicago, dated March 1, 1970 and as subsequently amended;

The Federal Occupational Safety and Health Act of 1970, together with all Amendments thereto and all rules and standards implementing said Act;

Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices current edition as issued by the American Conference of Governmental Industrial Hygienists.

Copies of the rules and regulations listed above shall be maintained at the job site by the Contractor's safety representative throughout the duration of the Contract.

Where a conflict exists between any standards, the most stringent will apply.

As-Built Drawings

(23)For Engineering Department contracts, upon completion of the work under this Contract, the Contractor shall furnish to the Water Reclamation District one complete set of As-Built drawings.

The original reproducible Contract Drawings will be made available to the Contractor by the Engineer upon which the Contractor shall make the necessary additions and corrections to show the As-Built conditions. The changes shall be made by using opaque black ink and standard drafting techniques. Each drawing changed or unchanged shall bear the notation "AS-BUILT" near the title block and shall be signed as to its correctness by the Contractor and submitted to the Engineer for approval.

The Contractor shall keep and maintain at the construction site a working set of plans for recording as-built conditions. This set of record drawings shall be kept up to date and available for the Engineer's use. It shall have marked or noted thereon all field information, properly dated; recording as-built conditions that may differ form the plans. These drawings shall be utilized to prepare the As-Built Drawings as herein specified.

The Contractor shall include in the appropriate pay items of this Contract, all engineering and drafting costs required to produce these As-Build Drawings.

Open Burning

(24) The Contractor shall not dispose of any material, debris or rubbish by open burning on the site of the work or on any other site, and shall comply with all rules and regulations of the Illinois Pollution Control Board (IPCB) in effect and as may be amended during the course of the Contract.

Posting of Project Signs

(25) Prior to the start of construction, the Contractor shall erect two 4' x 8' signs on the job site for public viewing at locations designated by the Engineer. These signs shall be erected in accordance with regulations of the USEPA and IEPA for grant-funded projects and in accordance with regulations of the Water Reclamation District for all other projects. These signs will be furnished to the Contractor by the Water Reclamation District at storage locations on District property.

For each sign, the Contractor shall furnish and install (2) 6" x 6" x 14' long dense structural grade Southern Pine mounting posts which are to be set 4 feet into the ground and 5 feet apart (center line to centerline). The bottom of the signs shall be 6 feet above ground. The Contractor shall also furnish (4) 3/8" x 10" long mounting bolts with nuts and washers for each sign.

These signs shall be maintained by the Contractor for the duration of the Contract. Upon completion of this Contract and acceptance by the Water Reclamation District, the Contractor shall dismantle the installed signs and deliver them to a place to be designated by the Engineer. All material furnished by the Contractor shall become his property and the site shall be restored to its original condition.

Proprietary Designations

(26) When proprietary specifications are used in the Contract documents followed by an " or equal" clause, they are intended to establish a standard of quality and not to inhibit the use of products of other manufacture.

Therefore, all processes, materials, devices, details, or parts specified by proprietary name shall be understood to mean and permit the use of other processes, materials, devices, details, or parts that the Engineer shall determine to be fully equal in suitability, quality and durability to the processes, materials, devices, or parts herein specified. The Engineer shall be sole judge in determining equals of proprietary specifications and his decision shall be final and binding to both parties.

The foregoing shall be adhered to unless specifically noted to the contrary in the Detail Specifications. Such note will refer to this section.

Fire or Other Emergency

(27) In the event of fire or other emergency occurring at or about the site of the work, the Water Reclamation District, at its option, may summon such aid as it deems necessary. The Water Reclamation District reserves the right to pay any third party for emergency services so rendered, and the Contractor shall promptly reimburse the Water Reclamation District for the amount of such payment. No liability on the part of the Water Reclamation District for cause of damage shall be inferred as a result of such aid being summoned, nor as a result of payment being made for such aid, and the Contractor hereby agrees to indemnify, keep and save harmless the Water Reclamation District from all claims, judgments, awards and cost which may in anywise come against the Water Reclamation District by reason of its summoning such aid and/or paying charges therefore. In the event that the Contractor summons emergency aid, the Water Reclamation District, at its option, may pay any party for emergency services rendered, and the Contractor shall be promptly reimburse the Water Reclamation District for the amount of such payment. No liability on the part of the Water Reclamation District shall inferred as a result of such payment being made, and the Contractor hereby agrees to indemnify, keep and save harmless the Water Reclamation District from all claims, judgement, awards and costs which may in anywise come against the Water Reclamation District by reason of its paying for emergency services rendered.

Care of Structures and Property

(28) All poles, trees, shrubbery, fences, pavements, railroads, sewer, water, gas or pipes, wires, conduits, culverts, drainage ditches, manholes, tunnels, tunnel shafts, buildings and all other structures and property at or adjacent to the site of the work shall be supported and protected from damage or injury by the Contractor during the construction an until the completion of said work. The Contractor shall be liable for all damages to structures and property and shall save and keep the Water Reclamation District harmless from any liability or expense for damage or repairs to the same.

In open cut work wherever existing pipes or conduits cross the excavation but do not conflict with the structure to be built under this Contract, the Contractor shall support said such pipes

and conduits without damage to them and without interrupting their use during the progress or work under this Contract.

Where existing pipes or conduits cross the excavation and do conflict with the structures or sewer to be built under this Contract, the Contractor shall notify the private individuals, utility company, city, village, or township who owns the pipes or conduits in order to move or rearrange them and shall cooperate with said owner in preserving service though said pipes or conduits, and all in accordance with the provisions or the ordinances, easements, and permits of the Contract Documents.

The Contractor shall conduct the work so that no equipment, material, or debris will be placed on or allowed to fall upon private property in the vicinity of the work, unless he shall have first obtained the owner's written consent thereto, and shall have shown his written consent thereto, and shall have shown his written consent to the Engineer.

All areas affected by the Contractor's work shall be thoroughly cleaned of all surplus materials, earth, and rubbish placed thereon by the Contractor, and such areas shall be restored to as good condition as existed before the commencement of the work. Where sod has been removed or damaged, new live sod shall be laid as hereinafter provided. Where the areas are to be seeded, top soil equal to that removed shall be placed, the area fertilized, seeded, and rolled to the satisfaction or the owner of the land, as hereinafter provided. All trees shrubs, and plants damaged shall be replaced during the proper season of the year with live growing stock of the same variety and reasonable size as that which was damaged.

The Contractor shall make such changes in the location of all electric power conduits and cables and police and fire alarm electrical wires of the municipalities as may be render necessary by the performance of the work specified under this Contract. Such changes shall be made at the places and in the manner designated by and be subject to the approval of the proper municipal officials, and the provisions of the ordinances, easements and permits of the Contract documents.

The Contractor shall arrange with all persons, partnerships or corporations for the support, removal, relocation and/or maintenance of any conduits wires, poles, pipes, gas mains, cables, or other structures within any portion of the streets, public alleys and highways and easements to be occupied or used during the performance of the work specified under this Contract, and shall do all work necessary for such support, removal, relocation and/or maintenance of such conduits, wires, poles, pipes, gas mains, cables, or other structures encountered, as may be rendered necessary by the construction of said work.

The Contractor shall furnish all material and supplies, plant, staging and falsework, machinery, tool and implements, vehicles, cars and railroad track; in fact, all material and appliances of every sort or kind that may be necessary for the full and complete performance of this Contract, and shall furnish and maintain, subject to the approval of the Engineer, all necessary barricades, and other protections, lights and signs, necessary for the proper protection of the public. The Contractor shall also furnish watchmen not only to protect the public, but to protect all materials, tools, machinery, and equipment and all work performed by the Contractor until said work has been completed and accepted by the Engineer.

On all connection items, the Contractor shall make a preliminary trench excavation to locate the existing sewers and other utilities before he begins the actual work of excavation for the connection to be built at each location.

The Contractor shall, at his own expense, repair any damage to machinery, equipment, masonry buildings, or other property of the Water Reclamation District, or other owners or work under construction by other contractors occasioned by the Contractor in the execution of this Contract.

All of the described work under this Section shall be done with no additional expense to the Water Reclamation District.

Historic and Scientific Specimens

(29) The Contractor shall preserve and deliver to the Engineer any specimens of historic or scientific value encountered in the work as directed by the Engineer.

Operation and Service Equipment Manuals

(30) In addition to the requirements specified in Section (3) of the General Specifications, unless otherwise specified in the Detail Specifications, the Contractor shall provide 9 copies of the Equipment Manual for all equipment furnished. The Manual shall consist of bulletins, certified manufacturers' prints, schematic diagram, as-built drawings of equipment, and other pertinent data which provide all information necessary to install, service, maintain, repair, and operate each piece of equipment, and shall include parts lists, service and maintenance instructions and performance data. The data, instructions and parts list for each piece of equipment shall necessarily include all accessories and controls furnished with the equipment.

The Manual must be submitted and approved at least four weeks prior to operating personnel training as specified in Section (31) of the General Specifications. Only 2 copies of the Manual will be required for purpose of review by the Engineer with 9 approved copies to be delivered to the Engineer prior to operation testing and personnel training.

The Manuals shall be bound in vinyl multi-ring binders bearing the contract title and number on the cover and in the window on the binder backbone. The inserts shall be 8-1/2" x 11"

in size, with any larger sized inserts folded to 8-1/2" x 11". The Manuals must include an index and tabbed sheets which will contain item numbers and descriptions in sufficient detail for easy reference to any particular piece of equipment included in the Manual.

Operating Personnel Training

(31) For Engineering Department contracts, it shall be the Contractor's responsibility to furnish necessary training and instruction to make supervisory and operating personnel completely familiar with the operation and maintenance of all equipment installed under this Contract. This training and instruction must be completed prior to the start of any operation tests that are required on this Contract. This training and familiarization shall include coordination of new with existing controls. Such instruction may, when deemed necessary by the Engineer, include instruction by factory-trained representatives of the manufacturer. The costs for all necessary instruction shall be included in the price or prices to be paid under the terms of the Contract.

Such time as is necessary shall be devoted to this requirement and a log shall be kept up to date by the Contractor of such training including date, duration, equipment and/or systems covered and party or parties conducting and attending the instructions. When all Operating Personnel Training is completed, the Contractor shall submit the certified log to the Engineer.

Operator training is to be provided on all three shifts, with all shifts receiving full and equal training.

Training schedules are to be approved by the Engineer two weeks prior to the starting of training.

Technical/Maintenance training is to be given on the day shift, during normal plant working hours. This training is to be separate from the operators' training.

Operation Tests

(32) For Engineering Department contracts, as soon as conditions will permit, and after safety devices, controls, and other components are checked, the Water Reclamation District, in cooperation with the Contractor, will place the equipment finished and/or installed under this Contract in operation, to such an extent that the Water Reclamation District may deem necessary, and will continue to operate and maintain lubrication where necessary, for at least sixty (60) calendar days. During this operation test period, the Contractor shall make such changes, betterments, or replacement in the equipment furnished and installed under this Contract as may be required to comply with the specifications, or to replace any defective work.

When, in the opinion of the Engineer, said changes, betterments, or replacements in the equipment are substantial, then the test period shall be reinitiated and continue for at least sixty (60) calendar days upon completion of the changes.

Prior to the above operation test period, the Contractor shall comply with Section (30) and (31) of the General Specifications. During the above operation test period, the Contractor shall furnish sufficient supervision to instruct the District in the maintenance and operation of the equipment furnished and installed under this Contract.

Acceptance

(33) If, in the opinion of the Engineer, it has been demonstrated in the operation test that the equipment furnished and installed under this contract meets the performance requirements of the Contract, then the equipment furnished and installed under this Contract shall be accepted by the Water Reclamation District; however, if , in the opinion of the Engineer, it has been demonstrated in the operation tests that the equipment furnished and installed under this Contract does not meet the performance requirements of the Contract, then the Contractor shall, at his own expense,, make all necessary changes, betterments, or replacements in the equipment so that it will meet the performance requirements when again tested.

If the Contractor fails or refuses to make changes, improvements, or betterments, or if the improved equipment when places in operation, shall again fail to meet the performance requirements, the Water Reclamation District, notwithstanding its ownership of work and material which have entered into the equipment, shall have the option of rejecting the equipment or of accepting the equipment at such reduced prices as may be agreed upon by the parties hereto.

In case the Water Reclamation District exercises its option and rejects the equipment, then the Contractor shall repay the Water Reclamation District all sums of money paid to him on progress payment vouchers or on account of the prices herein specified, and upon receipt of said sums of money, the Water Reclamation District will execute and deliver to the Contractor a letter relinquishing its right, title, and interest in and to the equipment. However, that the equipment shall not be removed from the premises of the Water Reclamation District until the Water Reclamation District obtains from other sources other equipment to take the place of that rejected. The Water Reclamation District agrees to obtain the other equipment within a reasonable time, and the Contractor agrees that the Water Reclamation District may use the equipment furnished and installed by him without rental or other charges until the other new equipment is obtained.

Removal of Equipment, Material and Debris

(34) Unless otherwise specified in the Detail Specifications all reusable or salvageable equipment and material specified to be

removed in the Detail specifications shall be delivered to the Water Reclamation District storekeeper or to a location on the site designated by the Engineer. The Contractor shall be responsible for the loading, transporting, and unloading of this equipment and material. Equipment, ductwork, or piping with insulating materials intact after removal may be considered, for practical purposes, as having salvage value.

All debris consisted of loose insulation materials, firebrick, broken concrete, etc., shall be removed from the Contractor's work site by the Contractor.

Maintenance Management System Manuals

(35) In addition to the requirements specified in Section (30) of the General Specifications, the Contractor shall furnish copies of Maintenance Management System (MMS) Manuals containing information/data as indicated by each of the items specified below. No later than one-third into the time of completion of this contract (or the one-third point of construction on performance specification contract), the Contractor shall provide a complete list of all equipment furnished under this contract. If the required listing is not provided, the District will withhold progress payments until the Contractor complies. From this list, the District will develop and forward to the Contractor EQUIPMENT LISTING sheet(s) that will define which equipment is to be included in the MMS Manuals. These sheets will also indicate the required naming and numbering conventions to be used for each piece of equipment. The Contractor shall utilize these EQUIPMENT LISTING sheet(s) for preparation of the MMS Manuals. The information/data specified below shall be furnished individually for each item of equipment entered on the EQUIPMENT LISTING sheet(s). The equipment included in the MMS Manuals need not be included in the manuals required under Section (30).

The Manuals shall be bound in vinyl D-ring binders bearing the contract title and number on the cover and in the window of the spine. The Manuals shall be sized for 8-1/2" x 11' SHEETS, WITH ANY LARGER SIZED SHEETS FOLDED TO 8-1/Z" X 11". Manuals shall include an index and tabbed insert sheets labeled for each item of equipment on the EQUIPMENT LISTING Sheet(s). The information/data within each tabbed section shall be organized in the order as it appears below.

All drawings and documents provided for the manuals shall have each individual sheet stamped/identified with the proper equipment number(s) as established in the EQUIPMENT LISTING sheet(s).

The Manuals shall be submitted and approved no less than two months prior to final acceptance of the work or two months prior to any personnel training (Section (31)) and/or operation tests (Section 32)) the Contractor is required to perform, whichever is sooner. Only two copies of the Manual will be required for purposes of review by the Engineer prior to approval.

The information/data required for the MMS Manuals is specified as follows:

- Completed **EQUIPMENT DATA** sheet;

- Completed **MOTOR DATA** sheet;

- Completed **EQUIPMENT MANUFACTURER/ SUPPLIER INFORMATION** sheet;

- Lubrication Information: a listing (for each lube point) specifying the generic type of lubricant used, the lubricant supplier, the lubrication frequency based on runtime hour and/or calendar day intervals, and the amount of lubricant used;

-Parts List: consisting of the manufacturers and generic part name, identification number and quantity of each component part of the equipment;

-Spare Parts List: consisting of the manufacturer's recommendations as to which parts from the above parts list should be inventoried, how many of each, and any special storage requirements;

-Control Diagrams: providing schematics showing complete internal and connection wiring;

-Installation Procedure: consisting of the manufacturer's recommendations of step-by-step procedures for proper installation of the equipment;

-Operating Procedures: consisting of equipment manufacturer's recommended step-by-step procedures for starting (including pre-start checks), operating, and stopping the equipment under specific modes of operation. Shut-down procedures (with checklists) for both long and short term outages and operating precautions that include safety for personnel and equipment shall be included;

-Preventive Maintenance Procedures: consisting of the equipment manufacturer's recommended steps and schedules (based on runtime hour and/or calendar day intervals) for inspecting and maintaining the equipment;

-Repair/Overhaul Maintenance Procedures: consisting of the manufacturer's directions for the disassembly, repair, and reasonably of the equipment with all safety precautions that must be observed while performing the work; The procedures shall include instructions for the adjustment, calibration, and troubleshooting of equipment;

-Predictive Maintenance Procedures: consisting of the manufacturer's criterion and recommendations for predictive maintenance including descriptions and parameters of all applicable diagnostic test/analysis to be performed and the recommended testing intervals based on runtime hours and/ or calendar days;

-Drawing; exploded or cut views of the equipment shall be provided if available as a standard item of manufacturer's information. When exploded or cut views are not available, plan and section views shall be provided with details callouts.

If CAD drawings are available in electronic format they shall be delivered on electronic or optical media in a format readable by the Water Reclamation District's current CAD systems. If the drawings were originally created using AutoCAD, it is preferred that the files be delivered in .DWG format. If the files are from some other CAD package, then .DXF format is acceptable. As-Built information will be segregated on a separate drawing layer so as to not be mixed with original design or design revision information.

Copies of the **EQUIPMENT DATA** sheet, the **MOTOR DATA** sheet and the **EQUIPMENT MANUFACTURER/SUPPLIER INFORMATION** sheet appear in these contract documents. The Contractor may reproduce the sheets or upon written request, obtain copies from the District.

EQUIPMENT LISTING

PAGE ☐ OF ☐

EQUIPMENT NUMBER

EQUIPMENT LOCATION

EQUIPMENT DESCRIPTION

PROGRAM NO.

EQUIPMENT NUMBER

EQUIPMENT LOCATION

EQUIPMENT DESCRIPTION

PROGRAM NO.

EQUIPMENT NUMBER

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EQUIPMENT DESCRIPTION

PROGRAM NO.

EQUIPMENT NUMBER

EQUIPMENT LOCATION

EQUIPMENT DESCRIPTION

PROGRAM NO.

EQUIPMENT MANUFACTURER/SUPPLIER INFORMATION

CONTRACT NO. (if applicable) **P.O. NUMBER** **ITEM NO.** **EQUIPMENT NUMBER**

MANUFACTURER INFORMATION:

MANUFACTURER NAME

ADDRESS

ZIP CODE **TELEPHONE NUMBER**

CONTACT PERSON **FAX NUMBER**

SUPPLIER NUMBER

SUPPLIER INFORMATION:

SUPPLIER NAME

ADDRESS

ZIP CODE **TELEPHONE NUMBER**

CONTACT PERSON **FAX NUMBER**

EQUIPMENT DATA

P.O. NUMBER **ITEM NO.** **CONTRACT NO. (if applicable)**

EQUIPMENT NUMBER **EQUIPMENT LOCATION**

EQUIPMENT DESCRIPTION **PROGRAM NO.**

MODEL NUMBER **SERIAL NUMBER**

MANUFACTURER **MANUFACTURE DATE** **PURCHASE DATE** **WARRANTY EXPIR. DATE**

SUPPLIER **ORIGINAL COST** **SIZE**

TYPE/STYLE

EQUIPPED W/ RUN METER? (Y/N) **IF YES:** **CURRENT METER READING** **METER UNITS OF MEASURE**

(MILES, GALLONS, HOURS, ETC.)

ESTIMATED SERVICE LIFE

(HOURS, DAYS, MONTHS, YEARS, ETC.)

OPERATING CHARACTERISTICS (COMPLETE AS APPLICABLE):

CAPACITY

INCLUDE UNITS OF MEASURE (GPM, CFM, MGD, BTU, ETC.)

OPERATING PRESSURE/HEAD

INCLUDE UNITS OF MEASURE (PSI, FT OF WATER, ETC.)

VELOCITY

INCLUDE UNITS OF MEASURE (FPM, MPH, CM/SEC., ETC.)

PRESSURE DROP

INCLUDE UNITS OF MEASURE (PSI, IN. WG [AIR], FT OF WATER, ETC.)

WATER TEMP: **IN** **DEG. F** **OUT** **DEG. F** **AIR TEMP:** **IN** **DEG. F** **OUT** **DEG. F**

**********IF EQUIPPED WITH A MOTOR, COMPLETE **MOTOR DATA SHEET**********

MOTOR DATA

P.O. NUMBER | **ITEM NO.** | **CONTRACT NO. (if applicable)** (- - -)

EQUIPMENT NUMBER | **EQUIPMENT LOCATION**

EQUIPMENT DESCRIPTION | **PROGRAM NO.**

TYPE/STYLE OF MOTOR

MOTOR MODEL NUMBER | **MOTOR SERIAL NUMBER** | **CONTRACT ITEM NO.**

MOTOR MANUFACTURER | **MANUFACTURE DATE** (- -) | **PURCHASE DATE** (- -) | **WARRANTY EXPIR. DATE** (- -)

MOTOR SUPPLIER | **ORIGINAL COST** | **HORSEPOWER** | **SERVICE FACTOR**

VOLTS | **AMPS** | **RPM**

FRAME SIZE | **KILOWATTS**

NEMA CLASS: | **PHASE:** | **FREQUENCY:** | **HERTZ** | **INSULATION CLASS:**

EQUIPPED W/ RUN METER? (Y/N) | **IF YES:** | **CURRENT METER READING** | **HOURS**

ESTIMATED SERVICE LIFE

(HOURS, DAYS, MONTHS, YEARS, ETC.)

INDEX

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO
GENERAL SPECIFICATIONS – CONCRETE (GSC)

Classes of Concrete.

(1) The following twelve classes of concrete shall be used in construction of sewage treatment plant structures, sewers, pavements, bridges, tunnels and miscellaneous structures:

Table 1-Concrete Mix Designs

Class R - Dense, watertight, durable concrete for structures in contact with sewage, sewage gas or vapor.

Class RA - Similar type of concrete as described in "Class R" with the addition of an ASTM C-494 MWRD approved water reducing admixture.

Class RAP - Similar to Class RA except modified for placement by pumping.

Class P - Dense, watertight, durable concrete for use where specified for pavement, walkways and architectural concrete work not in contact with sewage or sewage gas and when a uniform appearance (color) is desired.

Class PA - Similar to Class P except with the addition of an ASTM C-494 MWRD approved water reducing admixture.

Class S - To be used where a high strength concrete is required.

Class T - Concrete with reduced size aggregate for use where specified for topping or other special types of concrete work.

Class TA - Similar to Class T except with the addition of an ASTM C-494 MWRD approved water reducing admixture.

Class GB - Non-structural grout.

Glass GS - Structural grout.

Class GSA - Similar to Class GS except with the addition of an ASTM C-494 MWRD approved water reducing admixture.

Class F - Concrete used as fill concrete and mud coat where specified.

The class of concrete to be used for any particular location shall be as specified in the Plans or the Detail Specifications. When not otherwise specified, concrete shall be Class R or Class RA.

Concrete Mixtures.

(2) The Contractor shall use the proportions or weights of the ingredients as specified in Table 1 for each given class of concrete used.

If for a special purpose the Contractor proposes to use a concrete mix different than the designs listed in Table 1, he must submit the mix design to the Engineer for approval. The Contractor shall make trial batches and have the necessary tests performed as directed by the Engineer at no cost to the District. The tests shall be repeated as required until the proposed mix is approved by the Engineer. The concrete mix shall at all times be subject to modification by the Engineer on the basis of the Character of work in which the concrete is to be used, variation in aggregates, subsequent tests, and inspection of the work performed. Where mix designs necessitate increased water requirements (to accommodate higher slumps, increased percent of sand, special aggregates, etc.) cement contents shall be increased proportionately for any increase in water.

For concrete of a given class, the cementitious materials and fine and coarse aggregate shall be so proportioned and mixed as to produce homogeneous concrete of such consistency that it may be readily placed under the conditions of use, completely filling the forms or space into which it is placed, without voids and without separation of the ingredients.

All ingredients of concrete shall be weighed and not measured by bulk, except that full bags of portland cement weighing 94 pounds per bag and full bags of fly ash of the proper weight to produce the blend specified in Table 1 may be taken into the batch without further weighing.

TABLE 1-CONCRETE MIX DESIGNS

Class of Concrete		Class "F"		Class "GB"		Class "GS"		Class "GSA"		Class "P"		Class "PA"	
Type of Aggregate		**Gravel**	**Crushed Stone**	**Limestone Screenings**	**Sand**	**Sand**	**Sand**	**Sand**	**Sand**	**Gravel**	**Crushed Stone**	**Gravel**	**Crushed Stone**
Top Size of Aggregate		1"	1"	-	-	-	-	-	-	1"	1"	1"	1"
Cement Sacks/cu. yd.		2.55	2.87	4.50	4.50	12.0	11.1	11.0	10.2	7.0	7.0	6.5	6.5
Cement lbs./cu. yd.		240	270	423	423	1128	1045	1034	959	658	658	611	611
Fly ash lbs./cu. yd.		40	45	100	100	-	125	-	125	-	-	-	-
Coarse Agg. lbs./cu. yd.		1900	1780	2750	-	-	-	-	-	1900	1750	1900	1750
Fine Agg. lbs./cu. yd.		1500	1520	_	2700	2020	1955	2020	1955	1109	1245	1150	1290
Water lbs./cu. yd. max.		260	260	487	487	508	526	465	488	296	296	257	257
Air Entr. % of Vol.		4 to 6	4 to 6	+	+	8 to 10	8 to 10	8 to 10	8 to 10	4 to 6	4 to 6	4 to 6	4 to 6
Water Reducing		-	-	*	*	-	-	*		-	-	*	*
Admixture oz./sack													
Crushing Strength psi Minimum	7 Days	**-**		**-**		**2800**							
	28 Days	**1200**		**1500**		**4000**							

Class of Concrete		Class "R"		Class "RA"		Class "RAP"		Class "S"		Class "T"	Class "TA"
Type of Aggregate		**Gravel**	**Crushed Stone**	**Gravel**	**Crushed Stone**	**Gravel**	**Crushed Stone**	**Gravel**	**Crushed Stone**	**Gravel**	**Gravel**
Top Size of Aggregate		1"	1"	1"	1"	1"	1"	1"	1"	3/8"	3/8"
Cement Sacks/cu. yd.		6.28	6.28	5.75	5.75	6.28	6.28	7.5	7.5	7.69	7.0
Cement lbs./cu. yd.		590	590	540	540	590	590	705	705	723	658
Fly ash lbs./cu. yd.		100	100	100	100	100	100	100	100	100	100
Coarse Agg. lbs./cu. yd.		1900	1750	1900	1800	1750	1650	1955	1780	1260	1260
Fine Agg. lbs./cu. yd.		1060	1195	1200	1250	1310	1360	1190	1215	1313	1350
Water lbs./cu. yd. max.		310	310	269	269	290	290	338	338	370	325
Air Entr. % of Vol.		4 to 6	4 to 6	4 to 6	4 to 6	4 to 6	4 to 6	+	+	6.5 to 8.5	6.5 to 8.5
Water Reducing Admixture oz./sack		-	-	*	*	*	*	*	*	-	*
Crushing Strength psi Minimum	7 Days	**2800**						**4200**		**2800**	
	28 Days	**4000**						**6000**		**4000**	

* Varies with product used

\+ Residual air only; add no air entraining admixture

Slump.

(3) The slump of concrete utilized shall be as directed by the Engineer, however, in no case shall the slump exceed 5 inches at point of placement if time limits in Section 9 and water content in Table 1 are not exceeded. Typical slump ranges for various types of construction are shown in Table 2.

TABLE 2-SLUMP LIMITS

Types of Construction	Slumps, Inches	
	Max.	Min.
Reinforced foundation walls and footings	4	2
Unreinforced footings, caissons and substructure walls	3	1
Reinforced slabs, beams walls and columns	4	2
Pavements	4	2
Sidewalks, driveways and slabs on ground	4	2
Heavy mass construction	2	1
Concrete conveyed pneumatically or by pumping	5	3
Tunnel Lining and Sewers	4	2

Cement.

(4) Cement shall be ASTM C150 Type 1 portland cement unless otherwise specified in the Detail Specifications or approved by the Engineer.

Fly Ash.

(5) Fly Ash shall conform to ASTM C-618 Types C, F or N except that carbon content shall not be more than 3% by weight and loss on ignition shall not be more than 6 % by weight. Fly Ash shall be sampled in accordance with ASTM C-311.

Water.

(6) Water used with cement in concrete, mortar, and water used for curing concrete, shall be clean, clear, free from sugar, and shall not contain acid, alkali, salts or organic matter in excess of the following amounts when tested in accordance with AASHTO T 26:

(a) Acidity and Alkalinity
(1) Acidiy-0. 1 Normal NaOH 2 ml. Max.*
(2) Alkalinity-0.1 Normal HC1 10 ml. Max.*
* To neutralize 200 ml. sample.

(b) Total Solids
(1) Organic ..... 0.02% max.
(2) Inorganic ..... 0.30% max.
(3) Sulphuric anhydride (S03) ..... 0.04% max.
(4) Alkali chloride as sodium chloride (NaCl) ..... 0.10% max.

When standard 1:3 mortar briquettes made with cement, sand and water from the sample are compared with briquettes made with the same cement and sand and distilled water, there shall be no indication of unsoundness, marked change in time of set, or variation of more than 10 per cent in strength.

Water which has been approved by the Illinois Department of Public Health for drinking or ordinary household use may be accepted without being tested. All other sources shall he approved by the Engineer.

The Contractor shall not use water from shallow, muddy, or marshy surfaces. The intake of the pipe line shall be enclosed to exclude silt, mud, grass, and other solid materials, and there shall be a minimum depth of 2 feet of water below the intake at all times.

Admixtures.

(7) All admixtures shall be dispensed volumetrically at the concrete plant. When requested by the Engineer, the Contractor shall furnish the services of a manufacturer's qualified field representative to assure proper use of the admixture.

The maximum water soluble chloride content of the admixture shall be such that, when added to the concrete, the total water soluble chloride content shall not exceed 0.1% by weight of cement.

Air-entraining admixtures shall be MWRD approved and conform to the latest edition of ASTM C-260. The amount of air-entraining admixure used shall be adjusted to accommodate whatever variation there may be in the character of the concrete to provide the required air content.

Chemical admixtures added for the purposes of water reduction, acceleration, retardation or combinations thereof shall conform to the latest edition of ASTM C-494. The Contractor shall submit, when requested by the Engineer, appropriate tests, such as infrared spectrophotometry, pH value and solids content, for establishing the equivalence of the materials to the materials which have passed the District's Admixture Test Program.

The water-reducing admixture shall be used as determined by the manufacturer's recommended quantities per hundred weight of Type 1 cement. No ASTM C-494 Type admixture will be allowed unless it has successfully completed the District's Concrete Admixture Test Program and has been accepted for use by the District. The amount of water-reducing admixture and quantities of other ingredients per cubic yard of concrete are indicated in Table 1, Class of Concrete-Class RA, GB, RAP, S, PA and TA.

No other admixture will be allowed unless otherwise provided for in the Detail Specifications or approved by the Engineer.

Aggregates.

(8) Aggregates shall conform to ASTM C-33, except that the gradations shown in Table 3 shall apply.

TABLE 3
SAND

Sieve Size	Percent Passing
3/8"	100
# 4	94-100
# 16	45- 85
# 50	10- 30
#100	0- 5

3/8-INCH COARSE AGGREGATE

Sieve Size	Percent Passing
1/2"	100
3/8"	85-100
# 4	10- 30
# 8	0- 10
#16	0- 5

1-INCH COARSE AGGREGATE

Sieve Size	Percent Passing
1-1/2"	100
1”	90-100
1/2"	30- 60
#4	0-10

The fine aggregate shall consist of washed sand. Stone sand will be permitted for portland cement concrete provided it is blended with natural sand in the proportions satisfactory to the Engineer. In no case shall stone sand exceed 60 percent by weight of the total sand.

Coarse aggregate shall be natural crushed stone, gravel or crushed gravel. No blast furnace slag shall be used.

All aggregates shall be chemically compatible with each other and with other components of the concrete mix.

Chert, limonite and shale in the aggregate shall not exceed 2% by weight. Deleterious chert shall be defined as the light weight fraction separated in a 2.35 specific gravity heavy media separation. The aggregate shall have no more than 0.2% of other deleterious materials or substances whose disintegrating is accomplished by an increase in volume which may cause a spalling of the concrete.

If visual inspection indicates that the quality of any load or run of aggregate is outside the limits of the specifications, the Engineer may suspend the use of that load or run of material until laboratory tests verify the quality as acceptable or unacceptable.

Mixing.

(9) Concrete mixed at the jobsite shall be mixed in a batch mixer approved by the Engineer.

The Contractor shall provide a modern and dependable concrete mixing plant of sufficient capacity to produce the maximum output of concrete required to complete the work within the specified time without reducing the minimum mixing time hereafter specified. The mixers shall be of the rotary batch type so made and operated as to insure a uniform distribution throughout the mass, so that the resulting mixture is homogeneous, uniform in color and all coarse aggregate completely covered with mortar. Where cement is delivered in bags, no mixer shall be used that requires less than one bag per batch of concrete.

The mixer shall be equipped with batching equipment to meet the following requirements:

The amounts of cement and of each individual size of aggregate entering into each batch of concrete shall be measured by direct weighing equipment satisfactory to the Engineer. Weighing equipment shall be readily adjustable for compensating for the moisture content of the aggregate or for changing the proportionate batch weights, and shall include a visible dial or equally suitable device which will accurately register the scale load from zero to full capacity. The accuracy of the weighing equipment shall conform to the requirements of the U. S. Bureau of Standards. Cement must be weighed and batched separately from the fine and coarse aggregate and shall be discharged directly from the cement batcher into the charging hopper, conveying car or mixing drum of each unit.

Bulk cement weighing hoppers shall be equipped with vibrators to operate automatically and continuously while the weighing hoppers are being dumped to assure a clean dump of the cement each time into the mixer.

Bulk cement shall not be allowed to contact damp sand at any time for more than one hour, and in the winter time when the sand is hot, for more than 30 minutes before the batch is discharged into the mixer. If winter operations are to continue with heating of the aggregate at the batch plant and the batched material is to be held for long periods of time in the trucks, due either to the length of haul or to occasional breakdowns at the mixer plant, then the Contractor shall use bagged cement entirely instead of using bulk cement until the heating of the aggregate is no longer necessary and there is no longer danger of prehydration of the cement before it is used.

In no case shall the temperature of the concrete be allowed to exceed 90^0F.

The amount of water entering each batch of concrete shall be measured either by weight or volume. The equipment shall be capable of measuring the water within a tolerance of one percent plus or minus and shall be equipped with an accurate gauge or dial, reading clearly at all times, either in pounds or gallons.

The water measuring device shall be kept locked and the amounts of water to be used shall be varied only under the direction of the Engineer. During concreting, water shall be admitted to the mixer only through the water measuring device and then only at the time of charging.

Each mixer shall be equipped with a suitable clock or timing device, capable of being locked, for visibly indicating the time of mixing after all the materials, including the water, are in the mixer. The time of mixing shall be dependent upon the results obtained but in no case shall the time, after all materials, including water are in the mixer, be less than 1-1/4 minutes for 1 cubic yard and 15 seconds additional for each additional cubic yard.

The entire contents of the drum shall be discharged before recharging. The volume of mixed material per batch shall not exceed the manufacturer's rated capacity of the mixer.

The use of continuous mixing must be approved by the Engineer. When employed, continuous mixing must be in accordance with ASTM C-685. The mixing equipment specifications and performance data must be submitted to the Engineer for approval. The Engineer may then order such tests as necessary to verify the submitted data.

Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C-94. The ready-mix plant and its facilities must be approved by the Engineer. Plant facilities include the mixing apparatus, proportioning apparatus, storage facilities and provisions for heating and cooling materials. The plant facilities must be of the current state of the art and shall include a printing device to record the actual batch quantities. Also subject to approval by the engineer are the concrete trucks serving the plant. When agitation is accomplished in the truck, the truck must be equipped with a revolution counter. When the truck is equipped with a water reservoir, a water level sight gage must be provided. The mixed concrete shall have an initial air and slump content which will insure that the limits shown in Tables 1 and 2 are met at the point of placement within the following time constraints.

Max. Delivery & Placement Time

Air Temperatures 75^0F and above	60 min.
Air Temperatures below 75^0F	90 min.

The above temperatures are the ambient air temperatures at the point at which the concrete is being batched.

The above time limits are the maximum times between concrete batching and concrete placement and shall not be exceeded without the approval of the Engineer. The Engineer may approve longer time intervals when an MWRD approved retarding admixture is added to the concrete.

The producer of ready-mixed concrete shall furnish a ticket stamped by an approved time clock with the departure time from the plant. This time will be the starting time for the Maximum Delivery and Placement Time shown above. The time tickets shall accompany the truck delivering the concrete and shall be given to the Engineer or his representative upon arrival of the job site.

No truck shall be loaded to excess of its rated capacity.

No materials, including water and admixtures, shall be added to the concrete after leaving the ready-mix plant except with the approval of the Engineer.

Notification of Concrete Pours.

(10) The Contractor shall notify the Project Control office by 12 Noon of the day preceding Saturday or holiday concrete pours and by 3:00 P.M. of the day preceding all other concrete pours. Project Control also must be notified immediately of all concrete pour cancellations or other changes in concrete pour schedules.

Quality Control Laboratory.

(11) A Quality Control Field Laboratory must be provided at each concrete materials yard or concrete batching plant. The laboratory must be heated, air conditioned, lighted and reasonably free from noise. Water and sanitary facilities must be provided. The laboratory shall be equipped with the following:

1. Telephone
2. Desk and chair
3. Complete set of 8" sieves for fine aggregate, sizes 3/8" to #200
4. Motorized shaker for fine aggregate sieves
5. Complete set of large sieves for coarse aggregate, sized 1-1/2 to #4
6. Motorized shaker for large sieves
7. Triple beam balance, 200 gm capacity
8. Sample Splitter
9. Hot plate
10. Platform scale, 100 lb capacity
11. ASTM C-143 slump cone, base, rod
12. Long nose shovel, cleaning brush
13. Assorted pans and pails
14. ASTM C-231 Air Meter

The Contractor shall provide experienced quality control personnel, who are subject to the approval of the Engineer, at the ready mix plant or batch plant.

Placing Concrete.

(12) Concrete shall be deposited as nearly as possible in its final position to avoid rehandling and in the case of walls, in such a manner as to maintain the concrete surface approximately

horizontal. Once started, the placing of concrete in any unit shall be a continuous operation. Should any unavoidable break in the concreting operation occur before the completion of a unit, a construction joint shall be formed at the proper location, either by bulkheading or, in the case of a vertical wall, by leveling off to a horizontal plane. The joint shall be properly keyed and, if required, additional reinforcement bars shall be placed as dowels, as directed by the Engineer, without additional cost to the Water Reclamation District. On resuming work, the procedure hereinafter specified for construction joints shall be followed.

In depositing concrete, care shall be taken to prevent the segregation of concrete materials. If chuting is employed, the chute shall be arranged so as to insure a continuous flow without requiring an increase of water over the amount specified. The point of delivery of the chute, conveyor, tube, or other device, shall not be more than eight feet distant horizontally from the point of final deposit of the concrete.

Concrete placed on sloping surfaces shall be poured from toe of slope to top.

The concrete shall be deposited in approximately equal horizontal layers of 18 to 24 inch and shall not be allowed to drop freely more than 4 ft. or through a cage of reinforcing steel.

Bottom-dump buckets may be used to transport mixed concrete to the desired location. Particular care shall be taken to avoid jarring or bumping which may cause segregation.

Elephant trunks, and/or tremies shall be used in walls and columns to prevent freefall of the concrete and to allow the concrete to be placed through the case of reinforcing steel. They shall be moved at short intervals to prevent stacking of concrete.

Pumping equipment shall be a suitable type with adequate pumping capacity. Loss of slump in pumping shall not exceed 1-1/2 inch.

Concrete conveying equipment shall be designated specifically to place concrete. Conveyor systems shall not impair the strength, slump or air content of the concrete being placed. The placement system must be capable of delivering concrete over the entire placement area without delays or equipment relocation.

Alternate placing equipment shall be immediately available for use in the event that the primary placing equipment fails during a placement. Such equipment shall be able to commence placing operations within 30 minutes notice to avoid cold joints in the structural element being placed. The contractor shall submit the alternate methods or procedure to the Engineer prior to placement of the concrete.

Before commencing operations, all surfaces upon which or against which concrete is to be placed shall be cleaned of all mud and debris. At construction joints special care shall be taken as hereinafter specified. No concrete shall be deposited in water except by permission of the Engineer and then only with such precautions as he may require. In no case shall concrete be deposited in running water, nor shall water be permitted to flow over freshly deposited concrete.

Sections of walls between joints shall be placed continuously to produce a monolithic unit. At least 48 hours must elapse between casing of adjoining units.

Placing of concrete in beams of slabs, shall not begin until the concrete previously placed in walls or columns has attained initial set.

As soon as possible after placement, all concrete shall be tamped, spaded, or vibrated by the use of internal vibrators until it is thoroughly compacted so as to result in a dense, watertight structure, free from voids and with a smooth surface and so as to work the concrete around reinforcement and inserts and to prevent formation of voids. Forms will contain no pockets which will cause the formation of trapped air.

Where possible, all formed concrete shall be vibrated by the use of internal vibrators. Internal vibrators shall not be allowed to remain in one position in the concrete mix but must be continuously inserted and withdrawn in a brisk manner while adhering to a planned orderly pattern. Each horizontal layer shall be consolidated before another layer is placed. When internal vibrators are used, the vibrator shall extend into the underlying layer to bond the two layers together. To avoid excessive pressure on the forms, the vibrator shall penetrate no more than two feet into the underlaying layer. In no case will the internal vibrators be used to move the concrete from one spot to another in lieu of shoveling or other accepted methods of placing concrete. Concrete in walls shall be placed and vibrated in such a way that will not cause an accumulation of water at the top of walls nor drive water ahead of pouring toward an end of a wall. Mechanical high frequency vibrators with a minimum frequency of 7000 revolutions per minute are preferred for consolidation of the concrete within the forms. The concrete shall not be vibrated long enough to cause segregation of the aggregate. The bottom forms for beams, girders and floor slabs shall be covered with a structural grout surface before concrete is placed thereon.

The Contractor shall notify the Engineer in sufficient time before starting the concreting of any unit to permit a thorough inspection of forms and reinforcement steel within three working hours unless otherwise authorized by the Engineer. No concrete shall be poured until such inspection has been made and approval given, and then only in the presence of the Engineer or his representative.

In the construction of sewers and conduits, the Contractor shall concrete the section as soon as it is practicable after the excavation has been made. If, in the opinion of the Engineer, thedistance between the face of the heading and the end of the concreted section is excessive or unsafe, the Engineer reserves the right to require the Contractor to stop all tunnel work or open cut excavation and to concrete the section to such an extent as the Engineer may direct. The distance between the face of the heading and the end of the concreted section shall be subject to the approval of the Engineer at all times.

In tunnel construction, concrete shall not be placed by pouring through pipes from the surface of the ground directly into the forms. Pneumatic or mechanical concrete placing equipment shall be used in placing concrete into the forms in tunnel construction.

Bentonite slurry used in conjunction with the jacking method shall be pumped from inside the pipe.

In the use of circular or horse shoe forms in tunnel construction, the concrete shall not be discharged directly over the arch. Each side shall be filled alternately and uniformly before arch concrete is place.

Forms.

(13) The Contractor shall provide suitable forms of either steel, plywood or lumber or other material approved by the Engineer which shall conform to the shapes, lines, and dimensions of the concrete as shown on the plans, provide the desired quality of finished work and give the required degree of safety during construction.

Forms for monolithic concrete sewers and tunnel lining shall be made of steel. The Contractor shall submit the design of all steel forms to the Engineer for approval. The design data shall be scaled and signed by a Structural Engineer licensed in the State of Illinois. However, before approval, the Engineer may direct the Contractor to erect a section of the proposed steel forms either in the shop where fabricated or on the site of the work for inspection. Steel forms shall be neatly and accurately made with all similar parts in each longitudinal section of form interchangeable with other sections. Bent plates required to fit shall be rolled and fabricated to the curves before assembling. Steel forms shall have inspection holes or sizes, types and locations as approved by the Engineer.

Lumber used in forms for exposed surfaces shall be dressed to a uniform thickness and width and shall be free from loose knots or other surface defects. Joints in forms shall be horizontal or vertical. Lumber previously used in forms shall be free from warps and defects, shall have all nails withdrawn, and all surfaces to be in contact with concrete shall be smooth and thoroughly cleaned. No lumber shall be allowed to remain in finished concrete.

Forms shall be substantial, unyielding, and sufficiently tight to prevent leakage of mortar. Forms shall be properly braced and tied together so as to maintain position and shape while concrete is being poured. If adequate foundation for shores cannot be secured, trussed supports shall be provided. Form tie holes shall be patched if not used to prevent leakage of concrete.

Bolts and rods shall be used for internal ties, and designed and placed so that when the forms are removed no metal will be within one inch of the surface. All holes left by the ties shall be filled with cement mortar. Wire or band ties will not be used except where their use is permitted by the Engineer. They shall be chipped back, after removal of the forms, to not less than one inch from the surface and the holes filled with cement mortar. Wooden spreaders shall not be used.

Forms shall be set to line and grade and so constructed, fastened, and braced as to produce and maintain true lines. If necessary, measuring devices or reference lines shall be provided by the Contractor. Any bulging of the concrete or distortion from the true lines shall be corrected by the Contractor as the Engineer shall direct without additional cost to the Water Reclamation District.

All lines, grades and dimensions of finished concrete work shall be within the tolerances given in ACI Standard Recommended Practice for Concrete Formwork (ACI 347) except as noted below or otherwise specified.

Tolerances for concrete tunnel lining and cast-in-place conduits:

a. Departure from established alignment or from established grade at major connecting structures and existing facilities ..... 1/2 in.
b. Departure from established grade .....2 in.
c. Departure from established alignment.....3 in.
d. Variation from minimum thickness at any point ..... None
e. Variation from inside dimensions..... 1/2 of 1 per cent

After departure from established alignment and grade, the return shall be at a rate not greater than 3 inches per 100 feet of tunnel or cast-in-place sewer.

The finished surface of topping concrete for bottoms of settling tanks shall not vary more than 1/4 inch from the theoretical surface for circular tanks and not more than 1/8 inch for rectangular tanks.

Suitable mouldings or bevels shall be placed in the angles of forms to round or bevel the corners or edges of the concrete, unless otherwise shown on the plans or directed by the Engineer.

Form surfaces in contact with exposed concrete surfaces shall be smooth and free from any imperfections which would cause objectionable roughness on the finished surface of the concrete. Forms shall be thoroughly cleaned and repaired as necessary before reusing. Before each concrete pour, the inside surface of forms shall be coated with paraffin, non-staining mineral oil, or other approved material, or thoroughly wetted (except in freezing weather). When greasy or oily material is used, it shall be applied in such a way as to avoid contact with the reinforcement steel.

Temporary openings shall be provided in forms where necessary to facilitate cleaning and inspection before placing of concrete.

Temporary openings or portholes in wall or column forms may be used to limit the free-fall of the concrete to less than four feet and shall be so located as to facilitate the placing and consolidation of the concrete. The ports shall be spaced no more than six to eight feet apart to limit the horizontal flow of concrete and to avoid segregation.

In general, forms shall be designed and constructed to fit the requirements of the particular type of work for which they are

intended, and their design and construction as well as their use and reuse shall be subject to the approval of the Engineer at all times.

Forms shall not be disturbed until the concrete has adequately hardened and has developed sufficient strength, as determined by test cylinders made of the same quality concrete and cured under approximately the same conditions of temperature and moisture as the part of the structure in question or in accordance with Section 19. Concrete not subject to appreciable bending or direct stress, not dependent on forms for vertical support, not liable to injury from forms for vertical support, not liable to injury from form removal operations or other construction activities shall have a minimum compressive strength of 500 PSI prior to form removal. Concrete subject to appreciable bending or direct stress and partially dependent on forms for vertical support shall have a minimum compressive strength of 1,000 PSI when subject to dead loads only and 2,000 PSI when subject to dead and live loads prior to form removal. The structural classifications shall in all cases be as determined by the Engineer.

Members subject to additional loads during construction shall be adequately shored to support both the members and construction loads in such a manner as to protect the members from damage by the loads. This shoring shall not be removed until the member has acquired sufficient strength to safely support its weight and any imposed load.

The above is not intended to imply that test cylinders be cast with every pour of concrete. However, a sufficient number of test cylinders shall be made and tested to adequately represent the range of concrete quality under curing conditions prevailing for the work. The Contractor shall be fully responsible for the concrete at all times, and any damage to the work, including any caused by too early removal of forms, shall be repaired or replaced by the Contractor, to the satisfaction of the Engineer without any cost to the Water Reclamation District.

Reinforcement.

(14) Reinforcing bars shall conform to the requirements of ASTM Standard A615. They shall be grade 40 or grade 60, unless otherwise specified. Re-rolled or high carbon steel will not be accepted.

Welded wire fabric shall conform to the "Standard Specifications for Welded Wire Fabric for Concrete Reinforcement," ASTM A185.

All reinforcement shall be inspected and tested at the mill in accordance with the aforesaid specifications.

All reinforcement shall be of clean, new stock, free from defects, rust, grease, dirt, kinks and bends not required by the plans. They shall be straightened and bent prior to placing and only in a manner acceptable to the Engineer and subject to heating only when approved by the Engineer.

Reinforcing bars shall be bent accurately to the lines shown on the plans and in accordance with the requirements of the ACI Standard Details and Detailing of Concrete Reinforcement (ACI 315). A copy of the latest edition of ACI 315 shall be made available at the job site by the Contractor.

After delivery to the site, the reinforcing bars shall be sorted for size and length and stored in racks or on timbers and covered to protect them from weather in a manner acceptable to the Engineer. When cutting reinforcing steel to length on the job site, heat shall not be used. Reinforcing bars shall not be bent or straightened when partially cast into concrete.

Reinforcing bars shall be placed and fastened in position as shown on the plans and directly by the Engineer, wired together at all contact points with annealed iron 18 gauge wire or fastened with suitable clips, acceptable to the Engineer, sufficiently close together to hold the bars rigidly in position. They shall be supported and accurately held in position by metal bar chairs, spacers or hangers. Bar supports shall be in accordance with the latest version of the CRSI Manual of Standard Practice. A copy of this manual shall be made available at all times on the job site by the Contractor.

Reinforcing bars shall be placed and spaced as specified in ACI 315 latest edition.

Splicing of reinforcement shall be in accordance with ACI 315 latest edition.

The Contractor shall submit for approval of the Engineer, complete bar lists with all bending information, their location and any other information required for their proper placement in the work. The Contractor shall be responsible for the proper fit of all bars within the formwork to suit the concrete outlines shown on the contract plans.

Bars shall not be fabricated until the Engineer has approved all bar lists and bending details.

Construction Joints.

(15) Construction joints shall be made only where shown on the plans or approved by the Engineer. If the Contractor desires to change the location of construction joints or add additional construction joints other than shown on the plans, he shall notify the Engineer sufficiently in advance so that, if the change is approved, the reinforcement steel may be properly detailed. The top and end surface of concrete first poured shall be grooved or stepped as shown on the plans or directed by the Engineer. Before commencing the concreting of an adjoining unit, the surfaces shall be thoroughly cleaned of laitance, dirt and debris. If necessary, in the opinion of the Engineer, the old surface shall be cut back until sound, clean concrete is exposed. On all horizontal or near horizontal joints, a coating of GS or GSA gout shall be spread over the entire joint surface to such a depth as the Engineer may require, not to exceed three inches, before placing the fresh concrete. At vertical joints, special care shall be taken to work the freshly placed concrete to obtain an excess of mortar at the joint. All construction joints shall be thoroughly wetted before placing fresh concrete.

Floor slabs, beams and girders shall be constructed integral with each other and with as few construction joints as practicable. Where construction joints are necessary, they will be permitted only near the middle of the span of slabs, beams or girders unless a beam intersects a girder at this point, in which case the joint in the girder shall be set over a distance equal to twice the width of the beam. The maximum distance between joints in slabs and walls shall be no greater than 50 ft. Adequate provisions shall be made for the shear at joints by the use of inclined reinforcement or stirrups as determined by the Engineer.

All sewer arches shall be placed in one continuous operation and longitudinal construction joints shall not be used in the sewer arch. The invert of the sewer may be poured separately from the arch subject to the approval of the Engineer.

In sewer construction, the construction joint between separate pours shall be formed as a substantial continuous tongue and groove joint around the ring of the sewer, and the full length of all horizontal joints.

Water Stops.

(16) When water stops are required, they shall be extruded from a thermoplastic compound, the basic resin of which shall be polyvinychloride (PVC), and any additional ingredient materials required to provide a satisfactory water stop. The cross section of the water stop shall be such as to insure anchorage into the concrete by means of enlarged ends and/or fins. All intersections of the water stop consisting of Vertical-L, Vertical-T, and Horizontal-T shall be performed in the factory by the manufacturer of the water stop. Only fusion welded butt-joint splices will be permitted between preformed intersections and straight runs of water stop. All water stops shall be provided with tie holes along the inside of the edge ribs for tieing the water stop to the reinforcing steel. In all cases a sample of water stop shall be submitted to the Engineer for approval.

Finished water stops shall comply with U.S. Army Corps of Engineers specification CRD C-572. Finished water stops shall have an ultimate tensile strength of 1950 psi and an ultimate elongation of 350 percent in accordance with A.S.T.M. D412. The material shall have a high resistance to acids and alkalies and exhibit little deterioration under accelerated aging tests. Additional physical properties shall be in compliance with the following requirements:

Stiffness in flexure	−A.S.T.M. D747 750 psi min.
Low Temperature brittlesness	−A.S.T.M. 746-35^{0}F
Durometer hardness, 15 Sec., Shore A	−A.S.T.M. D2240 70 +5
Specific gravity	−A.S.T.M. D297 1.38 max.
Water absorption (48 hrs.)	−A.S.T.M. D570 0.5%

Synthetic rubber shall be allowed as an alternative to PVC for water/stop material with the approval of the Engineer. When used, synthetic rubber water stops shall be formulated from styrene-butadien synthetic rubber and shall comply with the U.S. Army Corps of Engineers specification CRD-C513.

Parts Set in the Concrete.

(17) The Contractor shall place all reinforcing steel, pipes, castings, manhole steps, necessary pipe sleeves, wall castings, anchor bolts, frames, expansion joints, and other inserts and shall form all openings in walls or floors shown on the plans or that may be required to accommodate piping work or equipment prior to pouring concrete unless otherwise specified. No aluminum shall be embedded in concrete unless coated with a protective coating which has been approved by the Engineer.

When practical, wall castings incorporating orifice or gate assemblies shall be placed as a unit in order to insure proper plumb and alignment.

The sizes and locations of inserts or openings will be the responsibility of the Contractor and shall be as determined by manufacturer's equipment drawings and as required by the work. All inserts will be included for payment under appropriate items of the contract except when otherwise noted.

Surface Finish.

(18) The top surface of all floor slabs, except where otherwise noted, shall be finished with a hard nonslippery surface. To accomplish this, the following procedure is recommended: Screed surfaces thoroughly and accurately; after excess water disappears float with a magnesium or wood float; steel trowel lightly to a smooth even surface; then brush, always in one direction, with a medium stiff long handled hair bristle brush with the proper pressure to give the result desired by the Engineer. The finished surface shall appear with very fine uniform depth hair lines. Any coarse ridging of the surface will not be acceptable.

The tops of walls, beams and walkways shall be accurately screeded, and the remaining surface given a plane, hard, magnesium or wood float finish. The corners of all concrete members shall be chamfered 3/4".

The bottoms of all sewage channels and conduits shall be screeded, floated, and steel trowelled to a smooth hard finish.

Water shall not be allowed to flow over or stand on the invert until 24 hours after placement of concrete.

The finished inverts of all sewers built in open cut or tunnel shall be protected during the entire progress of the work and thoroughly cleaned before final acceptance.

Surfaces for sliding joints to be coated shall be accurately screeded and steel trowelled to a smooth plane surface.

Top surfaces which will not be exposed in the finished work shall be carefully screened to the required grade.

Where expansion joints occur in horizontal surfaces, the concrete shall be neatly edged on both sides of the joint and the cork or other type joint material must be free from any concrete particles.

On all slabs and floors where drainage is indicated on the plans or is required, accurate slopes or pitches shall be produced in the finishing.

The addition of dry cement or a mixture of dry cement and sand to take up excess moisture in finishing will not be permitted. Likewise, sprinkling water over concrete surfaces during finishing operations will not be permitted.

On all faces of concrete, smooth dense surfaces will be required, free from honeycomb, stone pockets or roughness. The edges of all walls and beams shall be neatly beveled or rounded. It is the intention to secure smooth, plane surfaces free from roughness. After the removal of the forms, all fins and protrusions shall be removed flush with the surface.

Where shown on the plans, the bottoms of settling tanks shall be placed in two layers. The lower, or structural layer shall be screeded to the proper grade. Before placing the upper layer all laitance, dirt and other loose and soft particles shall be removed. For circular tanks, the upper layer shall be placed after the settling tank mechanism is erected and adjusted and shall be screeded to shape with the mechanism and steel trowelled to a smooth, hard surface. For rectangular tanks, the upper layer shall be placed after the wearing rails are set and shall be accurately screeded and steel trowelled to a smooth hard finish, with extraordinary care being used to insure a surface finished accurately to grade. The upper layer shall be Class T concrete.

All treads and landings of concrete stairs shall be made non-slippery by applying 0.25 pound of antislip grade silicon carbide size 8-16 grit aggregate on each square foot of surface. After the concrete surface is screeded level, it shall be permitted to stand until firm enough to bear the weight of workman standing on boards and before initial set.

Then, the non-slip aggregate (previously soaked about 10 minutes in water) shall be sprinkled by hand on the concrete surface and immediately floated into the cement finish. Grit shall not be required on stair treads when non-skid nosings are provided or where a separate topping is applied.

Concrete roadways shall be floated and straighedged to a true surface as called for on the plans. If contraction joints are to be sawed into hardened roadway surfaces, the sawing operation shall be accomplished within 24 hours.

Finishing operations shall be such as to require a minimum of manipulation from initial placing to finished surface. The final surface finish may be accomplished by belting brooming or burlap drag as directed by the Engineer.

Curing.

(19) Provision shall be made for maintaining concrete in a moist condition for a period of at least 5 days after placement.

Spray-on type membrane shall conform to specifications for Liquid Membrane-Forming Compounds for curing Concrete (ASTM C-309). Spray-on type shall not be used on construction joints, other surfaces where bond is required nor where surface repairs are to be made. Spray-on membrane shall be pigmented white.

Reusable-blanket type curing membrane shall be Waterproof Curing Paper conforming to specifications for Waterproof Paper for Curing Concrete (ASTM C-171) or Plastic Polyethylene Sheets. The covering shall be held securely in place and shall have vaporproof laps sealed with pressure adhesive tape between adjoining sheets and at edges.

On unformed surfaces, the covering shall be applied immediately after the concrete has set. On formed surfaces, the covering shall be applied immediately after the forms are removed and the surfaces inspected by the Engineer. Where surface repairs are to be made, as hereinafter specified, the surface may be uncovered only for the time necessary to make the repairs.

Whenever necessary in the opinion of the Engineer, all exposed surfaces of concrete shall be constantly kept moist by sprinkling with water at short intervals or by covering with moistened burlap or by such other means as may be approved, until the permanent covering is in place or until, in the opinion of the Engineer, the concrete is sufficiently hardened. No exposed concrete shall be placed during periods of hard rain. Freshly placed concrete shall be protected by canvas during storms, or as directed by the Engineer. Sufficient canvas covering shall be provided and kept ready for this purpose.

The Contractor shall have all necessary equipment for curing in readiness before any concrete is poured and curing provisions shall be applied within one hour from initial set.

Concrete Compression Test Cylinders.

(20) The Water Reclamation District will monitor the quality of the concrete by performing the following tests:

1. ASTM C39 test for compressive strength cylindrical concrete specimens.

2. ASTM C231 test for air content of freshly mixed concrete by the pressure method.

3. ASTM C143 test for slump of portland cement concrete.

4. ASTM C138 test for unit weight and yield of concrete.

District personnel will make four cylindrical test specimens for each concrete pour or for each 150 cubic yards of concrete if

the pour is larger than 150 cubic yards. The test specimens shall be made and cured per ASTM C31. Two specimens of each set of four shall be tested at seven days and the other two at twenty eight days.

All field storage and curing facilities for concrete compressive test specimens shall be provided by the Contractor as the Engineer will direct, and shall be such as will maintain a temperature not less than 60^0F and a moist air condition at all times.

If test specimens do not acquire the strength as specified in Sections 1 and 2, the Contractor shall make such changes in the materials, proportioning or methods of mixing as may be necessary to attain these strengths.

Grouting Sewers in Tunnels.

(21) The quality of materials shall be as herein before specified. Care shall be used in grouting to prevent damage to utilities or other property near the site of the work. The Contractor shall add at least 10 pounds of fireproof fibrous material per bag of cement to the grout to aid in preventing such damage, if so directed by the Engineer. The pressure used in grouting shall be low enough to prevent distortion of the concrete or masonry.

Whenever grout is not considered sufficient, in the opinion of the Engineer, to properly close up any leak, fill voids or repair other defective work, additional work shall be done by the Contractor to properly correct such defect without additional expense to the Water Reclamation District. Pneumatic or mechanical placing equipment used in placing grout shall be equipped, with adequate pressure gauges.

The Contractor shall stop all leaks through the walls or construction joints of the sewers, manholes or other structures by grouting all voids or by other means approved by the Engineer. All grout mixes for stopping leaks shall be approved by the Engineer and shall be applied by drilling completely through the masonry at the point of leakage and forcing the grout under pressure into all voids in the masonry and between the earth and the masonry until the leaks are completely stopped.

All voids between the concrete and the outside of the excavation in tunnel shall be completely filled with backfill grout (GB) or with concrete or other suitable material as the Engineer may direct.

Grout shall be forced through pipes or holes located in the crown of the sewer every 20 feet, to completely fill all voids between the concrete and the sheeting and between the sheeting and the earth or rock, using such pressure necessary to satisfy the Engineer that the voids have been completely filled, or drilling other grout holes and grouting at additional points.

The requirements for grouting in tunnels shall apply to sewers constructed by the jacking method. Grouting shall be completed immediately after jacking operations are completed.

Defective Work and Patching.

(22) It is an express condition of this contract that if any concrete placed in the work is found defective in quality of materials or in the mixing or the placing of same in the work or due to any other cause, so that it is structurally unsound, or not substantially watertight, as determined by the Engineer, it shall be cut out and removed by the Contractor together with such adjacent sound concrete as the Engineer may determine is necessary in order to obtain a safe, structurally sound and watertight structure. Such concrete so removed shall be replaced with new concrete of the quality herein specified, which shall be deposited and compacted and joined to the remainder of the concrete in a manner acceptable to the Engineer.

Where the Engineer grants permission to patch the defective area, it shall be done in accordance with the following procedure: Permission to patch any such area shall not be considered a waiver of the Engineer's right to require complete removal of the defective work if the patching does not, in his opinion, satisfactorily restore the quality and appearance of the surface.

After removing forms, all concrete surfaces shall be inspected. Any poor joints, voids, stone pockets or other defective areas requiring patching as determined by the Engineer shall be patched. All tie holes shall also be patched. Where necessary, defective areas shall be chipped away to a depth of not less than one inch with the edges perpendicular to the surface. The area to be patched and a space at least six inches wide entirely surrounding it shall be wetted to prevent absorption of water from the patching mortar. A grout of equal parts Portland cement and sand, with sufficient water to produce a brushing consistency, shall then be well brushed into the surface, followed immediately by the patching mortar. The patch shall be made of the same material and of approximately the same proportions as used for the concrete except that the coarse aggregate shall be omitted. The mortar shall not be richer than one part cement to three parts sand. White portland cement shall be substituted for a part of the gray portland cement to match the color of the surrounding concrete, where directed by the Engineer. The proportion of white and gray cements shall be determined by making a trial patch. The amount of mixing water used shall be as little as possible while being consistent with the requirement of handling and placing. The mortar shall be retempered without the addition of water by allowing it to stand for a period of one hour during which time it shall be mixed occasionally with a trowel to prevent setting.

The mortar shall be thoroughly compacted into place and screeded off so as to leave the patch slightly higher than the surrounding surface. It shall then be left undisturbed for a period of one to two hours to permit initial shrinkage before being finally finished. The patch shall be finished in such a manner as to match the adjoining surface. On exposed surfaces where unlined forms have been used, the final finish shall be obtained by striking off the surface with a straight-edge spanning the patch and held parallel to the direction of the form marks. All patches shall be cured in accordance with Section 19.

Tie holes left by withdrawal of rods or the holes left by removal of ends of ties shall be filled solid with mortar after first being thoroughly wetted. For holes passing entirely through the wall, a plunger type grout gun shall be used to force the mortar through the wall starting at the back face. A piece of burlap or canvas shall be held over the hole on the outside and when the hole is completely filled, the excess mortar shall be struck off with the cloth flush with the surface. Holes not passing entirely through the wall shall be filled with a small tool that will permit packing the hole solid with mortar. Any excess mortar at the surface of the wall shall be struck off flush with a cloth.

Where the repair is more extensive and requires concrete, the concrete shall be Class R or Class RA unless otherwise directed by the Engineer.

No payment will be made to the Contractor for the additional work of cutting out or removing defective concrete or correcting defective work as herein specified, or for furnishing and placing new mortar or concrete where the surface of older concrete is removed for the purposes herein specified.

Damaged Work.

(23) Before final acceptance of the work, all defective concrete work and all damaged surfaces, whether such damage has resulted from the action of the elements or from injury from any cause whatsoever, shall be neatly repaired without extra charge therefor to the Water Reclamation District. Any honeycombed surfaces or damaged places where surface repairs are permitted, shall be brought to a smooth, dense, watertight condition to the satisfaction of the Engineer. Broken corners, edges, and tops of walls shall be repaired by first chiseling or bush-hammering to allow a thickness of at least two inches of new material free from thin joining edges, and in such a manner as to anchor and key the new concrete to the old. The surface of the old material shall then be carefully washed with clean water and cement, suitable forms placed, and specified concrete deposited to conform to the lines of the structure and with the finish required.

Cold Weather Concreting.

(24) Unless the ambient air temperature is at least 40^0 (4.4^0C) and rising, water and/or aggregates shall be heated so that the temperature of the concrete, when placed, is not less than 55^0F (13^0C). The water shall not be heated above 175^0F (79.4^0C) and the sand may be heated to a maximum of only 150^0F (65.6^0C). Provisions shall be made for maintaining the concrete at a minimum temperature of not less than 50^0F (10^0C) for a period of at least seven days. Form removal shall be governed by the attainment of adequate strength in accordance with Section (13). No concrete shall be placed on or against frozen earth, in frosted forms, or on or against concrete or rock containing frost.

Hot Weather Concreting.

(25) When the ambient temperature is 90^0F (32^0C) or above, special precautions shall be taken during mixing, placing, and curing to maintain the quality of the concrete. Aggregate and cement shall be kept cool. A set-retarding admixture may be used in accordance with Section (17).

When necessary to cool the mixing water, the use of nitrogen, refrigeration, or replacing part of the water with shaved or crushed ice will be allowed.

Curing of the concrete shall be started as soon as finishing has been completed and/or the water sheen has disappeared.

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METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

GENERAL SPECIFICATIONS - LANDSCAPING (GSL)

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PART 1
INTRODUCTION

1.01 INTENT OF SPECIFICATIONS

It is the intent of the Metropolitan Water Reclamation District of Greater Chicago (District) to have high quality plant materials furnished, planted and maintained in accordance with the best and latest industry codes, standards and recommended practices, as defined by:

A. United States Department of Labor Occupational Safety and Health Administration (OSHA)

B. American Association of Nurserymen

C. American Standard for Nursery Stock

D. American National Standards Institute Inc. (ANSI)

E. American Society for Testing and Materials (ASTM)

F. American Society of Landscape Architects (ASLA)

The Contractor shall furnish and establish plant materials and provide landscape maintenance services in accordance with the following "General Specifications Landscaping" for any landscaping work in the Contract. The General Specifications Landscaping are designed to complement the Detail Specifications and Contract Drawings.

1.02 COORDINATION OF WORK

The Contractor shall coordinate all trades in the establishment of the plant materials and, if directed by the Engineer, prepare coordination drawings for approval of the Engineer.

On-site landscape work shall not be initiated until the final grades have been established with subsoil and topsoil as specified and the site has been approved by the Engineer.

PART 2
WOODY PLANT MATERIALS

2.01 GENERAL

A. This work includes, but is not limited to, the following:

1. Digging and preparing plant holes.
2. Furnishing, transporting, temporary storage and planting any replacement plant materials.
3. Planting and establishing all plant materials.
4. Mulching and wrapping of plant materials.
5. Caring of all plant materials
6. Replacing of Unsatisfactory plant materials.
7. General site clean-up.

B. Related work specified elsewhere within "General Specifications Landscaping" includes:

1. Perennial Materials (See part 3).
2. Restoration and New Seeding (See Part 4).
3. Woody Plant Materials Transplanting (See Part 5).
4. Protection of Existing Plant Materials (See Part 6).
5. Protection, Restoration and Clean-up (See Part 7).
6. Hillmass Construction and Final Grades (See Part 8).
7. Woody Plant Materials Transplanting for Purchase Requisition (See Part 9).

2.02 QUALITY ASSURANCE

Reference Standards: All nursery stock shall conform with the current "American Standards for Nursery Stock" ANSI Z60.1 adopted by the American Association of Nurserymen in every respect including:

1. Height
2. Caliper.
3. Branching.
4. Size.
5. Grade.
6. Root spread.
7. Ball depth and width.

2.03 SUBMITTALS

A. Samples: Submit the following to the Engineer for approval:

1. One cubic foot of mulch material.
2. One 3' length of tree wrapping material.
3. One 3' length of tie cord for tree wrapping.
4. One cubic foot of plant soil mixture.

B. Certificates: Submit the following to the Engineer.:

1. A state inspection certificate from the supplying nursery for all plant materials.
2. Certification that all plant materials conform to the American national Standards Institute published by the American Association of Nurserymen.
3. Certification as to the nursery where the plant materials were growing prior to being dug for delivery.
4. Certification by invoice number as to the date all plant materials in each shipment were dug.
5. Certification that the equipment used was of the proper type, size, capacity or condition to do the work.
6. Invoices of each shipment of plant materials.
7. Invoice showing the quality and kind of mulch materials delivered to the site.

2.04 JOB CONDITIONS

A. Environment: Planting shall be performed only when weather and soil conditions are favorable for such operations. Operations will be suspended or postponed whenever conditions are unfavorable for such work, as determined by the Engineer.

B. Equipment: Equipment of a type, size, capacity or condition unsuited for obtaining first-class work and expedition of the job shall be replaced with proper equipment as determined by the Engineer. Limits of the operation shall be restricted to areas designated by the Engineer.

2.05 PRODUCTS

1. PLANT MATERIALS LIST

Plant Materials: All plant materials shall be furnished in the sizes and quantities specified on the list and installed at locations shown on the Plans or at other locations as directed by the Engineer.

(SAMPLE LIST)
SHADE TREES
(All Balled and Burlapped)

2"-3"

BOTANICAL NAME	**COMMON NAME**
Acer Platanoides "Emerald Queen"	Emerald Queen Norway Maple
Acer Platanoides "Schwedleri"	Schwedler Norway Maple
Acer Rukbkrum "Armstrong"	Armstrong Red Maple
Acer Rubrum "Red Sunset"	Red Sunset Red Maple
Acer Rubrum X. Acer Saccharinum "Autumn Blaze"	Autumn Blaze Red Maple
Acer Saccharinum	Silver Maple
Acer Saccharum	Sugar Maple
Aesculus Glabra	Ohio Buckeye
Alnus Glutinossa	European Black Alder
Betula Nigra	River Birch
Celtis Occidentialis	Common Hackberry
Fraxinus Americana	White Ash
Fraxinus American "Autumn Purple"	Autumn Purple Ash
Fraxinus Pennsylvanica Lanceolata	Green Ash
Fraxinus Pennsylvanica Lanceolata "Marshall's Seedless"	Marshall's Seedless Green Ash
Fraxinus Pennsylvanica Lanceolata "Summit"	Summit Ash
Gleditsia Tria. In. "Shademaster"	Shademaster Honeylocust
Gleditsia Tria. In. "Skyline"	Skyline Honeylocust
Gleditsia Tria. In. "Green Glory"	Green Glory Honeylocust
Gymnocladus Diocus	Kentucky Coffeetree
Pyrus Callleryana "Bradford"	Bradford Pear
Quercus Palustris	Pin Oak
Tilia Americana	American Linden
Tilia Cordata "Greenspire"	Greenspire Linden
Tilia Euchora "Redmond"	Redmond Linden

(SAMPLE LIST)
ORNAMENTAL TREES
(All Balled and Burlapped)

5'-6'

BOTANICAL NAME	COMMON NAME
Acer Ginnala	Amur Maple
Acer Campestre	Hedge Maple
Amelanchier Arborea	Down Serviceberry
Amelanchier Canadensis	Shodblow Serviceberry
Amellanchier Grandiflora	Grandiflora Serviceberry
Cercis Canadensis	Eastern Redbud
Cornus Alternifolia	Pagoda Dogwood
Crataegus Crusgalli	Cockspur Hawthorn
Crataegus Viridis "Winter King"	Winter King Hawthorn
Magnolia Soulangiana	Saucer Magnolia
Malus Atrosanguinea	Carmine Flowering Crabapple
Malus "Beverly"	Beverly Flowering Crabapple
Malus "Coralburst"	Coralburst Flowering Crab
Malus "Donald Wyman"	Donald Wyman Flowering Crab
Malus "Doubloons"	Doubloons Flowering Crab
Malus Floribunda	Japanese Flowering Crabapple
Malus "Indian Magic"	Indian Magic Flowering Crab
Malus "Liset"	Liset Flowering Crab
Malus "Prairie Fire"	Prairie Fire Flowering Crab
Malus "Profusion"	Profusion Flowering Crabapple
Malus "Red Jewel"	Red Jewel Flowering Crabapple
Malus "Red Splendor"	Red Splendor Flowering Crabap.
Malus Sargentii	Sargent Flowering Crabapple
Malus "Selkirk"	Selkirk Flowering Crabapple
Malus "Snowdrift"	Snowdrift Flowering Crab
Malus Zumi Calocarpa	Redbud Flowering Crabapple
Prunus Americana	Common American Plum
Prunus Virginiana "Shubert"	Shubert Chokecherry
Syringa Reticulata	Japanese Tree Lilac

(SAMPLE LIST)
SHRUBS
(All Balled and Burlapped)

18"-24"

BOTANICAL NAME	COMMON NAME
Berberis Thunbergii	Japanese Barberry
Berberis Thunbergii Atropurpurea	Redleaf Japanese Barberry
Cotoneaster Apiculata	Cranberry Cotoneaster
Lonicera Xylosteum "Claveyi"	Clavey's Dwarf Honeysuckle
Lonicera Xylosteum "Emerald Mound"	Emerald Mound Honeysuckle
Myrica Pennsylvanica	Northern Bayberry
Potentilla Fruticosa "Gold Drop"	Gold Drop Potentilla
Potentilla Fruticosa "Gold Finger"	Gold Finger Potentilla
Potentilla Fruticosa "Jackmanni"	Jackman's Potentilla
Potentilla Fruticosa "Katherine Dykes"	Katherine Dykes Potentilla
Prunus Glandulolsa "Rosea"	Pink Dwarf Flowering Almond
Rhus Aromatica "Gro-Low"	Low Growing Sumac

(SAMPLE LIST)
SHRUBS
(All Balled and Burlapped)

18"-24"

BOTANICAL NAME	COMMON NAME
Rosa Rugosa	Rugosa Rose
Spirea Bulmalda "Anthony Waterer"	Anthony Waterer Spirea
Spirea Bulmalda "Froebeli"	Froebel Spirea
Spirea Japonica "Alpine"	Alpine Japanese Spirea
Spirea Japonica "Shirobana"	Shirobana Japanese Spirea
Spirea Nipponica "Snowmound"	Snowmound Spirea
Stephanandra Incisa "Crispa"	Cutleaf Stephanandra
Symhoricarpos Orbiculatus	Indian Currant
Syringa Meyeri "Palibin"	Dwarf Korean Lilac
Syringa Patula "Miss Kim"	Miss Kim Lilac

24"-30"

BOTANICAL NAME	COMMON NAME
Aronia Melanocarpa	Black Chokeberry
Berberis Thunbergii	Japanese Barberry
Berberis Thunbergii Atropurpurea	Redleaf Japanese Barberry
Chaenomeles Japonica "Texas Scarlet"	Texas Scarlett Flowering Quince
Cotoneaster Apicullata	Cranbery Cotoneaster
Hydrangea Arborescens "Annabelle"	Annabelle Hydrangea
Hydrangea Paniculata "Grandiflora"	Peegee Hydrangea
Hydrangea Paniculata Tardivum	Tardiva Hydrangea
Hypericum Kalmianum	Kalm St. Johnswort
Ilex Verticillata	Common Winterberry
Lonicera Xylosteum "Claveyi"	Clavey's Dwarf Honeysuckle
Lonicera Xylosteum "Emerald Mound"	Emerald Mound Honeysuckle
Myrica Pennsylvanica	Northern Bayberry
Prunus Glandulosa "Rosea"	Pink Dwarf Flowering Almond
Rhus Aromatica	Fragrant Sumac
Rosa Blanda	Meadow Rose
Rosea Rugosa	Rugosa Rose
Rosa Setigera	Prairie Rose
Spirea Bulmalda "Anthony Waterer"	Anthony Waterer Spierea
Spiera Bulmalda "Froebeli"	Froebel Spirea
Spirea Japonica "Alpine"	Alpine Japanese Spiera
Spirea Japonica "Shirobana"	Shirobana Japanese Spirea
Spirea Nipponica "Snowmound"	Snowmound Spirea
Spirea Vanhouttei	Vanhoutee Spirea
Symphoricarpos Orbicullatus	Indian Currant
Syringa Patula "Miss Kim"	Miss Kim Lilac
Viburnum Burkwoodii	Burkwood Vibukmum
Vibumum Carlesii	Koreanspice Vibumum
Vibumum Plicatum Tomentosum	Doublefile Vibumum

2'-3'

BOTANICAL NAME	COMMON NAME
Aronia Melanocarpa	Black Chokeberry
Chaenomeles Japonica "Texas Scarlet"	Texas Scarlet Flowering Quince
Cotoneaster Multiflora	Many Flowered Cotoneaster
Euonymus Alatus	Winged Euonymus
Euonymus Alatus "Compacta"	Dwarf Winged Euonymus

(SAMPLE LIST)

SHRUBS

(All Balled and Burlapped)

2'-3'

BOTANICAL NAME	COMMON NAME
Forsythia Intermedia (Meadowlark)	Meadowlark Forsythia
Forsythia Intermedia (Spring Glory)	Spring Glory Forsythia
Hamelis Vernnalis	Vernal Witchhazel
Hydrangea Paniculata "Grandiflora"	Peegee Hydrangea
Hydrangea Paniculata "Tardivum	Tardiva Hydrangea
Hydperiicum Kalmiamnum	Kalm St. Johnswort
Ilex Verticillata	Common Winterberry
Lonicera Xylosteum "Claveyi"	Clavey's Dwarf Honeysuckle
Lonicera Xylosteum "Emeral Mound"	Emerald Mound Honeysuckle
Myrica Pennsylvanica	Northern Bayberry
Prunus Glandddullosa "Rosea"	Pink Dwarf Flowering Almond
Prunus Cistena	Purpleleaf Cistina Plum
Prunus Trilola	Flowering Plum
Rhus Aromatica	Fragant Sumac
Rhus Tykphina	Staghorn Sumac
Rose Blanda	Meadow Rose
Rosa Rugosa	Rugosa Rose
Rosa Setigera	Prairie Rose
Spirea Vanhouttei	Vanhoutee Spirea
Symphoricarpos Orbiculatus	Indian Currant
Syringa Chinennsis	Chinese Lilac
Syringa Prestoniae "James MacFarllane"	James MacFarlane Lilac
Syringa Vulgaris	French Lilac
Vibumum Burkwoodii	Burkwood Vibumum
Vibumum Carlesii	Koreaspice Vibumum
Vibumum Dentatum	Arrowwood Vibumum
Vibumum Lantana	Wayfaring Vibumum
Vibumum Lentago	Nannyberry Vibumum
Vibuumum Opulus	European Cranberrybush
Vibumum Plicatum Tomentosum	Doublefile Vibumum
Vibumum Prunifolium	Blackhaw Vibumum
Vibumum Siebildi	Siebold Vibumum
Vibumum Trilobum	American Cranberrybush
Weigela Florida "Pink Princess"	Pink Princess Weigela
Weigela Florida "Vanicek"	Vanicek Wwigela

(SAMPLE LIST)

EVERGREENS

(All Balled and Burlapped)

3'-4'

BOTANICAL NAME	COMMON NAME
Thuja Occidentalis "Wareana"	Siberian Arborvitae
Thuja Occidentalis "Woodwardii"	Woodward Arbovitae

4'-5'

BOTANICAL NAME	COMMON NAME
Thuja Occidentalis "Techny"	Mission Arborvitea
Pinus Mugho "Mugho Pine"	Mugho Pine
Pinus Sylvestris "Scotch Pine"	Scotch Pine

(SAMPLE LIST)
EVERGREENS
(All Balled and Burlapped)

5'-6'

BOTANICAL NAME	COMMON NAME
Juniperus Chinensis "Fairview"	Fairview Juniper
Picea Glauca Densata "Black Hills Spruce"	Black Hills Spruce
Picea Punngens "Colorado Blue Spruce"	Colorado Blue Spruce
Pinus Nigra "Austrian Pine"	Austrain Pine

(SAMPLE LIST)
GROUND COVER

(1-Gallon Container)

BOTANICAL NAME	COMMON NAME
Euonymus Fortunei "Coloratus"	Purpleleaf Wintercreeper

(SAMPLE LIST)
FLOWERS

(2" Plugs)

BOTANICAL NAME	COMMON NAME
Achillea Filipendulina "Coronations Gold"	Yarrow
Achillea Millefolium "Rosea"	Rosy Yarrow
Aegopodium Podagraria "Variegatum"	Bishop's Weed
Astilbe Fannnal	Red Astilbe
Astilbe Pulmila	Creeping Purple Astilbe
Chkrysanthemum X Xuperbum	Shasta Daisy
Chrysanthemum Leuchatemum	Oxeye Daisy
Coreopsis "Baby Sun"	Coreopsis
Gaillardia X Grandiflora "Gobblin"	Dwarf Fiesta Daisy
Hosta "Royal Standard"	Royal Standard Hosta
Sedum Telephium "Indian Chief"	Live Forever Sedum
Stachys Byzantina	Lamb's Ears

(SAMPLE LIST)
BULBS

(Large Size DN II)

BOTANICAL NAME	COMMON NAME
Daffodil "Dutch Master"	Trumpet Daffodil

2. COST OF NEW AND REPLACEMENT PLANT MATERIALS

The Contractor and the District agree that the cost of new and replacement plant materials not planted shall be deducted from the Contractor's payment, all as determined by the Engineer, based on the latest average wholesale prices from acceptable nurseries at the time plant materials are being installed, all in accordance with these specifications, including installation costs. The costs are assumed to include the following:

1. Providing new and replacement plant materials.
2. Transportation of new and replacement plant materials to the site.
3. Site preparation for planting.
4. Planting operations in accordance with these specifications.
5. Removing any unacceptable plant materials and disposing them off site.

3. NURSERY STOCK REQUIREMENTS

A. General: Plants shall be nursery grown, good landscape quality and have a shape and habit of growth that is normal for the species. All plants shall be grown under climatic and soil conditions similar to the planting site. Any woody plant materials grown in predominantly sandy soils shall be unacceptable as Balled and Burlapped stock. All nursery stock shall be measured before pruning, with branches in normal position. All plants shall have broad, dense heads of foliage when in leaf, and be densely branched specimens characteristic to the species, diseases, sun scald, knots, stubs or other object able disfigurement. Thin, weal plants shall not be accepted. Plants must shown appearance of normal health and vigor in strict accordance with these specifications.

B. Shade Trees: Shade trees shall be free of branches (under-trimmed) not higher from the ground line than one-half the total height of the tree; shall have single leaders; be well-branched and with reasonably straight stems. This requirement shall cover general species, but some varieties, which have other characteristics of growth will be accepted.

C. Ornamental Trees and Shrubs: all ornamental trees and shrubs shall be branched and foliated to the ground.

D. Nomenclature: Plants shall be true to their name as specified.

E. Source: The southernmost limits for the source of plant materials shall be one sub-zone south of the site of the work. Plant Hardiness Zones shall be as designated in the current Miscellaneous Publication No. 1475, Agricultural Research Service, USDA.

4. SIZES AND MEASUREMENTS

A. Diameter: Shade Trees up to 4-inch diameter size shall be measured for diameter 6 inches above the ground line and 12 inches above the ground for larger tree sizes.

B. Root System: The root system of all plants shall be sufficient to ensure plant growth.

C. Balled and Burlapped Plants: Balled and Burlapped plants shall be dug with a sufficient quantity of earth taken equally on all sides and bottoms of the plants to include the necessary roots to ensure growth. The balls shall be prepared in a workmanlike manner and firmly bound. Where infrequent root pruning or transplanting in the nurseries have caused roots greater than ½" in thickness to extend beyond the recommended ball diameter, the ball diameter must be increased so that no roots greater than ½" in thickness, except tap roots, are cut.

D. Bare Root Trees: All bare root trees shall have a heavy fibrous root system that has been developed by proper root pruning and transplanting. All trees shall have been transplanted not less than two (2) times; no callipered lining out stock shall be accepted.

E. Bare Root Shrubs: All bare root shrubs shall be of (Balled and Burlapped) quality with a fully branched top and have a mature fibrous root system.

F. Container Grown Plants: Container grown plants shall be well-rooted and established in the container in which they are growing. They shall be grown in the container for a sufficient length of time for the root system to hold the earth when taken from the container but not long enough to become pot bound. The size of the containers shall be not less than 75 percent of the ball sizes for comparable Balled and Burlapped plant materials. Containers shall be stable and not deteriorated to a degree which will cause breaking up of the root ball during the planting operations.

G. Collected Stock: when collected plants are specified, the spread of roots, bare root, shall be one-third greater than the spread of roots, bare root nursery grown. If collected material is moved as Balled and burlapped, the minimum ball sizes shall be equal to those specified for the next larger size nursery grown stock, Balled and Burlapped.

H. Oversized Plants: Plants larger than specified in the plant list may be used, if approved by the Engineer, but use of such plants shall not increase the contract price. If the use of larger plants is approved, the spread of roots and root ball shall be increased in proportion to the size of the plant.

I. Size Range: Where a size range is specified, stock furnished shall be interpreted to means that no less than 50% shall be of the maximum size specified within each range.

J. Substitutions: When plants of kinds or sizes specified are not available for planting, substitutions may be made upon written request by the Contractor for approval by the Engineer. Plant substitutions must be the same genus and hardiness as specified, and of equal cost.

5. INSPECTION AND APPROVAL OF NURSERY STOCK

A. Inspection: Inspection of the trees and shrubs to be furnished will be made at the nursery by the Engineer and must be in the field of then nursery supplying the planting materials. All stock furnished shall be inspected and tagged with District numbered tags by the Engineer in the growing nurseries prior to digging.

B. Tagging: It is the Contractor's responsibility to locate all plant materials prior tagging by the Engineer for the first time. If re-tagging is required upon request by the Contractor, the Engineer shall determine the cost expended for time and distance traveled, which will be deducted from the Contractor's payments. Selecting and tagging for the Fall Planting Season shall be done no sooner than August 15th and no later than November 20th. Selecting and tagging for the Spring planting season shall be done no sooner than February 15th and no later than may 20th. The Contractor shall notify the Engineer in writing no less than two weeks before, for scheduling the selection and tagging.

C. Approval: Plants shall be subject to inspection and approval at the place of growth and upon delivery for conformity to specification requirements as to quality, size and variety. Such approval shall not impair the right of inspection upon delivery at the site or during the progress of the work or right of rejection due to damage suffered in handing or transportation.

D. Final Acceptance: Approval of plant material shall not be construed as an acceptance of it. Final acceptance will not be made until the plant material is determined to be in a healthy growing condition at the end of the establishment period.

E. Inspection Certificate: All plant material, including collected stock, shall comply with the State and Federal laws with respect to inspection for plant diseases and insect infestation. An inspection certificate required by law to this effect shall accompany each shipment and on arrival, the certificate shall be filed with the Engineer.

6. MISCELLANEOUS PLANTING MATERIALS

A. Planting Soil: The planting soil shall be 8 parts by volume of topsoil (2 parts by volume of blended mushroom compost as processed by GSO America, Crystal Lake, IL 60014, or an approved equal) and 5 lbs. of bone meal/cy of mix. Certification by the supplier is required.

1. Topsoil: Topsoil shall be natural, fertile, friable soil possessing the characteristics of rich productive soils in the Chicago area. Topsoil shall be without admixture of subsoil and shall be clean, free from clay lumps, weed seeds, roots, stones, stumps, or similar substances, debris or other objects which are a hindrance to planting or care operations.

2. Mushroom Compost: Compost shall be a mixture of horse manure, straw, peatmoss and fertilizer. It shall have been composted, used for mushroom growing, sterilized, and then aged as a finished organic compost. It shall be free of foreign matter and harmful chemicals.

3. Bone Meal: Bone meal shall be finely ground and steamed.

B. Tree Wrapping Materials:

1. Wrapping Paper: The tree wrapping material shall be burlap, heavy crepe paper or commercially available tree wrapping paper. Wrapping paper shall be first quality, not less than 4" nor more than 8" in width. Burlap shall be at least eight-ounce burlap.

2. Wrapping Cord: Cord shall be jute twine not less than two-ply. All ties or fasteners shall be of natural and decomposable material.

C. Mulch Material: The mulch material for planting shall be approved by the Engineer. It shall be uniformly graded and have the ability to completely block sunlight from reaching the surface of the soil. Mulch shall be from hard wood (tree back nuggets); minimum chip size shall be ½"; maximum chip size shall be 1 ½"; or shall be hardwood shredded bark, double processed. All mulch shall be clean with no "debris" or "fines" (as processed by GSO America, Crystal Lake,, IL 60014, or an approved equal). Certification by the supplier is required.

D. Soil Amendments: At planting time, the roots of all trees and shrubs shall be treated with "Roots TM Dry Formula" as manufactured by Roots TM Inc., a Division of Las Products Corp., New Haven, CT 06511, or an approved equal. The rates of application shall be as follows: shade and ornamental trees – 1 lb./cal. inch of tree; shrubs – ½ lb./shrub.

E. Bracing: Tree guying and staking will only be required when necessary to ensure the proper upright position of the tree. It shall be appropriate to the plant and site conditions. Bracing materials shall be approved by the Engineer prior to installation.

2.06 EXECUTION

1. PLANTING TIME

A. Plant Conditions: Regardless of calendar date, plants must be dormant at the time of digging and when they arrive at the site of the work or storage site.

B. Weather Conditions: Planting operations shall be conducted under favorable weather conditions during the planting seasons which are normal for such work as determined by accepted practice in the Chicago area.

C. Spring Operations: The Spring planting operations will start as soon as weather conditions are such that the plants can be dug and moved, and shall extend to May 30.

D. Fall Operations: The Fall planting season will begin about September 30 and extend to November 30, but after the plant has become dormant and before the soil is frozen. Evergreens may be planted August 15 through October 1.

E. Bare Root Planting: All bare root plant material shall be planted in the spring. It shall be planted only when the temperature exceeds 35°F. Planting shall terminate on May 15. Fall bare root planting shall be allowed only with written approval of the Engineer.

F. Restrictions: Planting shall not be made in frozen ground; holes shall not be dug in frozen ground and frozen backfill material shall not be used.

G. Extensions: The Contractor may request in writing an extension of the planting season. Extensions, if allowed will contain additional conditions and must be requested in writing at least two weeks prior to the close of the planting season.

2. DIGGING PLANTS

A. Notifications: The Contractor shall notify the Engineer not less than seventy-two hours in advance of the digging of any plant material in the nursery.

B. Digging Time: Plants shall not be dug until the Contractor is ready to transport them from their original locations to the site of the work or approved storage.

C. Digging Care: All stock shall be dug with care, avoiding injury to the plants or loss of damage to the roots, particular attention being given to the fibrous roots. Immediately after digging, roots shall be protected against drying out and freezing.

D. Balled and Burlapped: Balled and burlapped plants shall be dug with compact, natural balls of soil firmly wrapped with burlap and securely tied with twine or rope, or secured by other approved means. Synthetic twine or cord will not be accepted. Each ball shall be of sufficient width and depth to encompass the fibrous and feeding roots necessary to ensure full recovery and development of the plant. Earth balls shall be watered and protected against drying out freezing.

E. Bare Root: Bare root plants shall be dug only when air temperatures exceed 35 degrees F.

F. Container Grown: Container grown plants shall be well rooted and established in the container in which they are growing. They shall have grown in the container for a sufficient length of time for the root system to hold the earth when taken from the container, but not long enough to become pot bound. The size of the container shall be not less than 75% of the ball sizes for comparable balled and burlapped plant material. Containers shall be stable and not deteriorated to a degree which will cause breaking up of the root ball during the planting operation.

3. SHIPPING

A. Handling: Each species or variety shall be handled and packed in the manner approved for that plant, having regard for the soil and climatic conditions at the time and place of digging and of delivery, and to the time that will be consumed while in transit or delivery. All precautions that are customary in good trade practice shall be taken to ensure the arrival of the plants in good condition.

B. Packing: Plants shall be packed or covered in such a manner as to ensure adequate protection against damage while in transit. The roots of bare root plants shall be carefully protected with wet straw or other suitable material to ensure the arrival of the plants at their destination with roots in a moist condition.

C. Tagging: All stock furnished must be legibly tagged with the botanic and common name.

D. Transportation Care: During transportation, the Contractor or those transporting the plants for the Contractor shall exercise care to prevent injury and drying out of the plants. Upon arrival at the temporary storage location or the site of the work, plants shall be inspected for proper shipping procedures. Should the roots be dried out, large branches be broken, ball of earth broken or loosened, or areas of bark torn, the Engineer may reject the injured plant. When a plant has been so rejected, the Contractor shall at once remove it from the area of work and replace it.

E. Unacceptable Material: Any plant material not acceptable upon delivery shall be removed from the site and acceptable material shall be brought in to replace it within five days any within acceptable planting periods. Any replacement that may be required shall be selected and tagged by the Engineer.

4. TEMPORARY STORAGE

A. Storage Time: No plant shall remain in temporary storage over the Summer or Winter.

B. Storage of Balled and Burlapped Material: The earth balls of Balled and Burlapped planting materials shall be kept moist and their solidity carefully preserved. Plants may remain on the site of the work only 72 hours prior to being planted or placed in storage. To prevent drying out or freezing, they shall be stored either in a cool, moist storage building or placed in a compact group with a suitable mulch ma-

terial placed around and between the balls so that they are completely covered.

C. Storage of Bare Root Material: Bar root plants may remain on the site of the work only 24 hours prior to being planted or placed in storage. During this 24 hour period, the Contractor shall continue to exercise care to prevent injury and drying out of the plants. The roots of plants to be placed in storage shall first be puddle in a paste solution of planting soil and water. The plants shall then be protected and kept moist by "heeling-in" the roots or by placing the plant in a cool moist storage building the roots shall be covered with a suitable moist mulch.

D. Storage of Container Grown Material: The roots and rooting material of container grown planting material will be kept moist. To prevent freezing, they shall be stored either in a cool, moist storage building or placed in a compact group with a suitable mulch material placed around and between the balls so that they are completely covered

E. Duration of Storage: The duration of storage for balled and burlapped and container grown deciduous plant materials will terminate in the Spring when the plants, under field conditions, break dormancy and in the Fall when the ground freezes and cannot be satisfactorily worked. The mulch materials used for temporary storage of the plant materials shall meet with the approval of the Engineer.

F. Unplanted Materials: Plant materials not planted by the end of the storage periods shall be removed from the site and not returned to the site for use. The engineer shall note the District tag numbers, plant types and size to ensure this regulation.

5. SITE PREPARATION

A. Surface Preparation: The area to be planted will be finished to line and grade before site preparation work is begun. The immediate planting areas for trees, shrubs and ground covers, etc., shall be treated prior to planting. An area extending a minimum of 3 (three feet) in all directions from where any plant is to be planted and the entire plant beds where the spacing of the plant is 6 feet or less shall be treated. Treatment shall be by either mechanical or chemical means. If a mechanical method is used, the area shall be cultivated to a depth of not less than 2 inches with equipment approved by the Engineer until the surface is at final grade, smooth and free of debris, gullies, clods, stones, grass, weeds and any other living vegetation. If chemical control is used, the treated area does not have to be disturbed prior to planting provided the surface is smooth and free of debris, gullies, clods, and stones. All planting areas shall be in a weed-free condition prior to planting.

B. Layout of Planting Area: The Contractor shall furnish and place all stakes for locating the plantings. The specific location of each shade and ornamental tree shall be staked by the Contractor. Stakes shall be marked to indicate the tree species, variety, and size. Mass planting area for shrubs, vines and ground covers shall be outlined by the Contractor and marked to indicate the shrub species, variety, size, quantity and typical spacing. The spacing and location of species shall be as directed by the Engineer at the preconstruction meeting to be held at a mutually agreed time and date prior to the commencement of the planting operation.

C. Intent: It is the intent of the District to develop a natural woody, irregularly shaped planting area. Field adjustments necessary to obtain this effect, as well as to facilitate planting will be made subject to the approval of the Engineer.

6. EXCAVATION OF PLANT HOLES

A. General: All plant pits shall be excavated with vertical sides, horizontal bottom, and shall be circular in shape. An approved mechanical tree planting machine may be used. On slopes, the depth of excavation shall be measured at the center of the hole. All plant pits shall be approved by the Engineer prior to planting operations.

B. Excess Material: All excess material excavated from the holes shall be removed from the site.

C. Holes for Balled and Burlapped and Container Grown: Excavation of holes for planting Balled and Burlapped or container grown material shall be dug at the locations indicated by the stakes or on the Contract Drawings. They shall be excavated 1 foot greater in diameter than the earthen balls or containers. Depth of the holes shall be sufficient to accommodate ball when plant is set at the finished grade. Plants shall not be set lower than their original grade at the nursery, including allowance for final settlement.

D. Holes for Bare Root: Plant holes for bare root material shall be wide enough and deep enough to accommodate the spread out roots of the plants. The holes will be deep enough to allow the plant to be planted at the grade it grew in the nursery.

E. Drainage: When planting holes or planting beds are deemed by the Engineer to be poorly or insufficiently drained for the plant species to be planted, additional drainage shall be provided by the Contractor. The location and means of surface and subsurface drainage shall be proposed by the Contractor and approved by the Engineer before installation by the Contractor at no additional cost to the District. If the Contractor proceeds to install plant materials in such areas without the written approval by the Engineer and those plant materials fail to meet the requirements as herein called for in Section 2.07, Inspection for Acceptance of Plant Materials, the Contractor shall make all replacements as determined by the Engineer.

F. Obstructions: In the event that rock or underground construction work or obstructions are encountered in any plant hole excavation work, alternate locations shall be selected by the Engineer at no additional cost to the District.

7. PLANTING PROCEDURES

A. General: when planting trees, shrubs and ground-covers, etc., all stones, debris and all living herbaceous and woody material within the area to be mulched shall be killed or removed. All plants shall be planted in the plumb position. Plants will be set at the same depth as they grew in the nursery.

B. Mixing the Planting Soil: The Contractor shall notify the Engineer as to site location, time and equipment necessary for mixing the planting soil a minimum of one week before processing. The method of mixing the components of the planting soil shall meet the approval of the Engineer. The planting soil shall be in a loose friable condition at the time of planting.

C. Backfilling: Prepared planting soil shall be placed around the balls of Balled and Burlapped plants, around the container or mass of soil and roots of container grown plants or around the roots of bare root plants being planted in excavated holes. APPROVED WATERING EQUIPMENT SHALL BE AT THE SITE OF THE WORK AND IN OPERATING CONDITION PRIOR TO STARTING THE PLANTING OPERATION. Carefully tamp the planting soil during placement and thoroughly water after the backfilling has been completed. This watering shall completely saturate the backfill and be performed during the same day as the planting.

After ground settles, as a result of watering, the voids shall be filled to the proper level with more planting soil. When backfilling plant holes, sufficient planting soil shall be placed on the bottom of the plant holes or beds so that the plants will be at the proper grade when placed in the holes. All plants shall be set plumb and straight at the time of planting.

D. Saucers: Backfilled soil shall be "saucered" around the plant at the outer edge of the hole to aid in irrigation during the period of establishment. Watering saucers shall be constructed around all single plants. The saucers shall be a minimum of 4 feet in diameter and a minimum of 4 inches deep.

E. Balled and Burlapped: Remove all cords, wires and burlaped from the trunk of the plant during or at the end of the backfilling operation.

F. Container Grown: Prior to placing the container grown plant in the excavated hole, the container shall be removed with care so as to not disturb the soil in which the root system is growing. Care shall be taken during the backfilling operations not to destroy the solidity of the mass of soil. Containers of material that decompose within one growing season after planting need not be removed.

G. Bare Root: At planting time, the roots of all trees and shrubs shall be dipped in a prepared solution of "TerraSorb GB" as manufactured by Industrial Services International Inc. of Bradenton, Florida, or an approved equal. When planting in excavated holes, the roots shall be carefully spread in a natural position and prepared backfill material shall be worked in around the roots to eliminate air pockets. The plant shall be gently raised and lowered to assure contact of the roots with the soil. When planting in a slot made with a tree planting machine or a planting bar (a special planting spade manufactured for planting seedlings), The slot shall be of a adequate depth to allow the roots to be fully extended vertically when seedlings is placed in the slot at the proper depth. Care shall be taken when planting to prevent the end of the roots from being turned upward. After placing the seedling in the slot at the proper depth, the slot shall be completely closed to eliminate all air pockets.

8. PRUNING

A. General: Pruning shall be the responsibility of the Contractor. It may be done at the nursery or at the planting site in such a manner as to preserve the natural growth habit of the plant material.

All pruning shall completed within two days following planting operations of each plant, meet the approval of the Engineer and be done with sharp tools in accordance with good horticultural practices.

B. Deciduous Trees: Pruning shall consist of removing twigs and branches as directed by the growth habit of the trees being pruned. Unless otherwise directed by the Engineer, branches shall not be removed from a height exceeding one-third the total height of the shade tree; neither shall the leader or terminal buds of the leader be removed. Clump form trees, ornamental trees and shrubs shall not be stemmed up. All cuts over 1 inch in diameter shall be painted with an approved tree paint; paint shall cover all exposed cambium, as well as other exposed living tissue.

C. Deciduous Shrubs: Multi-stemmed shrubs shall have one-third of their height removed while maintaining their natural form and shape. Single stemmed shrubs shall be pruned in the same manner as ornamental trees.

9. MULCH COVER

A. General: Within 5 days after planting, a mulch cover shall be placed around all plants to control the growth of competing vegetation. A mulching material shall be applied to a minimum depth of 3 ½ inches. Depth of mulching material should not exceed 4 inches.

B. Individual Trees: Each individual shade and ornamental tree shall be mulched in a 4'(four foot) diameter around each plant.

C. Individual Shrubs: Each individual shrub shall be mulched in a 3' (three foot) diameter around each plant.

D. Planting Beds: The entire area of irregularly shaped planting beds shall be mulched to a minimum distance extending 3' (three feet) beyond the dripline of the plants.

10. WRAPPING

General: Trees shall be inspected for injury to trunks, insect infestation and improper pruning before wrapping. Within seven days after planting, all deciduous trees shall be wrapped from the ground line to the height of the first branch. The tree wrapping paper shall be secured with ties of stout cord (jute twine not less than 2 ply) that will stretch with the growth of the tree. Remove cord after one growing season from fast growing species.

11. BRACING

General: Tree guying and staking will only be required when necessary to ensure the proper upright position of the tree as determined by the Engineer. Bracing materials shall be approved by the Engineer prior to installation.

12. ESTABLISHMENT AND CARE

A. Time: The period of establishment shall extend from the date of planting/replanting through September of the following year at which time the plant materials will be inspected for acceptance.

B. General: During the period of establishment, the Contractor shall be responsible for properly caring for plants to assure maximum possible survival and vigorous healthy growth. Care of all plant material shall begin immediately after each plant is planted and shall continue through the establishment period.

Care shall consist of watering, weeding, spraying, cultivating, pruning and removal of dead materials, replenishing mulch to its original condition as specified, resetting of plants to proper grade, fertilizing and other necessary operations required or as ordered by the Engineer to maintain a neat appearance and healthful vigor of the plants. All requirements for proper care shall be considered as incidental to the cost of the Contract and shall be performed on a regular basis or within five days following notification by the Engineer.

C. Requirements: The minimum care requirements for proper care are:

1. Watering: Performed at least once every ten days during the months of May through October. The schedule for watering shall be determined by the Engineer. Should excessive moisture conditions prevail, the Engineer may delete any or all of the watering cycles or any part of said cycles. The water shall be applied to individual plants in such a manner that the plant hole will be saturated without allowing the water to overflow beyond the earthen saucer. Watering of plants in beds shall be applied in such a manner that all plants are uniformly saturated without allowing the water to flow beyond the periphery of the bed. The plants to be watered and the method of application shall be approved by the Engineer. The contractor shall not be relieved in any way from the responsibility for unsatisfactory plants due to the amount of watering.

2. Replenishing Mulch: Mulch disturbed by the weeding operations or other operations shall be replaced to its original condition as specified. Mulch shall be replenished to maintain a 3 ½" uniform cover, till final acceptance of the Contract.

3. Restoring Saucers: All saucers shall be restored to their specified condition when disturbed by the Contractor's operations.

4. Hand Weeding: Performed once each month during the months of May through September. Weeds and grass growth shall be removed from within the earthen saucer of individual plants and from within the entire area of the planting beds. The weeding schedule shall be determined by the Engineer. The weeding may be performed in any manner approved by the Engineer provided the weed and grass growth, including their roots and stems, are removed from the area specified therein. All debris that results from this operation must be removed at the end of each day. The plants weeded shall be determined by the Engineer. The Contractor shall not be relieved in any way from the responsibility for unsatisfactory plants due to the extent of weeding.

5. Tree Spraying: One preventative spray at the beginning of the season to protect susceptible shade and ornamental trees from recurring diseases and insect infestation.

6. Wrap Repair: All tree wrapping and ties shall be repaired and inspected monthly.

7. Fertilization: All trees and shrubs shall be fertilized at the end of the established period. Nitrogen nutrients shall be uniformly applied to the surfaces of all areas where plant material was installed. The rate shall be 10 pounds of nutrients per 1000 square feet of organic mulch.

8. Weed Control: Pre-emergent Herbicide chemicals shall be applied while plant materials are still dormant, once each year to control wild grasses.

9. General Clean-up: The overall work area shall be cleaned once each week. Weeds, debris, dead branches, etc., shall be removed from the site.

2.07 INSPECTION FOR ACCEPTANCE OF PLANT MATERIALS

A. Notification for Inspection: Prior to the September of the following year of the planting operations, the Contractor must request in writing an inspection for acceptance of the planted areas. At the end of the estab-

lishment period in September, of the following year, the Engineer will determine the number and species of missing, dead diseased or unhealthy plants and will inform the Contractor in writing which plants are rejected. The total number of each type and size of plants will be counted.

B. Minimum Requirements:

1. Acceptable Plants: To be considered a healthy and vigorously growing plant, the following conditions must be met:
   a. Visual evidence of new terminal growth.
   b. A good supply of mature foliage covering a minimum of 75% of the plant.
   c. Plant is in a vertical position, plant at the proper grade level.
   d. Growing plant meets specified contract size and intent.

2. Unacceptable Plants: A plant will be rejected when any of the following conditions are evident.

   a. Nutritional Deficiency (yellowing, undersized, or malformed leaves).
   b. Weather Damage (frost, cold, sun, scald, windburn, heat, drought).
   c. Mechanical Injury (damage from equipment).
   d. Chemical Injury (spills from gasoline, oil or herbicides).
   e. Improper Installation (planted too deep or too high, poor drainage, over-fertilized, over-pruned, dead branches).
   f. Pests and Diseases (including insects, root rot, borers, girdling and galls).
   g. Non-conformance with specified plant list, approved substitution list or approved locations.

2.08 FINAL ACCEPTANCE

To meet the requirements for final acceptance, the following procedures will be used.

A. Replacements: All rejected plants will be replaced. Replacements shall be the same species unless otherwise agreed on to before replacement. Replacement planting procedures shall conform to these specifications; it is entirely including new planting soil mix, etc., and shall only be accomplished in the presence of the Engineer. All rejected plants shall be removed from the site.

B. The Contractor must also:

1. Complete replacement of all dead, missing and defective plant material.

2. Mulch and weed planting beds and plant saucers. If a chemical was used originally for site preparation, then a second application shall be done at this time.

3. See to it that any required tree wrapping and all saucers are in good condition.

4. Complete remedial measures directed by the Engineer to ensure plant survival.

5. Repair any and all damage caused while making plant replacements.

6. Submit all certificates as specified.

PART 3
PERENNIAL MATERIALS

3.01 *PERENNIAL PLANTS, FLOWERING BULBS, GROUND COVERS AND VINES*

All material and handling criteria shall be the same as for Part 2 (Woody Plant Materials). The entire planting bed area shall be prepared and filled with "Planting Soil Mix" as detailed in this specification. Depth of planting bed shall be uniform and no less than 8 inches. Individual perennial plugs shall be placed at a slightly irregular spaced grid within the bedding area at approximately a 14-inch to 16-inch spacing in either direction.

The handling and planting of flower plugs, bulbs, ground cover and vines shall conform to Part 2 (WOODY PLANT MATERIALS), Sizes and measurements, "F", Container Grown Plants. Planting depths shall be appropriate to each specie of perennial or bulb.

PART 4
RESTORATION AND NEW SEEDING

4.01 DESCRIPTION

This work includes seedling all new areas and areas disturbed by the Contractor's operations as determined by the Engineer.

4.02 QUALITY ASSURANCE

A. Reference: All seed shall conform with the current seed laws of the State of Illinois.

B. Requirements**:**

1. Provide seed in tagged and labeled bags indicating the percentage of purity and germination.
2. The seed shall have been tested within six months prior to the date of seeing.
3. Seed shall have a minimum of 80% pure live seed.

4.03 SUBMITTALS

Certifications: Submit the following to the Engineer:

1. Certification as to the amount of each seed variety in a seed mix.
2. Certification as to the amount of each compound in a dry or liquid fertilizer.
3. Weight tickets for each load of mulch material.
4. Weight tickets for each load of topsoil.

4.04 JOB CONDITIONS

A. Environment: Seeding shall be performed only when weather and seedbed conditions are favorable for such operations. Operations will be suspended or delayed whenever conditions are unfavorable for such work.

B. Equipment: Equipment of a type, size, capacity or condition unsuited for obtaining first class work and expedition of the job shall be replaced with proper equipment. Limits of operation shall be restricted to areas designated by the Engineer.

Seed Varity	Permanent Seeding pounds/acre	Dormant Seeding pounds/acre
1. General Seed Mix		
Kentucky 31 or Alta Fescue	**70**	**105**
Dawson Red Fescue	**20**	**30**
Perennial Rye Grass	**20**	**30**
2. Low Maintenance Seed Mix		
Reed Canary Grass	**15**	**23**
Tall Fescue	**15**	**23**
Birdsfoot Trefoil	**15**	**23**
3. High Maintenance Seed Mix		
Tall Fescue (Turf Type)	**150**	**225**
Kentucky Bluegrass	**44**	**66**
Perennial Rye Grass	**20**	**30**

4.05 PRODUCTS

1. SEED MIXTURES AND RATES

The seed mixtures shown herein and rates per acre shall be seeded where indicated on the Contract Drawings and as directed by the Engineer. Birdsfoot Trefoil shall be inoculated within 12 hours of sowing with an inoculants specific to Birdsfoot Trefoil.

2. MISCELLANEOUS MATERIALS

A. Topsoil: Topsoil shall be a natural, fertile, friable soil processing the characteristics of rich productive soils in the Chicago area. Topsoil shall be without admixture of subsoil and shall be clean and free from clay lumps, weed seeds, roots, stones, stumps, or similar substances, debris or other objects which are a hindrance to planting or care operations.

B. Fertilizer: The fertilizer shall be regular commercial fertilizer (including liquid from) meeting the requirements of the applicable State Laws, and shall be in such physical condition to ensure uniform application over the area to be fertilized. Rate of application per acre shall be as follows:

Nitrogen	(N)	120 pounds
Phosphorus	(P)	180 pounds
Potassium	(K)	180 pounds

C. Mulch: All mulch material shall be non-toxic to vegetation and to the germination of seed, and shall be free from noxious weeds and weed seeds in the group classified as primary noxious weed seed in the existing Illinois Seed Law, and shall be approved by the Engineer.

1. Wood Fiber Mulch: Wood Fiber mulch shall be manufactured from whole wood chips; paper mulch is not acceptable.
2. Straw Mulch: Straw mulch shall be stalks of wheat, rye, oats, or other approved straw, and shall be air-dried.

4.06 EXECUTION

1. SEEDING TIME

Seeding Time and Restrictions: Seeding may be done at any season of the year except during certain limited periods of adverse weather conditions during which the Engineer may not permit seeding. No seeding shall be done during high winds or when the ground is wet, frozen or in an otherwise untellable conditions

2. SEEDBED PREPARATION

A. Surface Preparation: All gullies and washes shall be filled to conform to the desired shape and the entire area to be seeded shall be reasonably smooth before actual seedbed preparation is begun. Stones larger than one inch in diameter, sticks, stumps and other debris which would interfere with seeding operations, growth or maintenance of the vegetative cover shall be removed.

B. Fertilizer: At this stage of the operation, the required fertilizer shall be applied uniformly.

C. Seedbed: The seedbed shall be prepared with suitable tillage equipment to a three-inch minimum depth immediately after the fertilizer is applied. The area to be seeded shall be worked until all soil particles are reduced to a size not larger than one inch in the largest dimension. The prepared surface shall be free from all weeds clods, stones, roots, sticks, rivulets, gullies, crusting and caking.

D. Inaccessible Areas: On areas inaccessible to machinery, a suitable seedbed shall be prepared to a minimum depth of one inch, using hand tillage tools such as a rake or other suitable tillage tools.

E. Restrictions: The Contractor shall suspend operations when the soil is too wet, too dry, frozen or otherwise untillable.

F. Approval: Seeding may be done immediately after, preparation, or at a later date provided the seedbed has remained in a good, friable condition and has not become muddy or hard. If it has become hard, it shall be tilled to a friable condition again. No seeds shall be sown until the seedbed has been approved by the Engineer.

3. SOWING THE SEED

A. General: The seeding operation shall be performed immediately after preparation of the seedbed and approval by the Engineer. The seed shall be drilled or broadcast with equipment that will ensure uniform distribution of the seed, using one of the following methods:

1. The seed will be drilled approximately ¼ to ½ inch deep and cultipacked or rolled once over with a corrugated roller on all areas where equipment can be operated safely. Seeding operations will be at right angles to the run-off.

2. The seed will be broadcast and covered with a light harrow cultipacker or other suitable equipment.

3. The seed will be seeded with a hydraulic seeder using no less than 1000 gallons of water per acre. The water shall contain the proper quantity of seed to meet the specified seeding rate per acre. On other areas too steep or otherwise inaccessible to equipment, the seed shall be covered with a light harrow or other suitable equipment.

B. Seed Covering: Seed covering and firming operations will be across the slope. In areas inaccessible to equipment, seed will be covered using hand tools. Skipped areas, wider than four inches, shall be reseeded.

C. Inoculants: The recommended amount of inoculant will be tripled when legumes are hydroseeded.

4. MULCH COVER

A. General seeded areas shall be mulched with either a wood fiber mulch or a straw mulch within 24 hours of seeding. The Contractor's method of applying the mulch shall be subject to the approval of the Engineer before work is started.

B. Wood Fiber Mulch: Wood fiber mulch, seed and fertilizer may be applied evenly over the area to be seeded in a one-step operation in accordance with manufacturer's recommendations. On slopes of 3:1 or steeper, the wood fiber mulch shall be applied at a rate of 2,000 pounds per acre. On flat surfaces and slopes less than 3:1, the wood fiber mulch shall be applied at a rate of 1,500 pound per acre.

C. Straw Mulch: Straw mulch shall be applied uniformly over the area by hand, blower or other suitable equipment at a rate of two tons of air-dried material per acre. When applied, the mulch shall be free of thick layers or clumps. Mulch shall be anchored with an anchoring tool that crimps the mulch into the ground to a depth of approximately one inch.

5. CARE AND PROTECTION OF SEEDED AREAS

A. General: The Contractor shall care for all seeded areas, including watering, grading, or re-seeding for a minimum period of ninety days or until a healthy growth of grass exists over the entire seeded area. The ninety-day acceptance period shall be entirely within the growing season between April 1 and October 31. Any areas which are bare or fail to show a uniform stand, for any reason whatsoever, shall be reseeded with the original mixture, and if required, such seeding shall be repeated until final acceptance. The Contractor shall properly water, weed and otherwise care for all seeded areas until final acceptance of the entire job. Damage resulting from erosion, traffic, or any other cases shall be repaired by filling with topsoil, tamping, and seeding by the Contactor if such damage occurs prior to final acceptance.

B. Mowing: Seeded areas shall be maintained at a height of not more than four inches until final acceptance. On areas seeded in the Fall, the grass shall not be mowed until the following Spring. Mowing equipment or mowing operations which the Engineer may consider dangerous or injurious to the completed work shall not be used.

6. FINAL ACCEPTANCE OF SEEDED AREAS

General: At the completion of the contract work, the Contractor shall request the Engineer, in writing, to accept the work. For the purpose of establishing an acceptable standard, scattered bare spots, none larger than one square foot, will be allowed up to a maximum of three percent of any seeded area.

PART 5
WOODY PLANT MATERIAL TRANSPLANTING

5.01 GENERAL

All plant materials being transplanted or plant materials being furnished for replacement shall conform to these general specifications. ALL PLANT MATERIALS MUST BE PRUNED BY THE CONTRACTOR IN ACCORDANCE WITH THESE GENERAL SPECIFICATIONS AND APPROVED BY THE ENGINEER, PRIOR TO BEING TRANSPLANTED. The Contractor and the District agree that the District has the right to add or subtract plant materials to be transplanted as determined by the Engineer. The transplanting cost as determined by the Engineer shall apply for all subtractions or additions.

5.02 DESCRIPTION

This work includes, but is not limited to, the following:

1. Digging plant materials utilizing the tree spade method and preparing plant holes.
2. Furnishing, transporting, temporary storage and plant any replacement plant materials.
3. Pruning, mulching and wrapping of transplanted or replacement plant materials.
4. Restoration seeding, (See part 4).
5. Protection of existing woody plant materials, (See Part 6).
6. Protection, restoration and clean-up (See Part 7).

5.03 QUALITY ASSURANCE FOR ANY REPLACEMENT PLANT MATERIALS

Reference Standards: All nursery stock for any replacement plant materials shall conform with the current "American Standards for Nursery Stock" ANSI Z60.1 (adopted by the American Association of Nurserymen in every respect including.)

1. Height
2. Caliper.
3. Branching.
4. Size.
5. Grade.
6. Root spread.
7. Ball depth and width.

5.04 SUBMITTALS FOR TRANSPLANTED OR REPLACEMENT PLANT MATERIALS

A. Samples: Submit the following to the Engineer for approval:

1. One cubic foot of mulch material.
2. One 3' length of tree wrapping material.
3. One 3' length of tie cord for the tree wrapping.
4. One cubic foot of planting soil mixture.
5. If the planting soil mix is prepared off site, the Contractor shall provide a certificate showing that the quantities and types of materials required have been provided.

B. Certificates for any replacement plant materials: Submit the following to the Engineer:

1. A state inspection certificate from the supplying nursery for all replacement plant materials.
2. Certification that all replacement plant materials conform to the American National Standards Institute published by the American Association of Nurserymen.
3. Certification as to the nursery where the replacement plant materials were growing prior to being dug for delivery.
4. Certification by invoice number as to the date all replacement plant materials in each shipment were dug.
5. Certification that the equipment used was of the proper type, size, capacity or condition to do the work.
6. Invoices of each shipment of replacement plant materials.
7. Invoice showing the quantity and kind of mulch material delivered to the site.

5.05 JOB CONDITIONS

Environment: Digging and transplanting or planting of any replacement plant materials shall be performed only when weather and soil conditions are favorable for such operations. Operations will be suspended or postponed whenever conditions are unfavorable for such work, as determined by the Engineer.

5.06 PRODUCTS

1. LIST OF PLANT MATERIALS TO BE TRANSPLANTED (REQUIRING REPLACEMENT GUARANTEE)

A. Plant Materials: All plant materials shall be transplanted from existing on-site locations to various on-site or off-site locations as directed by the Engineer.

B. Equipment: Equipment to be utilized for transplanting operations shall be of a type and size as herein specified. All trees requiring a (90") diameter ball shall be "root pruned and/or transplanted" by utilizing a "Big John "90AA" or approved equal. All (80") by utilizing a "Big John 80A" or approved equal. All (65") by utilizing a "Big John 65A" or approved equal. All (55") by utilizing a "Big John 55A" or approved equal. Limits of the operation shall be restricted to areas designated by the Engineer.

C. Shade and Ornamental Trees: Shade and ornamental trees shall be transplanted to locations as directed by the Engineer. The Contractor shall stake proposed locations for approval by the Engineer prior to the initiation of transplanting procedures.

D. Shrubs: Shrubs shall be transplanted as individual plants within existing planting beds and/or to newly created irregularly shaped planting beds as directed by the Engineer.

2. (LIST OF PLANT MATERIALS TO BE TRANSPLANTED (REQUIRING REPLACEMENT GUARANTEE)

(SAMPLE LIST)
SHADE TREES

Plant Name	SIZE	Total	Min. Tree Spade Size or B&B
Green Ash	5 ½:-6”	(7)	(90”)
Green Ash	4 ½”-5”	(5)	(80”)
Green Ash	3 ½”-4”	(6)	(65”)
Autumn Purple Ash	6”	(1)	(90”)
Autumn Purple Ash	3 ½”-4”	(3)	(65”
Honey Locust	6”	(7)	(90”)
Honey Locust	4”-4 ½”	(3)	(65”)
Honey Locust	3 ½”	(2)	(65”)
Hackberry	7”	(2)	(90”)
Hackberry	5 ½”-6”	(4)	(90”)
Hackberry	4-4 ½”	(8)	(65”)
Hackberry	5”	(4)	(55”)
		80 Total Shade Trees	

(SAMPLE LIST)
ORNAMENTAL TREES

Plant Name	SIZE	Total	Min. Tree Spade Size or B&B
Amur Maple	**8’-10’**	**(1)**	**(65”)**
Dotted Hawthorn	**12’-14’**	**(1)**	**(80’)**
Dotted Hawthorn	**8’’-10’**	**(2)**	**(65”)**
Cockspur Hawthorn	**10’-12’**	**(5)**	**(65”)**
Cockspur Hawthorn	**6’-7’**	**(5)**	**(55”)**
Cockspur Hawthorn	**4 ½”-5”**	**(3)**	**(42”)**

(SAMPLE LIST- CONTINUE)
ORNAMENTAL TREES

Plant Name	SIZE	Total	Min. Tree Spade Size or B&B
Cockspur Hawthorn	2”-2 ½:”	(2)	(42”)
Cockspur Hawthorn	4”-4 ½”	(7)	(55”)
Thornless Hawthorn	6’-7’	(1)	(55”)
Thornless Hawthorn	2 ½-3”	(5)	(42”)
Winterking Hawthorn	12’-14’	(4)	(80”)
Winterking Hawthorn	10’12’	(7)	(65”)
Winterking Hawthorn	8’-10	(3)	(65”)
Winterking Hawthorn	3 ½”	(3)	(55”)
Winterking Hawthorn	2 ½”-3”	(3)	(42”)
Floribunda Crab	3”-3 1/2 “	(9)	(55”)
Royalty Crab	3”-3½”	(2)	(55”)
Royalty Crab	2 ½”-3”	(3)	(42”)
Sargeant Crab	6’-7’	(1)	(55”)
Sargeant Crab	2 ½”-3”	(3)	(42”)
Flowering Crab	5 ½”	(2)	(80”)
Flowering Crab	4”-5”	(8)	(65”)
Flowering Crab	8’-10’	(2)	(65”)
Flowering Crab	3 ½”-4”	(3)	(65”)
Flowering Crab	3”-3 ½”	(22)	(55”)
Flowering Crab	2”	(2)	(42”)
Plum Leaf Hawthorn	10’-12’	(5)	(65”)
Plum Leaf Hawthorn	2 ½”	(4)	(42”)
Newport Plum	5”-6”	(1)	(80”)
Newport Plum	4 ½”– 5”	(3)	(65”)
Newport Plum	3 ½”-4”	(27)	(65”)
Newport Plum	3”-3 ½”	(15)	(55”)

(SAMPLE LIST- CONTINUE)
ORNAMENTAL TREES

Plant Name	SIZE	Total	Min. Tree Spade Size or B&B
Newport Plum	2 ½"	(1)	(42")
American Plum	10'-12'	(4)	(65")
American Plum	8'10'	(4)	(65")
Shubert Plum	4 ½"	(3)	(65")
Shubert Plum	3 ½"	(3)	(55")
Shubert Plum	2 ½"-3"	(5)	(42")
		(184 Total) Ornamental Trees	

(SAMPLE LIST)
SHRUBS

Plant Name	SIZE	Total	Min. Tree Spade Size or B&B
Persian Lilac	3'-4'	(10)	(32")
Persian Lilac	4'-5'	(25)	(32")
Persian Lilac	5'-6'	(9)	(42")
Persian Lilac	6'-8'	(6)	(42")
Purple Leaf Plum	6'-7'	(10)	(55")
Vibumum Lentago	5'-6'	(8)	(42")
Vibumum Lentago	4'-5'	(19)	(32")
Vibumum Lantana	5'-6'	(7)	(42")
Vibumum Lantana	4'-5'	(10)	(32")
Vibumum Dentatum	3'-4'	(8)	(32")
Vibumum Dentatum	4'-5'	(330	(32")
Winged Euonymus	4'-5'	(12)	(32")
Upright Flowering Qunice	3'-4'	(22)	(32")
Upright Flowering Quince	4'-5'	(49)	(32")
Japanese Tree Lilac	3'-4'	(21)	(32")
Japanese Tree Lilac	4'-5'	(2)	(32")
Aronia (Black Chokeberry)	2'-3'	(15)	(32")
Aronia (Black Chokeberry)	3'-4'	(18)	(32")
Rosa Sitegera	3'-4'	(8)	(32")
		(292 Total) Shrubs	

2. LIST OF PLANT MATERIALS TO BE TRANSPLANTED (NOT REQUIRING REPLACEMENT GUARANTEE)

(SAMPLE LIST)
SHADE TREES

Plant Name	SIZE	Total	Min. Tree Spade Size or B&B
*Green Ash	10”-12”	(14)	(90”)
*Honey Locust	12”-14”	(9)	(90”)
*Honey Locust	10”-12”	(5)	(90”)
*Black Locust	10”12”	(1)	(90”)
*Honey Locust	8”-10”	(4)	(90”)
Norway Maple (Top Prune Only)	8”-10”	(3)	(90”)
*Little Leaf Linden	10”-12”	(5)	(90”)
*Little Leaf Linden	8”-10”	(1)	(90”)
American Linden (Top Prune Only)	8”-10”	(1)	(90”)
American Linden (Top Prune Only)	6”-7”	(1)	(90”)
Hackberry	8”-10”	(2)	(90”)
		(46 Total) Ornamental Trees	

*Note: All of these shade trees(*) must be top pruned first and root pruned with the respective tree spade size as designed herein, (2 times in place) and (2 sides each time) at intervals as directed by the Engineer. An application of RootsTM liquid form, shall be used at each root pruning interval. These trees will be transplanted after they are dormant as directed by the Engineer. Of these trees, only those trees as determined by the Engineer will be transplanted. Any of those not selected by the Engineer for transplanting shall be deducted from Contract payment at the cost determined by the Engineer.

(SAMPLE LIST)
ORNAMENTAL TREES

Plant Name	SIZE	Total	Min. Tree Spade Size or B&B
Cockspur Hawthorrn	15’-16’	(8)	(90”)
Flowering Crab	15’-16’	(3)	(90”)
Sargent Crab	8”	(1)	(90”)
Newport Plum	15’-16’	(6)	(90”)
Amur Maple	12’-14’	(3)	(90”)
		(21 Total) Ornamental Trees	

3. CONVERSION TABLE OF SIZES FOR PLANT MATERIALS

Clump To	Caliper Inch
3'-0"	1"
4'-0"	1 ½"
5'-0"	1 ¾"
6'-0"	2"
7'-0"	2 ½"
8'-0"	3"
10'-0"	4"
12'-0"	5"
14'-0"	6"
16'-0"	7"
18'-0"	8"

4. TRANSPLANTING COST OF EXISTING PLANT MATERIALS

The Contractor and the District agree that the transplanting cost of existing plant materials shall be as determined by the Engineer. The transplanting cost of any plant materials not transplanted by May 30 of the Spring planting season, or by November 30 of the Fall planting season shall be deducted from the Contractor's payment

5. COST OF EXISTING REPLACEMENT PLANT MATERIALS

The Contractor and the District agree that the cost of all guaranteed plant materials which may be unacceptable upon inspection time and not replaced by November 30 of the Fall planting season shall be deducted from the Contractor's payment, all as determined by the Engineer, based on the latest average wholesale prices from acceptable nurseries at the time plant materials are being installed, all in accordance with these specifications, including installation costs. The costs include the following:

A. Removing the unacceptable plant materials and disposing them off site as directed by the Engineer.

B. Site preparation for planting.

C. Providing the replacement plant materials.

D. Transportation of replacement plant materials to the site.

E. Planting operations in accordance with these specifications

6. REQUIREMENTS FOR REPLACEMENT OF GUARANTEED PLANT MATERIALS

A. Plant materials to be replaced under the contract guarantee shall be of the same type and size as those identified to be transplanted.

B. All replacement plant materials shall be Balled and Burlapped.

7. ESTABLISHMENT AND CARE OF TRANSPLANTED PLANT MATERIALS

A. Time: The period of establishment shall extend from the date of transplanting to replanting of replacement plant materials the following year.

B. General: During the period of establishment, the Contractor shall be responsible for properly caring for plants to assure maximum possible survival and vigorous healthy growth. Care of all plant material shall begin immediately after each plant is planted and shall continue through the establishment period.

Care shall consist of watering, weeding, spraying, cultivating, pruning and removal of dead materials, replenishing mulch to its original condition as specified, resetting of plants to proper grade, fertilizing and other necessary operations required or as ordered by the Engineer to maintain a neat appearance and healthful vigor of the plants. All requirements for proper care shall be considered as incidental to the cost of the contract and shall be performed on a regular basis or within five days following notification by the Engineer.

C. Requirements: The minimum care requirements for proper care are:

1. Watering: Performed at least once every ten days during the months of May through October. The schedule for watering shall be determined by the Engineer. Should excessive moisture conditions prevail, the Engineer may delete any or all of the watering cycles or any part of said cycles. The water shall be applied to individual plants in such a manner that the plant hole will be saturated without allowing the water to overflow beyond the earthen saucer. Watering of plants in beds shall be applied in such a manner that all plants are uniformly saturated without allowing the water to flow beyond the periphery of the bed. The plants to be watered and the method of application shall be approved by the Engineer. The Contactor shall not be relieved in any way from the responsibility for unsatisfactory plants due to the amount of watering.

2. Replenishing Mulch: Mulch disturbed by the weeding operations or other operations shall be replaced to its original condition as specified. Mulch shall be replenished to maintain a 3 ½" uniform cover, till final acceptance of the Contract.

3. Restoring Saucers: All saucers shall be restored to their specified condition when disturbed by the Contractor's operations.

4. Hand Weeding: Performed once each month during the months of May through September. Weeds and grass growth shall be removed from within the earthen saucer of individual plants and from within the entire area of the planting beds. The weeding schedule shall be determined by the Engineer. The weeding may be performed in any manner approved by the Engineer provided the weed and grass growth, including their roots and stems, are removed from the area specified therein. All debris that results from this operation must be removed at the end of each day. The plants weeded shall be determined by the Engineer. The Contractor shall not be relived in any way from the responsibility for unsatisfactory plants due to the extent of weeding.

5. Tree Spraying: One preventative spray at the beginning of the season to protect susceptible shade and ornamental trees from recurring diseases and insect infestation.

6. Wrap Repair: All tree wrapping and ties shall be repaired and inspected monthly.

7. Fertilization: All trees and shrubs shall be fertilized at the end of the establishment period. Nitrogen nutrients shall be uniformly applied to the surfaces of all areas where plant material was installed. The rate shall be 10 pounds of nutrients per 1000 square feet of organic mulch.

8. Weed Control: Pre-emergent Herbicide chemicals shall be applied while plant materials are dormant, once each year to control wild grasses.

9. General Clean-up: The overall work area shall be cleaned once every week. Weeds, debris, dead branches, etc., shall be removed from the site.

8. NURSERY STOCK REQUIREMENTS FOR REPLACEMENT PLANT MATERIALS

A. General: Plants provided for replacement shall be nursery grown, good landscape quality and have a shape and habit of growth that is normal for the species. All plants shall be grown under climatic and soil conditions similar to the planting site. Any woody plant materials grown in predominantly sandy soils shall be unacceptable as balled and burlapped stock. All nursery stock shall be measured before pruning with branches in normal position. All plants shall have broad, dense heads of foliage when in leaf, and be densely branched specimens characteristic to the species, free from cracks and splits. Plants shall be free from insects, diseases, sun scald knots, stubs or other objectionable disfigurements. Thin, weak plants shall not be accepted. Plants must show appearance of normal health and vigor in strict accordance with these specifications.

B. Shade Trees: Shade trees shall be free of branches (under trimmed) not high from the ground line than one-half the total height of the tree, shall have single leaders, be well-branched and with reasonable straight stems. This requirement shall all cover general species, but some varieties which have other characteristics of growth will be accepted.

C. Ornamental Trees and Shrubs: All ornamental trees and shrubs shall be branched and foliated to the ground.

D. Nomenclature: Plants shall be true to their name as specified.

E. Source: The southernmost limits for the source of plant materials shall be one sub-zone south of the site of the work. Plant hardiness zones shall be as designed in the current Agricultural Research Service, USDA, and Miscellaneous Publication No. 1475.

9. METHODOLOGY FOR DETERMINING SIZES AND MEASUREMENTS OF REPLACEMENT PLANT MATERIALS

A. Diameter: Shade trees up to 4" diameter size shall be measured for diameter 6" above the ground line and 12" above the ground for larger tree sizes.

B. Root System: The root system of all plants shall be sufficient to ensure plant growth.

C. Balled and Burlapped Plants: Balled and burlapped plants shall be dug with a sufficient quantity of earth taken equally on all sides and bottoms of the plants to include the necessary roots to ensure growth.

The thickness of depth of the balls shall be sufficient to include the depth of the roots according to species. The balls shall be prepared in a workmanlike manner and firmly bound. When infrequent root pruning or transplanting in the nurseries have caused roots greater than ½" in thickness to extend beyond the recommended ball diameter, the ball diameter must be increase so that no roots greater than ½" in thickness, except tap roots, are cut.

D. Oversized Plants: Plants larger than those being replaced may be used if approved by the Engineer, but use of such plants shall not increase the contract price. If the use of larger plants is approved, the spread of roots and root ball shall be increased in proportion to the size of the plant.

E. Size Range: Where a size range is specified, stock furnished shall be interpreted to mean that no less than 50% shall be of the maximum size specified within each range.

F. Substitutions: When plants of kinds or sizes of those being replaced are not available for planting time or within the same climate zone or similar soil conditions, substitutions may be made upon written request by the Contractor and approval by the Engineer. Plant substitutions must be the same genus and hardiness as specified, and of equal cost.

10. INSPECTION AND APPROVAL OF NURSERY STOCK FOR REPLACEMENT PLANT MATERIALS (ALL BALLED AND BURLAPPED)

A. Inspection: Inspection of the trees and shrubs to be furnished as replacements will be made in the field of the growing nursery by the Engineer. All stock furnished shall be inspected and tagged with District numbered tags by the Engineer in the growing nurseries prior to digging.

B. Tagging: It is the Contractor's responsibility to locate all plant materials prior to tagging by the Engineer for the first time. If re-tagging is required upon request by the Contractor, the Engineer shall determine the cost expended for time and distance traveled, which will be deducted from the Contractor's payments. The Contractor shall give the Engineer at least two weeks notice prior to any proposed tagging date. The notification shall be in writing and should suggest dates that can be mutually agreed upon.

C. Approval: Plants shall be subject to inspection and approval at the place of growth and upon delivery for conformity to specification requirements as to quality, size and variety. Such approval shall not impair the right of inspection upon delivery at the site or during the progress of the work or right of rejection due to damage suffered in handling or transportation.

D. Inspection Certificate: All plant material shall comply with the State and Federal law with respect to inspection for plant diseases and insect infestation. An inspection certificate required by law to this effect shall accompany each shipment and on arrival, the certificate shall be filed with the Engineer.

11. *MISCELLANEOUS PLANTING MATERIALS FOR TRANSPLANTED OR REPLACEMENT PLANT MATERIALS*

A. Planting Soil: The planting soil shall be 8 parts by volume of topsoil, (2 parts by volume of blended mushroom compost as process by GSO America, Crystal Lake, Il 60014, or an approved equal) and 5 lbs of bone meal/cy of mix. Certification by the supplier is required. Planting soil mix shall be utilized to fill in pockets and/or voids for tree spade transplanted plant materials.

1. Top soil: Topsoil shall be a natural, fertile, friable soil possessing the characteristics of rich productive soils in the Chicago area. Topsoil shall be without admixture of subsoil and shall be clean and free from clay lumps, weed seeds, roots, stones, stumps or similar substance, debris or other objects which might be a hindrance to planting or care operations.

2. Mushroom Compost: Compost shall be a mixture of horse manure, straw, peat moss and fertilizer. It shall have been composted, used for mushroom growing, sterilized and then aged as finished organic compost. It shall be free of foreign matter and harmful chemicals.

3. Bone Meal: Bone meal shall be finely ground and streamed.

B. Tree Wrapping Materials:

1. Wrapping Paper: the tree wrapping materials shall be burlap, heavy crepe paper or commercially available tree wrapping paper. Wrapping paper shall be first quality, not less than 4" nor more than 8" in width. Burlap shall be least 8 ounce burlap.

2. Wrapping Cord: Cord shall be jute twine not less than 2 ply. All ties or fasteners shall be of natural and decomposable material.

C. Mulch Material: The mulch material for planting must be approved by the Engineer. It shall be uniformly graded and have the ability to completely block sunlight from reaching the surface of the soil. Mulch shall be from hard wood (tree bark nuggets); minimum chip size shall be ½"; maximum chip size shall be 1 ½"; or shall be hardwood shredded bark, double processed. All mulch shall be clean with no "debris" or "Fines" (as processed by GSO America, Crystal Lake, IL 60014, or an approved equal). Certification by the supplier is required.

D. Soil Amendments: At planting time, the roots of all trees and shrubs, shall be treated with "RootsTM Dry Formula" as manufactured by RootsTM Inc., a Division of Lisa Products Corp., New Haven, CT 06511, or an approved equal. The rates of application shall be as follows: shade and ornamental trees – 1 lb./cal. Inch of tree; shrubs – ½ lb. shrub.

5.07 *EXECUTION*

1. PLANTING TIME FOR TRANSPLANTED OR REPLACEMENT PLANT MATERIALS

A. The Contractor shall complete the work required in this Contract on the following schedule:

PHASE I – TRANSPLANTING: All plant materials to be relocated under the Contract shall be transplanted by no later than May 30 of the Spring planting season or November 30 of the Fall planting season.

The transplanting cost of any existing shade trees, ornamental trees and/or shrubs not transplanted shall be deducted from the Phase I Contract payment, all as called for in Section 5.06, Transplanting Cost of Existing Plant Materials.

PHASE II – GUARANTEE & REPLACEMENT:

The Contractor shall guarantee all transplanted plant materials. During the month of September of the following year, the Engineer will inspect the plant materials and identify those plant materials which do not meet the requirements of Section 5.08, Inspection For Acceptance of Transplanted Plant Materials.

The Contractor shall replace all unacceptable plant materials during the Fall planting season and no later than November 30. The cost of any unacceptable plant material not replaced by November 30 shall be deducted from the Phase II Contract payment, all as called for in Section 5.06, Cost of Replacement Plant Materials.

B. Plant Conditions: Regardless of calendar date, plants must be dormant at the time they are dug and planted.

C. Weather Conditions: Transplanting operations shall be conducted under favorable weather conditions. See Part 2, Woody Plant Materials, Section 2.06 Execution, Planting Time.

D. Restrictions: Plantings shall not be made in frozen ground; holes shall not be dug in frozen ground and frozen backfill material shall not be used.

2. DIGGING PLANTS FOR REPLACEMENT PLANT MATERIALS (ALL BALLED AND BURLAPPED)

A. Notification: The Contractor shall notify the Engineer not less than 72 hours in advance of the digging of any plant materials in the nursery.

B. Digging Time: Plants shall not be dug until the Contractor is ready to transport them from their original locations to installation on the site of the work or approved storage. The maximum time lapse between digging and being properly loaded for delivery to the site of work or being placed in approved storage shall be three days.

C. Digging Care: All stock shall be dug with care, avoiding injury to the plants or loss of or damage to the roots, particular attention being given to the fibrous roots. Immediately after digging, roots shall be protected against drying out and freezing.

D. Balled and Burlapped: All replacement plant materials shall be Balled and Burlapped and shall be dug with compact, natural balls of soil firmly wrapped with burlap and securely tied with twine or rope or secured by other approved means. Synthetic twine or cord will not be accepted.

Each ball shall be of sufficient width and depth to encompass the fibrous and feeding roots necessary to ensure full recovery and development of the plant. Earth balls shall be watered and protected against drying out.

3. SHIPPING METHODOLOGY FOR REPLACEMENT PLANT MATERIALS

A. Handling: Each species or variety shall be handled and packed in the manner approved for that plant, having regard for the soil and climatic conditions at the time and place of digging and of delivery and to the time that will be consumed while in transit or delivery.

All precautions that are customary in good trade practice shall be taken to ensure the arrival of the plants in good condition.

B. Packing: Plants shall be covered in such a manner as to ensure adequate protection against damage while in transit.

C. Tagging: All replacement stock furnished must be legibly tagged with the botanic and common name.

D. Transportation Care: During transportation, the Contractor or those transporting the plants for the Contractor shall exercise care to prevent injury and drying out of the plants. Upon arrival at the temporary storage location or the site of the work, plants shall be inspected for proper shipping procedures. Should the roots be dried out, large branches be broken, ball of earth broken or loosened, or areas of bark torn, the Engineer may reject the injured plant. When a plant has been so rejected, the Contractor shall at once remove it from the area of the work and replace it.

E. Unacceptable Material: Any plant material not acceptable upon delivery shall be removed from the site and acceptable material shall be brought in to replace it within 5 days and within acceptable planting periods. Any replacements that may be required shall be selected and tagged by the Engineer.

4. TEMPORARY STORAGE FOR REPLACEMENT PLANT MATERIALS.

A. Storage Time: No plant shall remain in temporary storage beyond May 30 of the Spring planting season or November 30 of the Fall planting season.

B. Storage of Balled and Burlapped Material: The earth balls of Balled and Burlapped planting materials shall be kept moist and their solidity carefully preserved. Plants may remain on the site of the work only 72 hours prior to being planted or placed in storage. To prevent drying out or freezing, they shall be stored either in a cool moist storage building or placed in a compact group with a suitable mulch material placed around and between the balls so that they are completely covered. The mulch materials shall meet with the approval of the Engineer.

C. Unplanted Materials: Replacement plant materials not planted by November 30 shall be removed from the site. The Engineer shall note the MWRD tag numbers,

plant types and determine their dollar cost which will be deducted from the final payment to the Contractor.

5. EXCAVATION OF PLANT HOLES FOR REPLACEMENT PLANT MATERIALS

A. General: All plant pits shall be excavated with vertical sides, horizontal bottom, and shall be circular in shape. An approved mechanical tree planting machine may be used. On slopes, the depth of excavation shall be measured at the center of the hole. All plant pits shall be approved by the Engineer prior to planting operations.

B. Excess Material: All excess material excavated from the holes shall be removed from the site.

C. Holes for Balled and Burlapped and Container Grown: Excavation of holes for planting Balled and Burlapped or container grown material shall be dug at the locations indicated by the stakes or on the Contract Drawings. They shall be excavated 1 foot greater in diameter than the earthen balls or containers. Depth of the holes shall be sufficient to accommodate ball when plant is set at the finished grade. Plants shall not be set lower than their original grade at the nursery, including allowance for final settlement.

D. Drainage: When planting holes or planting beds are deemed by the Engineer to be poorly or insufficiently drained for the plant species to be planted, additional drainage shall be provided by the Contractor. The location and means of surface and subsurface drainage shall be proposed by the Contractor and approved by the Engineer before installation by the Contractor at no additional cost to the District. If the Contractor proceeds to install plant materials in such areas without the written approval by the Engineer and those plant materials fail to meet the requirements as herein called for Section 5.08, Inspection for Acceptance of Transplanted Plant Materials, the Contractor shall make all replacements as determined by the Engineer.

E. Obstructions: In the event that rock or underground construction work or obstructions are encountered in any plant hole excavation work, alternate locations shall be selected by the Engineer at no additional cost to the District.

6. PLANTING PROCEDURES FOR TRANSPLANTED OR REPLACEMENT PLANT MATERIALS

A. General: All plants shall be planted in the plumb position. Transplanted plants will be set at the same depth as they grew before transplanting. Replacement plants will be set at the same depth as they grew in the nursery.

B. Layout of Planting Area: The Contractor shall furnish and place all stakes for locating the plantings. The specific location of each shade and ornamental tree shall be staked by the Contractor. Stakes shall be marked to indicate the tree species, variety and size. Mass planting areas for shrubs, vines and groundcovers shall be outlined by the Contractor and marked to indicate the shrub specie, variety, size and quantity, and typical spacing. The spacing and location of species shall be as directed by the Engineer at the pre-construction meeting to be held at a mutually agreed time and date prior to the commencement of the planting operations.

C. Mixing the Planting Soil: The Contractor shall notify the Engineer as to site location, time and equipment necessary for missing the planting soil a minimum of one week before processing. The method of mixing the components of the planting soil shall meet the approval of the Engineer. The planting soil shall be in a loose, friable condition at the time of planting.

D. Backfilling: Prepared planting soil mix shall be utilized immediately to fill in pockets and/or voids for tree spade transplanted plant materials, as well as placed around the balls of Balled and Burlapped plants being planted in excavated holes. APPROVED WATERING EQUIPMENT SHALL BE AT THE SITE OF THE WORK AND IN OPERATING CONDITION PRIOR TO STARTING THE PLANTING OPERATION. Carefully tamp the planting soil during placement and thoroughly water after the backfilling has been completed. This watering shall completely saturate the backfill and be performed during the same day as the planting.

After ground settles as a result of watering, the voids shall be filled to the proper level with the planting soil. All plants shall be set plumb and straight at the time of planting.

E. Saucers: Soil shall be backfilled with a saucer shape around the plant at the outer edge of the hole to aid in irrigation. Watering saucers shall be constructed around all single plants. The saucers shall be a minimum of 4" deep and sized to surround the entire hole.

F. Balled and Burlapped Stock: Remove all cords, wires and burlap from the trunk of the plant during or at the end of the backfilling operation.

G. Planting Beds: The entire area of planting beds shall be prepared to a depth of no less than 8" by tilling and/or disking prior to digging planting holes.

7. PRUNING FOR TRANSPLANTED OR REPLACEMENT PLANT MATERIALS

A. General: Pruning shall be the responsibility of the Contractor. It may be done at the nursery or at the planting site in such a manner as to preserve the natural growth habit of the plant material. All pruning shall be completed within 2 days following planting operations of each plant, meet approval of

the Engineer and be done with sharp tools in accordance with good horticultural practices.

B. Deciduous Trees: Pruning shall consist of removing twigs and branches as directed by the growth habit of the trees being pruned. Unless otherwise directed by the Engineer, branches shall not be removed from a height exceeding one-third the total height of the shade tree; neither shall the leader or terminal buds of the leader be removed. Clump form trees, ornamental trees and shrubs shall not be stemmed up. All cuts over 1" in diameter shall be painted with an approved tree paint; paint shall cover all exposed cambium, as well as other exposed living tissue.

C. Deciduous Shrubs: Multi-stemmed shrubs shall have one-third of their height removed while maintaining their natural form and shape. Single stemmed shrubs shall be pruned in the same manner as ornamental trees.

8. MULCH COVER FOR TRANSPLANTED OR REPLACEMENT PLANT MATERIALS

A. General: Within 5 days after planting, a mulch cover shall be placed around all plants to control the growth of competing vegetation. All mulching material shall be applied to a minimum depth of 3 ½". Depth of mulching material should not exceed 4".

B. Individual Trees: Each individual shade and ornamental tree shall be mulched around each plant to cover the entire hole size.

C. Individual Shrubs: Each individual shrub shall be mulched around each plant to cover the entire hole size.

D. Planting Beds: the entire area of irregularly shaped planting beds shall be mulched to a minimum distance extending 3' (three feet) beyond the dripline of the plants.

9. WRAPPING FOR TRANSPLANTED OR REPLACEMENT PLANT MATERIALS

General: Trees shall be inspected for injury to trunks, insect infestation and improper pruning before wrapping. Within 7 days after planting, all deciduous trees shall be wrapped from the ground line to the height of the first branch.

The tree wrapping paper shall be wrapped tightly around the trunk from the bottom to the top with a minimum of 1" overlap. At the top and bottom and at two intermediate intervals not greater than 18", the wrapping paper shall be secured with ties of stout cord (jute twine not less than 2 ply) that will stretch with the growth of the tree. Remove cord after one growing season from fast growing species.

10. BRACING FOR TRANSPLANTED OR REPLACEMENT TREES

General: Tree guying and staking will only be required when necessary to ensure the proper upright position of the tree as determined by the Engineer. Bracing materials shall be approved by the Engineer prior to installation.

5.08 INSPECTION FOR ACCEPTANCE OF TRANSPLANTED PLANT MATERIALS

A. Inspection: The Engineer during the month of September will inspect all the plant materials to determine the number and species of plants that are acceptable and will inform the Contractor in writing which plants are rejected. The total number of each type and size of plants will be counted.

B. Minimum Requirements:

1. Acceptable Plants: To be considered a healthy and vigorously growing plant, the following conditions must be met:
   a. Visual evidence of new terminal growth.
   b. A good supply of mature foliage covering a minimum of 75% of the plant.
   c. Plant is in a vertical position, planted at the proper grade level.

2. Unacceptable Plants: A plant will be rejected when any of the following conditions are evident:
   a. Nutritional Deficiency (yellowing, undersized, or malformed leaves).
   b. Weather Damage (frost, cold, sun, scald, wind burn, drought).
   c. Mechanical Injury during installation (damage from equipment and improper handling).
   d. Improper Installation (planted too deep or too high, poor drainage, overpruned, dead branches).
   e. Pests and Diseases (including insects, root rot, borers, girdling and galls).
   f. Non-conformance with specified plant list, approved substitution list or approved locations.

C. Replacements: The Engineer, following the September inspection of the transplanted plant materials, will provide a list of unacceptable plant materials to be replaced during the Fall planting season and no later than November 30th. All rejected plants shall be removed from the site.

Replacement shall be the same species and sizes as those that were transplanted unless otherwise agreed to before replacement. Replacement planting procedures shall conform to these specifications in their entirety, including new planting

soil mix, etc., and shall only be accomplished in the presence of the Engineer. All unacceptable transplanted materials will be replaced no late than November 30th.

PART 6
PROTECTION OF EXISTING PLANT MATERIALS

6.01 DESCRIPTION

The Contractor shall provide the proper protection of all trees and shrubs not designated to be removed for permanent construction as shown on the Contract Drawings and as determined by the Engineer.

6.02 MATERIALS

General: Materials for the purpose of protecting existing plant materials may be new or used, adequate for the required purpose and must not violate applicable codes and regulations.

6.03 EXECUTION

A. General: All trees on the property to be preserved and all trees adjacent to the property shall be protected against damage during the construction operations by fencing or armoring. The tree protection shall be placed before any excavation or grading is begun and shall be maintained in repair for the duration of the construction work unless otherwise directed. No material shall be stored or construction work carried on within 40' of any tree designated to be saved. Tree protection shall remain until the planting work is started and then be removed.

B. Armoring: Individual trees near heavy construction traffic shall be wrapped with burlap and 2"x4" planks wired vertically as armor around trunks and spaced not more than 2" apart to a height of 5' above the ground.

C. Fencing: All trees in groups near construction traffic shall be protected by fencing in the following manner. Fences shall have posts equivalent to 4"x4" set 3' in the ground and extending 5' above the ground, set at intervals not to exceed 8'. Two wales shall be provided, equivalent to 2"x6", and vertical 1"x6" boards applied not over 6" apart.

D. Snow Fencing: The Contractor shall install snow fencing held in place by metal posts along the Contract Limit Lines to protect the trees and forest floor outside these limits.

6.04 DAMAGES

General: Any damage to existing tree crowns or root systems shall be repaired immediately by an approved tree surgeon. Roots exposed and/or damaged during operations shall immediately be cut off cleanly inside the exposed or damaged area, cut surfaces painted with approved tree paint, and topsoil spread over the exposed root area. If any trees to be saved are severely injured by mechanical equipment, the Contractor agrees to pay for each tree 3" in caliper the sum of $600.00 for each tree up to 6" in caliper the sum of $1,200.00, and for each 6" and over in caliper the sum of $1,800.00 for each 4' in height the sum of 4100.00, and for each shrub 8' and over in height the sum of $300.00 as fixed and agreed liquidated damages.

PART 7
PROTECTION, RESTORATION AND CLEAN-UP

7.01 DESCRIPTION

This section of the specifications pertains to protection of private and public property. Restoration of any areas or devices damaged. Clean-up of any soil, other material or debris spilled on paved roads, walks or other areas by the Contractor.

A. Protection: The Contractor shall be responsible for the protection of private and public property in the course of performing his work. Entry to the site shall be only made at the locations indicated on the drawings or as directed by the Engineer. Public streets shall not be used for parking of construction vehicles or of workers' vehicles. Street surfaces, if deposited with dirt or other debris related to the Contractor's work shall be cleaned in a manner and to the extent satisfactory to the Engineer. Existing fencing and gates shall be repaired or replaced to the satisfaction of the Engineer if damaged or destroyed by the Contractor.

B. Restoration: Restoration of any areas or devices damaged by the Contractor shall be performed to the satisfaction of the Engineer. The greatest potential for damage will be to existing trees, shrubs, Part 6, Section 6.04, damages to ground cover, flowers and to the grass surfaces over which the Contractor's work will proceed. When grass areas have been damaged by construction activity to the extent that they will not return to their previous condition of their own course in time as determined by the Engineer, the damage shall be repaired at the Contractor's expense. Damage shall include, but not be limited to rutting or tearing of grass by wheeled vehicles or killing of grass caused by traffic, stockpiling of materials or construction equipment, etc.

C. Clean-up: Any soil and other material or debris spilled on paved areas, walks and drives shall be removed promptly, keeping these areas clear at all times. Large stones, excess planting soil and debris shall be removed from the site upon the completion of all work. The Contractor shall re-

move all excess soil, dead plant materials, packing materials, burlap, brush, limbs and other trimmings or debris, from the site. All disturbed areas shall be smoothed, reseeded or resodded, if required. All clean-up work will be considered incidental to construction work, and no extra compensation will be allowed.

PART 8
HILLMASS CONSTRUCTION AND FINAL GRADES

8.01 DESCRIPTION

This section of the specifications pertains to the hillmass construction shown on the Contract Plans. The subject hillmass development specifications are as follows:

A. Intent: The Contractor shall construct a hillmass as shown on the Contract Plans. The subject hillmass is to be constructed from suitable fill material. Any additional topsoil that may be required shall be provided by the Contractor at his expense from an out side source and comply with "Topsoil" as described herein.

B. Debris Removal: The Contractor shall remove all debris. Removed debris shall be properly disposed of by the Contractor in accordance with all State, County, and local laws and regulations in effect and preceding the contract period. Debris shall be removed at the direction of the Engineer. Debris under 18 inches in nominal size may be disposed of in the embankment of the hillmass at the direction of the Engineer. Debris disposed of in the hillmass must be buried a minimum of five feet (5') below the final surface contour as shown on the Contract Plans. All organic debris, regardless of size, shall be removed.

C. Topsoil Removal: Existing topsoil from the hillmass work zone shall be removed and stored outside the hillmass work zone at the direction of the Engineer. The top six inches (6") or more of topsoil as determined by the Engineer, containing plants, roots and foreign debris shall be removed separately and stored outside the work zone at the direction of the Engineer.

D. Grading: The Contractor shall perform the grading work necessary to establish the contours as shown on the Contract Plans. All grading shall establish proper drainage so as to eliminate the potential for ponding of water. All grading work shall be performed by the Contractor at the direction of the Engineer. The Engineer shall approve all rough grading prior to the application of clay and topsoil.

E. Placement of Fill Material: The Contractor shall provide and place all fill material to develop and complete the contours of the hillmass as shown on the Contract Plans. The Contractor shall place and compact such fill material at the direction of the Engineer to 75% maximum density (ASTM D-1557).

F. Seeded Areas: A six inch (6") thick layer of clean topsoil shall be provided.

G. Planting Areas: The top shall be five feet (5') thick, (shall be composed of four feet (4') thick clay loam and one foot (1") thick topsoil). The woody planting areas and seeded areas shall be smoothly blended together to establish a uniform grading.

H. Topsoil Definition: Topsoil shall be a natural, fertile, friable soil possessing the characteristics of rich productive soils in the Chicago area. Topsoil shall be without admixture of subsoil and shall be clean, free from clay lumps, weed seeds, roots, stones, stumps, or similar substances, debris or other objects which are a hindrance to planting or care operations.

The Contractor shall re-adjust the contour and landscaping of the hillmass required because of more or less excavated suitable fill material as directed by the Engineer with no additional cost to the District.

PART 9
WOODY PLANT MATERIALS TRANSPLANTING (FOR PURCHASE REQUISITIONS)

9.01 GENERAL

All plant materials being transplanted shall conform to these general specifications. ALL PLANT MATERIALS MUST BE PRUNED BY THE CONTRACTOR IN ACCORDANCE WITH THESE (GSL) AND APPROVED BY THE ENGINEER, PRIOR TO BEING TRANSPLANTED. The Contractor and the District agree that the District has the right to add or subtract plant materials to be transplanted as determined by the Engineer shall apply for all subtractions or additional.

9.02 DESCRIPTION

This work includes, but is not limited to the following:

1. Digging plant materials utilizing the tree space methods and preparing plant holes.
2. Furnishing, transporting, temporary storage and planting any replacement plant materials.
3. Pruning, mulching and wrapping of transplanted plant materials.
4. Restoration seeding, (See Part 4).
5. Protection of existing woody plant materials, (See Part 6).
6. Protection, restoration, and clean-up (See Part 7).

9.03 SUBMITTALS FOR TRANSPLANTED PLANT MATERIALS

Samples: Submit the following to the Engineer for approval:

1. One cubic foot of mulch material.

2. One 3' length of tree wrapping material.

3. One 3' length of tie cord for the tree wrapping.

4. One cubic foot of planting soil mixture.

5. If the planting soil mix is prepared off site, the Contractor shall provide a certificate showing that the quantities and types of materials required have been provided.

9.04 JOB CONDITIONS

Environment: Digging and transplanting of any plant materials shall be performed only when weather and soil conditions are favorable for such operations. Operations will be suspended or postponed whenever conditions are unfavorable for such work, as determined by the Engineer.

9.05 PRODUCTS

1. LIST OF PLANT MATERIALS TO BE TRANSPLANTED (NOT REQUIRING REPLACEMENT GUARANTEE), NOTE: FOR PLANT MATERIALS REQUIRING GUARANTEE, (SEE PART 5).

A. Plant materials: All plant materials shall be transplanted from existing on site locations to various new on-site or off-site locations as directed by the Engineer.

B. Equipment: Equipment to be utilized for transplanting operations shall be of a type and size as herein specified.

C. Shade and Ornamental Trees: Shade and ornamental trees shall be transplanted to locations as directed by the Engineer. The Contractor shall stake proposed locations for approval by the Engineer prior to the initiation of transplanting procedures.

(SAMPLE LIST)
SHADE TREES

Plant Name Red Maple	SIZE	Total	Min. Tree Spade Size or B&B
Red Maples	8"	(1)	(90")
Red Maple	9"	(1)	(90")
Sugar Maple	9"	(1)	(90")
Silver Maple	10"	(1)	(90")
Honey Locust	9"	(2)	(90")
Honey Locust	10"	(1)	(90")
Honey Locust	12"	(2)	(90")
		(9 Total) Shade Trees	

Plant Name	SIZE	Total	Min. Tree Spade Size or B&B
Flowering Crab	10"	(2)	(90")
Flowering Crag	9"	(1)	(90")
Flowering Crab	6"	(1)	(65")
Flowering Crab	4"	(1)	(55")
		(5 Total) Ornamental Trees	

D. Shrubs: Shrubs shall be transplanted as individual plants within existing planting beds and/or to newly created irregularly shaped planting beds as directed by the Engineer.

E. Shrubs: Shrubs shall be transplanted as individual plants within existing planting beds and/or to newly created irregularly shaped planting beds as directed by the Engineer.

2. TRANSPLANTING COST OF EXISTING PLANT MATERIALS

The Contractor and the District agree that the transplanting cost of existing plant materials shall be as determined by the Engineer. The transplanting cost of any plant materials not transplanted by May 30 of the Spring plant season or November 30 of the Fall planting season shall be deducted from the Contractor's payment.

3. MISCELLANEOUS PLANTING MATERIALS FOR TRANSPLANTED PLANT MATERIALS

A. Planting Soil: The planting soil shall be 8 parts by volume of topsoil, 2 parts by volume of blended mushroom compost as process by GSO America, Crystal Lake, Il 60014, or an approved equal and 5 lbs. of bone meal/c. yd. of mix.. Certification by the supplier is required. Planting soil mix shall be utilized to fill in pockets and/or voids for tree spade transplanted plant materials.

1. Topsoil: Topsoil shall be a natural, fertile, friable soil possessing the characteristics of rich productive soils in the Chicago area. Topsoil shall be without admixture of subsoil and shall be clean and free from clay lumps, weed seeds, roots, stones, stumps or similar substances, debris or other objects which are a hindrance to planting or care operations.

2. Mushroom Compost: Compost shall be a mixture of horse manure, straw, peat moss and fertilizer. It shall have been composted, used for mushroom growing, sterilized and then aged as a finished organic compost. It shall be free of foreign matter and harmful chemicals.

3. Bone Meal: Bone meal shall be finely ground and steamed.

B. Tree Wrapping Materials:

1. Wrapping Paper: The tree wrapping material shall be burlap, heavy crepe paper or commercially available tree wrapping paper. Wrapping paper shall be first quality, not less than 4" nor more than 8" in width. Burlap shall be at least 8 ounce burlap.

2. Wrapping Cord: Cord shall be jute twine not less than 2 ply. All ties or fasteners shall be of natural and decomposable material.

C. Mulch Material: The mulch material for planting must be approved by the Engineer. It shall be uniformly graded and have the ability to completely block sunlight from reaching the surface of the soil. Mulch shall be from hard wood (tree bark nuggets); minimum chip size shall be ½"; maximum chip size shall be ½"; or shall be hardwood shredded bark, double processed. All mulch shall be clean with no "debris" or fines" (as processed by GSO America, Crystal Lake, Il 60014, or an approved equal). Certification by the supplier is required.

D. Soil Amendments: At planting time, the roots of all trees and shrubs shall be treated with "RootsTM Dry Formula" as manufactured by Roots TM Inc., a Division of Lisa Products Corp., New Haven, CT 06511, or an approved equal. The rates of application shall be as follows: shade and ornamental trees – 1 lb. /cal. inch of tree; and shrubs – ½ lb./shrub.

9.06 EXECUTION

1. PLANTING TIME FOR TRANSPLANTED PLANT MATERIALS

The Contractor shall complete the work required in this Contract in accordance with the following:

A. Transplanting: All plant materials to be relocated under this Contract shall be transplanted by no later than May 30 of the Spring planting season or November 30 of the Fall planting season..

B. Plant Conditions: Regardless of calendar date, plants must be dormant at the time they are dug and planted.

C. Weather Conditions: Transplanting operations shall be conducted under favorable weather conditions

D. Restrictions: Planting shall not be made in frozen ground; holes shall not be dug in frozen ground and frozen backfill material shall not be used.

2. PLANTING PROCEDURES FOR TRANSPLANTED PLANT MATERIALS

A. General: all plants shall be planted in the plumb position. Transplanted plants will be set at the same depth as they grew before transplanting.

B. Layout of Planting Area: The Contractor shall furnish and place all stakes for locating the plantings. The specific location of each shade and ornamental tree shall be staked by the Contractor. Stakes shall be marked to indicate the tree species, variety, and size. Mass planting areas for shrubs, vines and ground covers shall be outlined by the Contractor and marked to indicate the shrub specie, variety, size and quantity, and typical spacing. The spacing and location of species shall be as directed by the Engineer at the preconstruction meeting to be held at a mutually agreed time and date prior to the commencement of the planting operations.

C. Mixing the Planting Soil: The Contractor shall notify the Engineer as to site location, time and equipment necessary for mixing the planting soil a minimum of one week before processing. The method of mixing the components of the planting soil shall meet the approval of the Engineer. The plant soil shall be in a loose, friable condition at the time of planting.

D. Backfilling: Prepared planting soil mix shall be utilized immediately to fill in pockets and/or voids for tree spade transplanted plant materials. APPROVED WATERING EQUIPMENT SHALL BE AT THE SITE OF THE WORK AND IN OPERATING CONDITION PRIOR TO STARTING THE PLANTING OPERATION. Carefully tamp the plant soil during placement and thoroughly water after the backfilling has been completed. This watering shall completely saturate the backfill and be performed during the same day as the planting.

E. After ground settles as a result of watering, the voids shall be filled to the proper level with the planting soil. All plants shall be set plumb and straight at the time of planting.

F. Saucers: Soil shall be backfilled with a saucer shape around the plant at the outer edge of the hole to aid in irrigation. Watering saucers shall be constructed around all single plants. The saucers shall be a minimum of 4" deep and sized to surround the entire hole.

G. Planting Beds: The entire area of planting beds shall be prepared to a depth of not less than 8" by tilling and/or disking prior to digging planting holes.

3. *PRUNING FOR TRANSPLANTED PLANT MATERIALS*

A. General: Pruning shall be the responsibility of the Contractor. It shall be done immediately prior to transplanting in such a manner as to preserve the natural growth habit of the plant material.

B. Deciduous Trees: Pruning shall consist of removing twigs and branches as directed by the growth habit of the trees being pruned. Unless otherwise directed by the Engineer, branches shall not be removed from a height exceeding one-third the total height of the shade tree; neither shall the leader or terminal buds be removed. Clump form trees, ornamental trees and shrubs shall not be stemmed up. All cuts over 1" in diameter shall be painted with an approved tree paint; paint shall cover all exposed cambium, as well as other exposed living tissue.

C. Deciduous Shrubs: Multi-stemmed shrubs shall have one-third of their height removed while maintaining their natural form and shape. Single stemmed shrubs shall be pruned in the same manner as ornamental trees.

4. *MULCH COVER FOR TRANSPLANTED PLANT MATERIALS*

A. General: Within 5 days after planting, a mulch cover shall be placed around all plants to control the growth of competing vegetation. All mulching material shall be applied to a minimum depth

of 3 ½". Depth of mulching material should not exceed 4".

B. Individual Trees: Each individual shade and ornamental tree shall be mulched around each plant to cover the entire hole size.

C. Individual Shrubs: Each Individual shrub shall be mulched around each plant to cover the entire hole size.

D. Planting Beds: The entire area of irregularly shaped planting beds shall be mulched to a minimum distance extending 3' (three feet) beyond the dripline of the plants.

5. *WRAPPING FOR TRANSPLANTED PLANT TREES*

General: Trees shall be inspected for injury to trunks, insect infestation and improper pruning before wrapping. Within 7 days after planting, all deciduous trees shall be wrapped from the ground line to the height of the first branch.

The tree wrapping paper shall be wrapped tightly around the trunk from the bottom to the top with a minimum of 1" overlap. At the top and bottom and at two intermediate intervals not greater than 18", the wrapping paper shall be secured with ties of stout cord (jute twine not less than 2 ply) that will stretch with the growth of the tree. Remove cord after one growing season from fast growing species.

6. BRACING FOR TRANSPLANT TREES

General: Tree guying and staking will only be required when necessary to ensure the proper upright position of the tree as determined by the Engineer. Bracing materials shall be approved by the Engineer prior to installation.

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SAFETY RAILING AROUND TANKS
CALUMET WATER RECLAMATION PLANT
CONTRACT 15-265-3D

SPECIFICATION SIGNATURE

DIVISION 1 – GENERAL REQUIREMENTS

DIVISION 2 – SITE CONSTRUCTION

DIVISION 3 – CONCRETE

DIVISION 5 – METALS

SAFETY RAILING AROUND TANKS
CALUMET WATER RECLAMATION PLANT
CONTRACT 15-265-3D

SPECIFICATION SIGNATURE

SIGNATURE
MANAGING STRUCTURAL ENGINEER

DATE: 7-7-2016

SEAL:

EXPIRATION: 11-30-2016

SECTION 01100

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Summary of Work

B. Mobilization

C. Contractor's use of site and premises

D. Site Inspection

E. Safety

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, General Specifications, and Detail Specifications, apply to this Section.

1.3 SUMMARY OF WORK

A. Work to be performed at Calumet Water Reclamation Plant (CWRP) in Chicago, Illinois.

B. Under this Contract the Contractor shall perform work as described in Invitation to Bid, Agreement, and as shown on the plans and specified herein. The major Work items consists of, but are not limited to, the following:

1. Provide all materials, labor and equipment to furnish and install safety railing, including swing gates, as specified and/or shown on the Contract drawings.

2. Provide all materials, labor and equipment to furnish and install davit bases as specified and/or shown on the Contract drawings.

3. Provide all materials, labor and equipment to furnish and install stainless steel chains as specified and/or shown on the Contract drawings.

4. Provide all materials, labor and equipment for concrete repair where required for installation of safety railing on a unit price basis as approved by the Engineer.

5. Provide all labor and equipment for removal and disposal of an approximately 13 cubic yard of concrete and 23 cubic yard of subbase.

6. Provide all materials, labor and equipment for installing 36 cubic yard of concrete and reinforcements as specified and/or shown on the Contract drawings.

7. Demolition and disposal of an approximately 31 linear feet of angle railing.

C. WORK CONDITIONS

1. It is anticipated that the safety railings will be installed on walkways around and across operational and not operational preliminary settling tanks.

2. No shutdowns are anticipated for this work.

3. Water levels in the operational aeration tanks vary and are generally around 1 to 4 feet below top of walkway surfaces as are the top of effluent weirs next to walkways inside the tanks.

4. Water levels in the preliminary settling tanks vary and are generally around 1 to 15 feet below top of walkway surfaces.

5. Concrete bottom of the aeration tanks vary from approximately 17 to 19 feet below top of walkway surfaces.

6. Concrete bottom of the preliminary settling tanks vary from approximately 10 to 20 feet below top of walkway surfaces.

7. Aeration piping is located just above bottom of the aeration tanks and continuously disperses air into the water during operation.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 SITE INSPECTION

A. The Contractor, before bidding on these documents shall have personally visited and thoroughly examined the site location shown on the contract drawings to determine the accessibility and assess the safety measures to perform the work under safe working conditions.

B. The Contractor shall accept conditions at the site of the work as found and shall assume the risk of variation of the condition of site, which may occur subsequent to signing of the contract. The contract price shall include the cost of removal of rubbish, site cleaning, and other obstacles and delay or damage occasioned by the same, whether or not these obstacles are shown on the contract drawings.

C. The Contractor shall thoroughly examine the site to determine the extent to which the existing utility lines and process piping, which may have or may not have been shown on the contract drawings, require relocation. The Contractor shall include the costs of all the relocation of utility lines and process piping for completing this work in his bid. No extra payment shall be made to the Contractor for such relocation.

3.2 CONTRACTOR'S USE OF SITE AND PREMISES

A. Contractor shall install his office and storage trailers during the life of the contract at a place approved by the Engineer.

B. Access to Calumet Water Reclamation Plant is limited to the main gate or as authorized by Calumet Water Reclamation Plant Security. Normal plant work hours are from 7:45 a.m. to 3:30 p.m. on all weekdays.

C. Construction Operations: Limited to areas noted on Drawings.

D. Utility Outages and Shutdown: Coordinate with the Engineer and refer to Section 01130, "Shutdowns".

3.3 SAFETY

A. Refer to General Specifications and as specified herein.

B. If the Contractor needs to work in any confined space, all federal, state, and local rules and regulations pertaining to the safety procedures shall be followed.

C. FALL PROTECTION

1. Where applicable, the contractor/subcontractor shall abide by the OSHA's Fall Protection regulation 29 CFR 1926 Subpart M.

D. LOCKOUT/TAGOUT

1. If any District equipment or any disconnect switch needs to be locked, tagged or put on hold, the contractor must first consult with the Resident Engineer before proceeding with the job. The District's Lockout/Tagout procedure must be adhered to at all times.

E. COMPRESSED GASES

1. Compressed gases containers shall be marked, labeled, stored, handled, and used in accordance with the applicable Occupational Safety and Health Administration standard as well as other regulating agencies.

2. Only experienced and properly instructed personnel shall use compressed gases.

3. When welding or cutting is being performed, precautions shall be taken to prevent sparks or hot metal from falling into open gratings, onto employees or flammable materials. Fireproof blankets must be used by the contractors to cover all the openings.

4. The Contractor shall furnish suitable fire extinguishing equipment, which shall be immediately available at all locations where welding and cutting is done.

5. In dusty or gaseous spaces where there is a danger of causing an explosion, welding or cutting equipment shall not be used until the space is adequately ventilated. All

piping or other structures being cut or burned must be cleaned off before cutting or burning. Certain conditions shall also require wetting down the area.

6. Welding or cutting of any pipeline, tank, or empty container shall not be performed until positive proof is obtained that it is free from an explosive mixture of gases. The Contractor shall furnish the necessary equipment to test for explosive gases.

7. Before welding or cutting closed containers, they shall be vented to atmosphere to prevent and stop an explosion by expansion of trapped gases.

F. GENERAL HOUSE KEEPING

1. Areas or sections being worked on shall be marked with ropes or barriers to designate the working area.

2. Good housekeeping shall be maintained at all times.

3. Upon completion of the day's work, all debris must be removed from the floors, and away from the work areas.

4. All fire lanes and walkways shall be kept clear at all times.

5. No flammable liquid shall be stored in the working area or building at any time.

6. A fire watch shall be maintained by the Contractor at all times during cutting, burning, and/or welding. A fire watch consists of a watchman with a fire extinguisher, monitoring the work during cutting or welding procedure, and for 30 minutes thereafter, to make sure that sparks or hot metal do not start a fire.

G. SAFETY EQUIPMENT

1. The contractor shall be responsible for all the safety equipment needed for the job.

2. When in the plant, hard hats must be worn at all times, except in offices or lunchrooms.

END OF SECTION

SECTION 01130

SHUTDOWNS

PART 1 - GENERAL

1.1 GENERAL

A. Any work which may interfere with the normal operations of the facility shall be scheduled with the Engineer as specified in the Agreement, "OPERATION OF THE EXISTING FACILITY" and as specified herein.

B. The District reserves the right to cancel or postpone any scheduled shutdown without advance notice due to weather or plant operational necessity. ALL SHUTDOWNS SHALL BE ON A "WEATHER PERMITTING" BASIS AND ONLY AS APPROVED BY THE DISTRICT.

C. Shutdowns will normally be allowed to begin on Tuesdays, Wednesdays, Thursdays and Fridays. Re-starts are not permitted after 12:00 p.m. on Fridays, on weekends or on District holidays, unless specifically approved by the District. Once the shutdown has begun, the completion of all work shall occur uninterrupted. If necessary, and permitted by the Engineer, the Contractor shall work Saturdays, Sundays, Holidays, and twenty-four (24) hours per day, to meet the time specified. Shutdowns that are not critical to operations of the facility or weather dependent, may be allowed to begin on Mondays as approved by the District.

D. Treatment issues or inclement weather that is intermittent, or occurring at the scheduled start time of an outage, may postpone an outage; however, a forecast for inclement weather several days in the future will not be used as a reason to deny an outage unless the forecast is for severe inclement weather affecting critical equipment with a high degree of certainty. Outage requests will be evaluated each successive day until approved.

E. Coordination must be made through the Engineer to ensure that scheduled shutdowns do not conflict with other planned outages in the plant. The District will not accept any delay claims or additional costs for impacts to the Contractor's shutdown schedule due to schedule conflicts with other contracts. The Engineer will make the final decision on all matters of overlapping shutdown requests.

1.2 NOTIFICATION

A. The Contractor shall notify the District of any planned shutdown not less than five (5) working days in advance of that shutdown as stated in the Agreement. The Contractor shall provide a written notice to the Engineer indicating that he has received all equipment, materials, and lined up sub-contractors required for the outage. The notice shall include a work schedule indicating crew size and the number of shifts (including weekends if applicable) that the Contractor intends to work to complete construction during the outage.

1.3 RESPONSIBILITIES

A. The Contractor shall have all the materials, labor, and equipment necessary ready before shutdowns so the work can be completed within the shortest possible time. All work that can be done with the plant in full operations shall be completed prior to any shutdowns. All submittals for materials to be used during the shutdown must be approved prior to receiving the shutdown.

B. The Contractor shall provide, and be solely responsible for, all necessary labor and material which shall include, but not be limited to, construction, installation and maintenance of bulk heads, stop logs, scaffolding, sandbags, pumps, piping, weather protection and appurtenances required to adequately and properly shutdown and drain any pipelines or other structures necessary to maintain the progress of his work throughout the contract.

C. During the shutdown the Contractor is solely responsible for maintenance of the water stop facilities and provision of sump pumps, weather protection, winter protection from ice and extreme temperatures, and other appurtenances necessary to maintain the progress of his work throughout the shutdown.

PART 2 - PRODUCTS

2.1 NOT USED.

PART 3 - EXECUTION

3.1 OPERATION OF THE EXISTING FACILITY

A. The Contractor's attention is called to the fact that the Calumet Water Reclamation Plant, upon the site of which the work under this Contract is located, is in permanent operation by the District and will be kept in continuous operation while work under this Contract is in progress. The Contractor shall arrange his work and agrees to cooperate with the District so as not to interfere with the continuous operation of the facility by the District, except as otherwise definitely specified.

3.2 SCHEDULE OF SHUTDOWNS

A. General

1. No shutdowns are anticipated for the Work under this contract.

END OF SECTION

SECTION 01140

CONSTRUCTION LIMITATIONS & CONSTRAINTS

PART 1 - GENERAL

1.1 SUMMARY

A. Coordination.

B. Care of structures and property and restoration.

C. Construction progress documentation.

D. Submittal procedures and coordination.

E. Contractor and associated personnel identification and credentials.

1.2 RELATED SECTIONS

A. Section 01130 – Shutdowns.

B. Section 01325 – Project Management System.

C. Section 01700 – Execution Requirements.

1.3 COORDINATION

A. The Contractor shall be responsible for coordinating the construction sequence requirements between the sub-contractors.

B. The Contractor shall employ and make necessary arrangements to have adequate manpower, materials, and equipment throughout the contract duration, especially before requesting and during partial and/or complete plant shutdowns.

1.4 GENERAL REQUIREMENTS

A. The Contractor shall submit and utilize a detailed construction sequence to meet all of the requirements under this Section.

B. The Contractor shall coordinate their use of the site and premises to allow Work by MWRDGC and Work by Others.

1.5 WORK RESTRICTIONS

A. CARE OF STRUCTURES AND PROPERTY

1. All poles, trees, shrubbery, fences, pavements, sewer, water, gas or pipes, wires, conduits, culverts, drainage ditches, manholes, and all other structures and property at or adjacent to the site of the work shall be supported and protected from damage

or injury by the Contractor during the construction and until the completion of said work. The Contractor shall be liable for all damages to structures and property and shall save and keep the Water Reclamation District harmless from any liability or expense for damage or repairs to the same.

2. All areas affected by the Contractor's work shall be thoroughly cleaned of all surplus materials, earth, and rubbish placed thereon by the Contractor, and such areas shall be restored to as good condition as existed before the commencement of the work. Where sod has been removed or damaged, new live sod shall be replaced as hereinafter provided. Where the areas are to be seeded, top soil equal to that removed shall be placed, the area fertilized, seeded, and rolled to the satisfaction of the owner of the land, as hereinafter provided. All tree shrubs, and plants damaged shall be replaced during the proper season of the year with live growing stock of the same variety and reasonable size as that which was damaged.

3. The Contractor shall arrange with all persons, partnerships or corporations for the support, removal, relocation and/or maintenance of any conduits wires, poles, pipes, gas mains, cables, or other structures within any portion of the streets, public alleys and highways and easements to be occupied or used during the performance of the work specified under this Contract, and shall do all work necessary for such support, removal, relocation and/or maintenance of such conduits, wires, poles, pipes, gas mains, cables, or other structures encountered, as may be rendered necessary by the construction of said work.

4. The Contractor shall, at his own expense, repair any damage to buildings, or other property of the MWRD, or other owners by the Contractor in the execution of this Contract.

5. All of the described work under this Section shall be done with no additional expense to the Water Reclamation District.

6. The Contractor shall assume full responsibility for the security and safety of everything he may have on the property of the MWRD or other owners.

7. The Contractor shall provide concrete scanning services (ground-penetrating radar or x-ray device) to detect any embedded conduits and reinforcing bars before core drilling any openings for ducts, pipes, electrical conduits, etc. The contractor shall be responsible for repairing any severed conduits.
8. Contractor shall prevent materials and equipment from falling into tanks.

1.6 CONSTRUCTION PROGRESS DOCUMENTATION

A. Before starting construction, the Contractor shall submit his proposed order of procedure to the Engineer for approval. The construction of the various parts of the work shall be performed in such sequence that interference with operations of the Water Reclamation District or other contractors shall be kept to a minimum.

1.7 SUBMITTAL PROCEDURES & COORDINATION

A. All submittal copies shall have the Contractor's review stamp with the Contractor's name, contract number, date, submittal number, and Contractor's signature. Contractor's review stamp shall be considered as certification by the Contractor that the submittal is in accordance with the requirements of the contract documents, and that the Contractor has reviewed/verified the products submitted, field dimensions, adjacent construction work, and coordination of information.

B. Submittals and written project communication shall be in accordance with Specification Section 01325, Project Management System.

1.8 PERSONNEL

A. In addition to the requirements of the General Conditions, all employees of any Contractors or Subcontractors, performing work on any of the premises of any of the facilities of MWRDGC, shall be required to provide a photo identification (State Photo Identification card or Driver's License), upon demand by District's representatives.

B. MWRDGC reserves the right to request identification and deny access to the District's facilities to any person, including employees of any Contractor or Subcontractor, who in the District's opinion, has not provided proper identification or documentation of the same. The Contractor shall not be entitled to any damages when any person is denied access to the District's facilities for lack of proper identification.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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SECTION 01310

COORDINATION AND MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Related requirements specified elsewhere include:

1. Section 01325 – Project Management System

1.2 COORDINATION

A. The Contractor shall:

1. Coordinate scheduling, submittals, and work to assure efficient and orderly sequence of installation.

2. Coordinate work to minimize disruption of the District's activities.

3. Verify existing conditions before starting work.

4. Coordinate completion and clean up of work in preparation for substantial completion.

1.3 PRECONSTRUCTION CONFERENCE

A. The resident engineer will schedule a conference after Notice of Award.

B. Required Attendees: Engineers, Contractor, and Subcontractors.

C. Agenda will include:

1. Distribution of Contract Documents

2. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule

3. Designation of personnel representing the parties in Contract, and the Engineer

4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures

5. Scheduling

1.4 SITE MOBILIZATION CONFERENCE

A. The District will schedule a conference at the project site prior to the Contractor's occupancy.

B. Required Attendees: Engineers, the Contractor, the Contractor's Superintendent, and all major Subcontractors.

C. Agenda will include:

1. Use of premises by MWRD and the Contractor
2. MWRD's requirements
3. Construction facilities and controls provided by the District
4. Temporary utilities provided by the District
5. Survey
6. Security and housekeeping procedures
7. Schedules
8. Procedures for maintaining record documents

1.5 PROGRESS MEETINGS

A. The Contractor shall schedule and administer meetings throughout the progress of the Work at maximum bi-monthly intervals.

B. The Contractor shall make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record and prepare minutes, and distribute copies within two days to the Engineer, the participants, and those affected by decisions made.

C. Required Attendees: The Contractor’s superintendent, the Contractor’s safety representative, Resident Engineer or Resident Engineer’s Representative, all major Subcontractors and suppliers, Engineers, and others as appropriate to address and resolve agenda topics for each meeting.

D. Agenda will include:

1. Review minutes of previous meeting
2. Review of work progress
3. Field observations, problems, and decisions
4. Identification of problems which impede planned progress
5. Review of submittals schedule and status of submittals
6. Review of off-site fabrication and delivery schedules

7. Maintenance of progress schedule

8. Planned progress during succeeding work period

9. Other business relating to Work

PART 2 – PRODUCTS

2.1 (NOT USED)

PART 3 – EXECUTION

3.1 The Contractor and the sub-Contractors shall fully cooperate and follow the directives to finish the construction work in the timely, satisfy manner.

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SECTION 01321

CONSTRUCTION PROJECT SCHEDULE

PART 1 - GENERAL

1.1 DESCRIPTION

This work consists of preparing, maintaining, and submitting a Critical Path Method (CPM) Schedule, referred to as the Project Schedule that depicts the sequence and timing of all of the Work.

1.2 PURPOSE

A. The purpose of the Project Schedule and this specification is to:
1. Ensure that the Contractor has a detailed plan to complete the Project in accordance with the Contract Documents;
2. Ensure that the Project Schedule is regularly updated and revised to accurately depict the Contractor's plan;
3. Provide a means of monitoring the Work;
4. Aid in communication and coordination of activities among all parties;
5. Provide Notice of events for observation, inspection, or participation.

1.3 DEFINITIONS

A. General
1. **Activity** – A discrete, identifiable task listed in the work schedule or event that usually has a planned duration, has a definable start date and finish date, and can be used to plan, schedule, and monitor a project.
2. **Activity, Controlling** – The first incomplete activity on the Critical Path.
3. **Activity, Critical** – An activity on the Critical Path.
4. **Actual Start Date** – The date that meaningful work actually started on an activity.
5. **Actual Finish Date** – The date that meaningful work actually ended on an activity.
6. **Business Days, MWRDGC** – Any calendar day that is not a Saturday, Sunday, or MWRDGC-recognized holiday.
7. **Completion Date, Contract** – The date specified in the Contract for completion of the Project or a revised date resulting from a properly executed Time Extension.
8. **Start Date, Contract** – The day following the MWRDGC's approval of the Contractor's Performance Bond.
9. **Completion Date, Scheduled** – The date forecasted by the Project Schedule for the completion of the Project.
10. **Constraint** –An early or late date restriction imposed on an activity or milestone. Will alter Total Float values and the forecasted start or finish of an activity or milestone.
11. **Contemporaneous Period Analysis Method** – Also known as the Contemporaneous Schedule Analysis, it is an observation schedule analysis

technique used to identify and quantify critical delay. The method is identified and described in AACEI's Recommended Practice for Forensic Schedule Analysis, Method Implementation Protocol (MIP) 3.4.

12. **Critical Path** – The longest continuous path, time wise, of activities that determine the Schedule Completion Date or other Contract Milestones, also called the Longest Path. The Critical Path may change from time to time as activities are completed ahead of or behind schedule.
13. **Critical Path Method (CPM)** – A method of planning and scheduling that relies on activities, activity durations, activity relationships, and network calculations to forecast when activities will be performed. This method also allows for the identification of the Critical Path of the Project.
14. **Data Date (DD)** – The date entered in the Project Details, in the Dates tab, which is used as the starting point to calculate the schedule. For the As-Planned Schedule, the Data Date shall be the Contract Start Date; for Progress Schedule Update submissions, the Data Date shall be the date up to which the Contractor is reporting progress (generally the day after the last working day for the corresponding contract payment period).
15. **Duration, Original (OD)** – The original estimated number of working days (not including holidays) in which the Work associated with an activity is expected to be performed. (The number of calendar days may be different based on the calendar assigned to the activity.)
16. **Duration, Remaining (RD)** – The estimated time, expressed in working days (not including holidays or other non-working periods), needed to complete an activity that has started, but has not finished.
17. **Early Dates** – The earliest date an activity can start or finish based upon activity relationships, duration, and placement within the network. These dates are calculated by the software during the forward pass.
18. **Early Completion Schedule** – A Project Schedule that forecasts a Scheduled Completion Date(s) that is earlier than the Contract Completion Date(s). This includes Project Schedules that are planned to finish early based on the Project plan and estimate.
19. **Enterprise Project Management Database (EPMD)** – The MWRDGC's database of Project Schedules.
20. **Float, Free (FF)** – Number of working days by which an activity in the Work Schedule may be delayed from its early dates without necessarily delaying successor activities.
21. **Float, Total (TF)** – Number of working days by which an activity in the Work Schedule may be delayed from its early dates without necessarily extending the time stated in the Agreement.
22. **Fragnet** – A "fragmentary network" that consists of an activity or collection of activities that represents work added to the Contract. The fragnet representing the added work is inserted into the Project Schedule to measure the resulting delay, if any, in a Time Impact Analysis.
23. **Global Data** – Data classified by Primavera software as Global, including Project Codes, Global Activity Codes, Global Calendars, Resource, Global Filters, Global Reports, User Defined Fields, and Unit of Measure.
24. **Lag** – An amount of time, measured in workdays, between an activity and its successor used during the schedule calculation.

25. **Late Dates** – The latest date an activity can start or finish based upon activity relationships, duration, and placement in the network. These dates are calculated by the software during the backward pass.
26. **Longest Path** – The sequence of activities in the Project Schedule network that calculates the Scheduled Completion Date. Also referred to as the Critical Path.
27. **Milestone** – An activity with zero duration that represents a significant event. For example, the beginning and end dates of the Project specified by the Contract, a project phase, interface point with other contracts, or revised date resulting from a properly executed Change Order.
28. **Narrative Report** – A descriptive report that accompanies each Project Schedule submission. The required contents of this report are set forth in this specification.
29. **Open End** – The condition that exists when an activity has either no predecessor or no successor, or when an activity's only predecessor relationship is a finish-to-finish relationship or only successor relationship is a start-to-start relationship.
30. **Organizational Breakdown Structure (OBS)** – An OBS is a hierarchical arrangement of a program or project management structure. User access and privileges to nodes and projects within the Enterprise Projects Structure (EPS) hierarchy are implemented via a responsible manager defined in the enterprise-wide OBS hierarchy.
31. **Predecessor** – An activity that is defined by schedule logic to precede another activity.
32. **Project Scheduler** – The person designated by the Contractor and approved by the MWRDGC that is responsible for developing and maintaining the Project Schedule.
33. **Project's Must-Finish-By-Date** – A date constraint entered in the Project Details, in the Dates tab, that reflects the Contract Completion Date specified by the Contract or revised date resulting from properly executed Change Order.
34. **Relationships** – The interdependence among activities in the network. Relationships link an activity to its predecessor(s) and successor(s). Relationships are defined as:
    a) Finish-to-Start (FS) – The successor activity can start only when the predecessor activity finishes.
    b) Finish-to-Finish (FF) – The successor activity can finish only when the predecessor activity finishes.
    c) Start-to-Start (SS) – The successor activity can start only when the predecessor activity starts.
    d) Start-to-Finish (SF) – The successor activity can finish only when the predecessor activity starts.
35. **Schedule, As-Built (AB#)** – This schedule is typically the final Schedule Update for the project and records the completion of all Contract work. This schedule shall be submitted for final payment in accordance with specification section 01 3300 – Submittal Procedures.
36. **Schedule, As-Planned (AP)** – This schedule fully details the plan to complete the Project in accordance with the Contract Documents. Once the As-Planned Schedule is accepted by the MWRDGC, it shall be archived and a copy of it shall be used as the basis to create Schedule Update No. 1.
37. **Schedule, Forensic** – A schedule (or schedules) developed retrospectively or well after the fact to replace or approximate a contemporaneous schedule (or schedules). The MWRDGC does not accept forensic schedules.
38. **Schedule, Look-Ahead or Monthly Work Plan (MWP)** – These are short excerpts from the Project Schedule that are presented in construction or progress meetings for

coordination purposes. Usually referred to by the MWRDGC as the "three-week-look-ahead schedule" or whatever time duration the MWRDGC Engineer directs. These schedules should contain more detail than the Project Schedule and should be coordinated with and reflect the dates, logic, etc. with the latest Schedule Update.

39. **Schedule, Project** – This term will be used when referring generally to the Project's CPM Schedules. This term only refers to the As-Planned Schedule, Look-Ahead or Monthly Work Plan, Schedule Update, Recovery Schedule, or any other schedule accepted by the Engineer.
40. **Schedule, Recovery (RS#)** – A schedule that the MWRDGC's Engineer instructs the Contractor to develop to recover or mitigate the forecasted project delay depicted in an unaccepted Schedule Update.
41. **Schedule, Current** – A version of the Project Schedule that reflects the status of activities that have started or have finished as of the Data Date. This schedule depicts the activities' actual start dates, actual finish dates, and remaining durations as of the Data Date and is developed on a monthly basis.
42. **Schedule Update Submittal (SU#)** – A version of the Project Schedule that reflects the status of activities that have started or have finished as of the Data Date, as required at specific dates for submittal to the Engineer and to preserve the record.
43. **Schedule Log Report (F9 Report)** – The report generated by the software application when a user "schedules" the Project Schedule. It documents the settings used when scheduling the project, along with project statistics, error/warning, scheduling/leveling results, exceptions, etc.
44. **System Administrator** – The individual who manages the Primavera scheduling system and EPMD for the MWRDGC.
45. **Substantial Completion** – A milestone event or a point in time when the Work, or a MWRD-designated portion of the Work, has been declared in writing by the Engineer to have been completed in accordance with the Contract Documents, to a sufficient extent that it can be used by the MWRD for its intended purpose and/or begin a 60 day test. Substantial Completion is not substantial performance of the contract.
46. **Successor** – An activity that is defined by schedule logic to succeed another activity. The Start Date or Finish Date of a successor may be controlled by its predecessor.
47. **Work Breakdown Structures (WBS)** – A deliverable oriented grouping of project elements that organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of project components or work packages.
48. **Working Day** – A Working Day is a calendar day designated as a day that work can occur in the work calendars of the Project Schedule.

1.4 RELATED SECTIONS

A. 01325 - Project Management System

B. 01326 – Submittal Procedures

C. 01310 – Coordination and Meetings

1.5 REFERENCES

A. Oracle Corporation:

1. Primavera P6 Project Management Software

B. The Association for the Advancement of Cost Engineering (AACE):
1. AACE International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS.
2. AACE International Recommended Practice No. 37R-06, SCHEDULE LEVELS OF DETAIL – AS APPLIED IN ENGINEERING, PROCUREMENT AND CONSTRUCTION.
3. AACE International Recommended Practice No. 52R-06, TIME IMPACT ANALYSIS – AS APPLIED IN CONSTRUCTION.
4. AACE International Recommended Practice No. 78R-13, ORIGINAL BASELINE REVIEW AS APPLIED IN ENGINEERING, PROCUREMENT, AND CONSTRUCTION.

PART 2 - PRODUCTS

A. SCHEDULING SOFTWARE
1. The MWRDGC will provide Oracle's Primavera P6 Project Management software, or a newer release, and its Oracle's Enterprise Primavera P6 Project Management Database (EPMD) on internet accessible network servers for Contractors to develop, maintain, and submit the Project Schedules for MWRDGC personnel and Consultants to review, evaluate, and accept the Project Schedules. The MWRDGC will determine the location to store the Project Schedule files on the EPMD and will provide the Contractor with the naming convention for all Project Schedule submissions.

PART 3 - EXECUTION

3.1 EPMD ACCESS AND USAGE

A. Submit a request for access to the MWRDGC for one proposed user, unless otherwise specified, to obtain a User ID and Password for access to the MWRDGC's EPMD. Upon receipt of the Notice of Award, contact the Resident Engineer to request access for a username and password via Constructware or directly to the MWRDGC's Resident Engineer via email if the Contractor does not have access to Constructware. If at any point the contract is terminated, the Contractor's access to the project will be rescinded.

B. Early Access to the MWRDGC's EPMD will be provided upon request to the lowest apparent bidder.

C. The MWRDGC will provide the Contractor with a Project Schedule template for the Contractor's use in developing its Project Schedule. The Contractor shall develop,

update, and revise the Project Schedules in the MWRDGC's EPMD. In addition, a narrative template will be added in Constructware under template projects for the Contractor's use.

D. The MWRDGC will not "Import" or accept Project Schedule files from any other computer system.

E. MWRDGC will create and maintain access rights within the EPMD. As this software is an enterprise application, the MWRDGC will be the sole entity to modify the EPS structure, the OBS Structure, Global Project Codes, Global Activity Codes, Global Calendars, User Defined Fields, Security Profiles, Admin Categories, and Admin Preferences.

Table No. 1 provides the MWRDGC Schedule Filename Convention. Use this naming convention for all Project Schedules.

Table No. 1: Schedule Filename Convention		
Project Schedules	Initial Submission	Resubmission
As-Planned Schedule	XX-XXX-XX AP-R0	XX-XXX-XX AP-R1
Schedule Update Month No. 1	XX-XXX-XX SU1-R0	XX-XXX-XX SU1-R1
Schedule Update Month No. 2	XX-XXX-XX SU2-R0	XX-XXX-XX SU2-R1
1st Recovery Schedule	XX-XXX-XX RS1-R0	XX-XXX-XX RS1-R1
2nd Recovery Schedule	XX-XXX-XX RS2-R0	XX-XXX-XX RS2-R1
As-Built Schedule	XX-XXX-XX AB1-R0	XX-XXX-XX AB1-R1
* 15-265-3D is the MWRDGC Contract Number.		

F. The MWRDGC's EPMD will generally be available for the Contractor's use at all times unless system maintenance (i.e. backups, upgrades, etc) is being performed. No time extensions will be granted for users being unable to access the system due to system maintenance.

G. The MWRDGC does perform regular backup of data contained in the EPMD, and will make every effort to restore the latest historical copy of schedule submissions in the event of any failure of the EPMD. The Contractor is responsible for its own backup of these submissions. In the event a Contractor's authorized user cannot access the EPMD from 6:00 a.m. to 10:00 p.m., Monday through Friday, the Contractor shall provide notification in Constructware to the System Administrator.

H. Project Schedules are developed in part based on the Contractor's knowledge of the project, the Contractor's means and methods, and the Contractors' understanding of the Contract and past experience. Note that all other schedule data, and all Enterprise data residing on the EPMD, are the sole property of the MWRDGC and the Contractor is not to use the EPMD system for non-MWRDGC projects.

3.2 PROJECT SCHEDULE SUBMITTALS:

A. Project Scheduler:

1. Designate an individual, entitled the Project Scheduler, who will develop and maintain the Project Schedule. Ensure that the Project Scheduler is present at the As-

Planned Schedule Meeting and attends all meetings, or is knowledgeable of the meeting minutes that outline schedule-related issues during those meetings, which may affect the CPM schedule, including but not limited to those between the Contractor and their Subcontractors and between the Contractor and the MWRDGC. The Project Scheduler must be knowledgeable of the status of all aspects of the Work throughout the duration of the Contract, including but not limited to original Contract Work, alterations or additions, and unanticipated conditions.

2. Provide a Project Scheduler with the following minimum qualifications:
   a) The Project Scheduler shall have at least one (1) year of experience using Oracle's Primavera P6 Project Management software in an enterprise environment. A Project Scheduler with less experience may be acceptable if he or she can document the completion of at least three (3) days of training in Oracle's Primavera P6 Project Management from a certified instructor and has one year of experience in the use of Oracle's Primavera Project Planner (P3) software.
   b) The Project Scheduler duties should not be shared by more than one person at any time. It may be a full or part-time position or may be filled by a Consultant.
   c) The Contractor may fill the Project Scheduler position using a person who is not on the Project, except for meetings and other times when the Project Scheduler's presence is required on the Project to satisfactorily fulfill the Project Schedule requirements of the Contract Documents.
   d) The Contractor may not name the Project Manager as the Project Scheduler, but may identify a Project Scheduler with other part-time responsibilities.
   e) The Contractor's submittal to MWRDGC proposing the Project Scheduler shall contain a resume and other documentation sufficient to establish the Project Scheduler's compliance with the requirements of this specification. MWRDGC will review the submittal and indicate its approval, ask for additional information regarding the proposed Project Scheduler's qualifications or other responsibilities, or reject the Contractor's proposed candidate. MWRDGC will not accept the Contractor's Project Schedule submission before the Contractor has submitted and MWRDGC has accepted the Contractor's proposed Project Scheduler.

B. As-Planned Schedule Meeting:

1. After receipt of the Notice of Award, contact the Engineer to schedule an As-Planned Schedule Meeting. Ensure that the As-Planned Schedule Meeting occurs within 30 calendar days of the approval of the Contractor's Performance Bond. The purpose of this meeting is to discuss all essential matters pertaining to the satisfactory scheduling of the Project, and to resolve questions regarding interpretation of the Contract related to the Project Schedule.
2. The Contractor is required to submit the Project As-Planned Schedule draft that demonstrates how the Project Scheduler's entire proposed alphanumeric coding structure and the activity identification system for labeling work activities in the Project Schedule will conform to the detailed requirements of this specification. The Contractor may submit the Project As-Planned Schedule draft at any time following the Notice of Award, but before the As-Planned Schedule Meeting.
3. At the As-Planned Schedule Meeting, ensure that the Project Scheduler is prepared to discuss the following:
   a) A construction plan describing the proposed sequence of Work and means and method of construction.

b) How the Contractor plans to depict its planned sequence of Work in the Project Schedule.
c) The proposed hierarchal Work Breakdown Structure (WBS) for the Project Schedules. The Project Scheduler shall provide a paper copy of the proposed WBS at the meeting.
d) The proposed project calendars.
e) The proposed project activity codes and code values for each activity code and shall provide a paper copy of this information at the meeting.

4. The System Administrator will be available to answer questions regarding scheduling, including the availability of MWRDGC-supplied electronic file(s) containing sample Project Schedule information, such as WBS, Global Activity Codes, and Calendars, sample Project Schedule Narratives, Special Notes for CPM Scheduling, the CPM Scheduling Manual, and required standard format for Project Schedules.
5. Schedule meetings as necessary with the System Administrator and Engineer to discuss schedule development and resolve schedule issues until the As-Planned Project Schedule is accepted by the Engineer.
6. Critical items for this review should include, but are not limited to the proposed WBS for subsequent progress schedules; the proposed project Calendars; the Project planned start date; the Project Must-Finish-By-Date; major Milestone activities; critical procurement items; and the critical path (i.e. – Approval of Performance Bond, Contract Completion).

C. Project Schedule Submission on the EPMD:

1. Submit the Project Schedule to the Engineer for review and acceptance. Ensure that the filename conforms to the requirements of Table No. 1. The Project Scheduler can change the Project ID and Name through the WBS at the top node, as they do not have privileges to edit data through the Project Details tab. Ensure that all submissions meet the requirement of specification section 01326 – Submittal Procedures.
   a) Project Schedule shall be copied and renamed in Loadspring. Place the renamed file in the "Current EPS folder for the Engineer's review.
   b) The Project Schedule printouts, Scheduling Log (F9) report, and Narrative Report shall be submitted through the submittal module in Constructware. A copy of the .XER Export shall also be included in the submittal for record, but only the schedule file copied over in the EPMD will be reviewed. If information in the schedule files is found to be different, the schedule file in the EPMD will govern.
2. Schedules submittals will be immediately rejected without review for the following reasons:
   a) All submittal items required by subsection 3.2.D are not included in the submittal package.
   b) The data date is not correct for the type of schedule being submitted. For schedule updates the data date should be the first calendar day following the period for which progress was recorded.

D. Project Schedule Submittal Requirements:

1. As-Planned Schedule Submittal Requirements.
   a) A Narrative Report in Adobe Acrobat Format.
   b) The .XER export file of the Project Schedule (archived copy) shall be copied and renamed in Loadspring.
   c) A Project Schedule electronic printout in Adobe Acrobat Format using the Global Layout named "As-Planned Schedule – Critical Path," with activities sorted by Start Date in ascending order, grouped by WBS, and the "Longest Path" filter applied. This plot shall provide a clear longest path from the Data Date to the last activity in the schedule.
   d) A Project Schedule electronic printout in Adobe Acrobat Format of the entire schedule using the Global Layout named "As-Planned Schedule – Full Schedule", with activities sorted by Start Date in ascending order and grouped by WBS.
   e) A Schedule Log Report (F9 report) in Adobe Acrobat Format.
   f) A Look-Ahead or Monthly Work Plan Schedule in Adobe Acrobat Format using the Global Layout named "Three-Month Look Ahead", with activities sorted by Start Date in ascending order and grouped by WBS. This plot depicts the activities that are forecasted to occur from DD to DD+90 (3-month Look-ahead).
2. Schedule Update and Recovery Schedule Submittal Requirements
   a) A Narrative Report in Adobe Acrobat Format.
   b) The .XER export file of the Project Schedule (archived copy) shall be copied and renamed in Loadspring.
   c) A Project Schedule plot in Adobe Acrobat Format using the Global Layout named "Schedule Update – Critical Path," with activities sorted by Finish Date in ascending order, grouped by WBS, and the "Longest Path" filter applied. This plot shall provide a clear longest path from the Data Date to the last activity in the schedule.
   d) A Project Schedule electronic printout in Adobe Acrobat Format of the entire schedule using the Global Layout named "Schedule Update – Full Schedule", with activities sorted by Start Date in ascending order and grouped by WBS.
   e) A Look-Ahead or Monthly Work Plan Schedule in Adobe Acrobat Format using the Global Layout named "One-Month Look Ahead", with activities sorted by Start Date in ascending order and grouped by WBS. This plot depicts the activities that show from DD-30 to DD (1-month Look-back) and the activities that are forecasted to occur from DD to DD+30 (1-month Look-ahead).
   f) A Schedule Log Report (F9 report) in Adobe Acrobat Format.

3.3 PROJECT SCHEDULE DEVELOPMENT

A. General

1. Develop and maintain a computer-generated Project Schedule utilizing the Oracle's Primavera P6 Project Management software on the MWRDGC's EPMD.
2. Use the Project Schedule to manage the work, including but not limited to the activities of subcontractors, fabricators, the MWRDGC, other involved City and State agencies and authorities, other entities such as utilities and municipalities, and all other relevant parties involved with the project.
3. The Contractor is the sole entity allowed to physically modify the following data within the Project Schedule: Activity IDs; Activity names; Activity durations;

relationships between activities; successors and predecessors, actual start and actual finish dates of activities; planned start and planned finish dates of activities; and activity resources.

4. The MWRDGC may modify certain data associated with the Project Schedule to ensure conformance to the EPMD's standard schedule format. This means that the MWRDGC may create additional layouts, filters and reports; create and edit additional user defined custom data fields; assign project codes; add and assign additional project activity codes; add and assign additional cost account codes;; enter data in Notebook tabs; modify calendar ID's (although not the calendar itself); etc; that do not alter the established activities or schedule logic of the Contractor.
5. Introduce and request approval of proposed changes to the Project Schedule during the regularly scheduled Project Progress Meetings. Only proposed changes that are approved by the Engineer can be incorporated into the Project Schedule.
6. Develop the Project Schedule using, to the maximum extent practicable, the Global Activity Codes (MWRDGC GLOBAL) identified in the MWRDGC's EPMD. Any schedule "Layouts", "Filters" and "Report" formats that the Contractor develops for the various Project Schedules submissions to the Engineer shall be saved and made available to all other users of the Project Schedule with a name that includes the Contract Number (XX-XXX-XX).
7. The MWRDGC may make copies of the Project Schedules to perform what-if type analysis, which may involve any type of modification to those copies of the schedules.
8. In scheduling and executing the work, the Contractor shall:
    a) Sequence the work commensurate with the Contractor's abilities, resources, and the Contract Documents. The scheduling of activities is the responsibility of the Contractor.
    b) Ensure that the Project Schedule contains all work constraints and Milestones defined in the Contract. Schedule the work using such procedures and staging or phasing as required by the Contract. Work designated as part of separate stages may be performed concurrently with other stages where allowed by the Contract or where approved by the MWRDGC.
    c) Ensure that the Project Schedules prepared by the Project Scheduler for submission to the MWRDGC are in compliance with the Contract. This includes the Project Schedule submissions and accompanying Narratives are timely, complete, accurate, and in compliance with the Contract.
    d) Communicate all Contract changes, and decisions or actions taken by the Contractor and all subcontractors, fabricators, etc, that affect the Project Schedule to the Project Scheduler in a timely manner to allow appropriate development, maintenance, and updating of the Project Schedule.
    e) Include and satisfactorily complete all Work contained in the Contract.
    f) Ensure that the Project Schedule includes all work directed in writing by the Engineer in the next Schedule Update submission.
    g) Ensure that the Schedule Updates reflect the actual dates that work activities started and completed in the field.
    h) Break a schedule activity into multiple activities to reflect a discontinuity in the work if a work activity is suspended in the field and restarted at a later date, and the break between when the work was suspended to when it was resumed is significant compared to the original activity duration.

9. The Contractor is responsible for the means and methods necessary to complete the Work required by the Contract and as depicted in the Project Schedule. Failure by the Contractor to include any element of work required by the Contract in the accepted Project Schedule does not relieve the Contractor from its responsibility to perform such work.
10. All activities that represent a submittal must have a separate activity for the review of the submittal. Durations for review activities should be no less than 21 calendar days.
11. Errors or omissions on schedules shall not relieve the Contractor from finishing all work within the time limit specified for completion of the Contract.

B. Detailed Schedule Requirements

1. Defining Project details and defaults – Within the Dates tab, the "Planned Start" shall be 1 day after approval of Bond and the "Must-Finish-By" date shall be the Contract Completion Date. Within the Settings tab, define the Critical Activities as the "Longest Path." The Project Scheduler role does not have security privileges to change this option in the Project Details tab, so requests for changes to this data needs to be forwarded to the System Administrator; the Contractor shall include in your request the contract and the Project ID.
2. Detail the Project Schedule to Level 4 in the Schedule Levels Requirement of AACEi's Recommended Practice No. 37R-06, SCHEDULE LEVELS OF DETAIL – AS APPLIED IN ENGINEERING, PROCUREMENT AND CONSTRUCTION. The appropriate number of activities will be largely dependent upon the nature, size, and complexity of the project. In addition to all site construction activities, the Project Schedule shall include activities necessary to depict the procurement/submittal process, including shop drawings and sample submittals; the fabrication and delivery of key and long-lead procurement elements; testing of materials, and equipment; settlement or surcharge period activities; sampling and testing period activities; cure periods; activities related to temporary structures or systems; activities assigned to subcontractors, fabricators, or suppliers; erection and removal of falsework and shoring; inspections; activities to perform punch list work; and activities assigned to the MWRDGC and other State, County, and City agencies and authorities and other adjacent contractors. The Project Schedule shall indicate intended submittal dates, and depict the review and approval periods in accordance with specification section 01326 – Submittal Procedures.
3. The following activities shall be incorporated into the Progress Schedule:

Required MWRD Schedule Activities				
Activity ID	Activity	Minimum Duration (CDs)	Predecessor Logic Relationship	RESPONSIBILITY (MWRDGC GLOBAL)
Preconstruction Phase (To Occur 30 days after Award is Actualized)				
REQ-1000	Contract Start Date (Start Milestone)	0		MWRDGC
REQ-1010	Submit Insurance Requirements	1	REQ-1000 - FS	Contractor
REQ-1020	Review Insurance Requirements	7	REQ-1010 -FS	MWRDGC
REQ-1030	Submit Safety Engineer	1	REQ-1000 - FS	Contractor
REQ-1040	Review Safety Engineer	7	REQ-1030 - FS	MWRDGC

REQ-1050	Submit Project Engineer	1	REQ-1000 – FS	Contractor
REQ-1060	Review Project Engineer	7	REQ-1040 - FS	MWRDGC
REQ-1070	As-Planned Meeting	1	REQ-1020 – FS, REQ-1040 – FS, REQ-1060 – FS,	Contractor
Construction Phase				
REQ-1080	Contractor Starts Work/Mobilization (Start Milestone)	0	–All REQ submittals and pre-mobilization submittals - FS	Contractor
REQ-1090	Maintenance Manual(MMS) Listing Submittal	30	Finish No Later Than 1/3 Project Duration	Contractor
REQ-2000	MMS List Approved by M&O	30	REQ-1090 - FS	Contractor
REQ-2010	Submit MMS Manuals	30	REQ-2000 - FS	Contractor
REQ-2020	Approve MMS Manual	30	REQ-2010 - FS	Contractor
REQ-2030	Submit O&M Manuals	30	REQ-2000 - FS	Contractor
REQ-2040	Approve O&M Manuals	30	REQ-2030 - FS	Contractor
REQ-2050	Equipment Training	30	REQ-2040 - FS	Contractor
REQ-2060	60 day Operation Test	60	REQ-2050 - FS	Contractor
REQ-2070	Substantial Completion (Finish Milestone)	0	See Definition, REQ-2060 - FS	Contractor
REQ-2080	Punchlist	30	REQ-2070 - FS	Contractor
REQ-2090	Demobilization/Cleanup	30	REQ-2070 - FS	Contractor
REQ-3000	Final Completion (Finish Milestone)	0	REQ-2090 - FF	Contractor

4. Work Breakdown Structure (WBS) - A multi-level-hierarchal WBS shall be incorporated. The levels (nodes) shall include, but not be limited to:
   a) Level 1- is the project level;
   b) Level 2- shall have three nodes; PRECONSTRUCTION, CONSTRUCTION, and POST CONSTRUCTION;
   c) Level 3-
      1) the node for PRECONSTRUCTION activities shall have at least three sub nodes; SUBMITTALS, REVIEW/APPROVALS, , and PROCUREMENT / FABRICATION;
      2) The node for CONSTRUCTION activities shall be broken into nodes for various PHASES/AREAS of construction work;
      3) The node for POST CONSTRUCTION activities requires no sub nodes.
   d) Level 4- The nodes for PHASES/AREAS of Construction activities should include sub nodes for the various categories of work;
5. Activity ID – Include a unique identification number for each activity. Activity ID numbers shall not be changed or reassigned.
6. Scheduling Method – All contractors schedules must use the 'retained logic' scheduling feature in Primavera P6 Project Management. Schedules may not use the "Progress Override" feature within the software.

7. The Resource Leveling feature of Primavera P6 Project Management may not be used on any Project Schedule to be submitted and will not be considered for approval by the Engineer.
8. Activity Name – Clearly and uniquely name each activity with a description of the work that is readily identifiable to inspection staff. Each Activity shall have a narrative description consisting at a minimum of a verb or work function (i.e. form, pour, excavate, etc.), an object (i.e. slab, footing, wall, roof, etc.), and a location. The work related to each Activity shall be limited to one Area of the contract, one Stage of the contract, and one Responsible Party of the contract.
9. Milestone Activities – Include activities for all Milestones that define significant contractual events such as Notice of Award, Contract Signing/ Bond Approval, Contractor Start Work Date, Substantial Completion, Final Completion, and coordination points with outside entities such as utilities, State agencies, Authorities, municipalities, Time-Related Contract Provisions, etc.
10. All milestone activities in the schedule shall be assigned the standard Global calendar named 'MWRDGC Milestone / 365 Day / 8 hour," this calendar should also be assigned to any activities for concrete curing.
    a) The Notice of Award milestone shall have a primary constraint of "Start On or After."
    b) The Final Completion milestone shall have a primary constraint of "Finish on or before" of the Contract Completion Date.
    c) All contractual Interim Milestones shall have a primary constraint of "Finish On or Before" using the dates established within the contract.
11. Activity Durations – Except for submittal and procurement activities, ensure that durations do not exceed 20 workdays unless approved by the Engineer and that durations for MWRDGC submittal reviews meet the requirements set forth in the Contract. If requested by the Engineer, the Contractor shall justify the reasonableness of planned activity time durations. The activity durations should include allowances for anticipated inclement weather. The planning unit is workdays.
12. Activity Relationships – Clearly assign predecessors and successors relationships to each activity, and assign appropriate relationships between activities (Finish-to-Start, Start-to-Start, Finish-to-Finish, etc). Ensure that there are no open-ended activities, with the exception of the first activity and last activity in the schedule. Do not include inappropriate logic ties with Milestone activities (For example, a finish milestone activity, a predecessor shall only be assigned a Finish-to-Finish relationship and a successor shall only be assigned a Finish-to-Start or Finish-to-Finish relationship. For a start milestone, a predecessor shall only be assigned a Finish-to-Start or Start-to-Start relationship and a successor shall only be assigned with a Start-to-Start relationship). The use of each Lag within the Project Schedule must be approved by the Engineer. Lag durations may not exceed 10 days. The Contractor shall not use negative Lag durations.
13. Assign the "Contract Award Date" activity as a predecessor to all submittal preparation activities.
14. Activity Constraint Dates – The Contractor shall not use constraint activities, with the exception of contractual, unless the Engineer approves the use of such constraints in writing.
15. Activity Dates – With the exception of Milestone dates, "Actual Start" and "Actual Finish" dates and "Planned Start" and "Planned Finish" dates, ensure that activity

dates are calculated by software. No Actual Start or Actual Finish dates shall be entered in the As-Planned Schedule.

16. Global Calendars – Any Global Calendars used in the Project Schedule are those established by the MWRDGC. There are only two Global Calendars developed and maintained by the MWRDGC for use by Contractor's, they are the following:
    a) MWRD7D-MWRDGC 7-Day Work Week W/ no Holidays
    b) MWRD5DWH-MWRDGC Business Day, 5-Day Work Week w/ MWRDGC recognized Holidays
17. If the Contractor desires to make any changes to these Global Calendars, forward the proposed changes to the System Administrator and, if appropriate, these changes will be incorporated by the System Administrator.
18. Project Calendars – If the Contractor needs additional calendars that include expected seasonal weather conditions (such as winter shutdown periods) and environmental permit requirements, for the planning and scheduling of activities, the Contractor should create Project Calendars for the specific project. Do not incorporate an activity with a description of "Winter Shutdown" that requires constraints. Provide the working days per week, holidays, the number of shifts per day, and the number of hours per shift by using the Calendar modifier in the P6 software.
    a) All Calendars should be based on an 8-hour shift.
    b) If the Contractor needs to perform work outside of the typical 8-hour workday, then the Contractor should request approval from the Engineer to work more than 8 hours per day. Upon receipt of the Engineer's approval, create a Project Calendar with a title that describes the non-standard working hours. The working hours within the newly created calendar must not deviate from an 8 hour day. Remaining durations should be adjusted to reflect any time gain expected by working non-standard hours or non-business days (i.e. weekends or holidays).
    c) No resource calendars are to be used in the Project Schedule unless requested by the Contractor and approved in writing by the Engineer.
    d) Ensure that all calendars developed by a Contractor use the following naming convention: Contract No. 15-265-3D and describing the function (i.e., XX-XXX-XX – Concrete Calendar, XX-XXX-XX – Landscape Calendar, XX-XXX-XX – Painting Calendar, XX-XXX-XX – Contractor's 5 Day/8 Hour Workweek).
    e) Assign activities for shop drawing reviews and other approvals by MWRDGC personnel the MWRDGC's standard Global – "MWRDGC Business Day, 5-Day Work Week w/MWRDGC Holidays," Calendar.
    f) The As-Planned Schedule cannot include a calendar that reflects any workers working more than 8 hours in any one calendar day or more than 5 days in any one week, without approval of the Engineer, unless otherwise specified. Following the Contract Award the Contractor may submit a request for an overtime dispensation and if approved can add additional calendars in their next Schedule Update submission. The working hours within any newly created calendar must not deviate from an 8 hour day. Remaining durations should be adjusted to reflect any time gain expected by working non-standard hours or non-business days (i.e. weekends or holidays).
    g) The Contractor shall include weather calendars that include expected seasonal weather conditions (such as winter shutdown periods, rain days, snow days, and other expected normal weather conditions). The weather calendar shall be assigned to activities which would normally be impacted or stopped due to weather. (The Contractor shall provide evidence from a nationally recognized

published source, that the expected weather for each month is based on historical data).

19. Clearly define significant hand-over points between the Contractor, the MWRDGC, and other entities including, but not limited to, Federal, State, and local agencies/authorities; and utilities. Include all activities of the MWRDGC, utility companies, adjacent contracts, and other entities that affect progress and influence Contract-required dates in the Project Schedule. This includes dates related to all Permits or Agreements. Ensure that the Project Schedule includes special consideration to sensitive areas and shall indicate any time frames when work is restricted in these sensitive areas as outlined in the permits issued by the regulatory agencies, and provided in the Contract Documents.
20. Activity Resources – MWRDGC may require labor and equipment resource loading within the project schedule. If requested by the Engineer or District, and at no additional cost, the Contractor will load resources using the following methods.
    a) The Contractor will create an activity code or codes to identify each labor crew planned to be used by the Contractor. Each construction type activity in the project schedule must have a labor crew activity code assigned. Within the written narrative that accompanies each schedule submittal, the Contractor will identify each labor crew type used in the project schedule. The Contractor will detail the count and type of each craft in the crew, the standard days of the week the crew will work, and the standard number of hours each day the crew will work.
    b) The Contractor will create an activity code or codes to identify each major piece of equipment planned to be used by Contractor. The equipment activity codes will be assigned to construction type activities where the major equipment is needed to perform the work as planned by the Contractor. Within the written narrative that accompanies each project schedule submittal, the Contractor will identify each major piece of equipment that has been used In the Project Schedule. The Contractor will detail the standard working hours and days of the week that the equipment will be available.
21. Activity Codes – Include a well-defined activity coding structure that allows project activities to be sorted and filtered. Activity Codes shall include, but not be limited to, Responsible Party; Stage; Area of Work; CSI Code; Subcontractor; Non-Standard Work Hours; and additionally as required by the Engineer to meet the needs of the specific contract work to facilitate the use and analysis of the schedule.
    a) Ensure that only Global Activity Codes established by the MWRDGC are incorporated in the Project Schedule.
    b) Use the Global Activity Codes established by the MWRDGC to the maximum extent practicable. Assign the appropriate activity code values to each activity in the progress schedule for the following Global Activity Codes that are in the MWRDGC's enterprise database:
        1) RESPONSIBLE PARTY (MWRDGC GLOBAL)
        2) STAGE (MWRDGC GLOBAL)
        3) AREA (MWRDGC GLOBAL)
        4) CSI CODE (MWRDGC GLOBAL)
        5) PAY ITEM (MWRDGC GLOBAL)
        6) NON-STANDARD CALENDAR (MWRDGC GLOBAL)
        7) CHANGED (ADDED/DELETED) WORK (MWRDGC GLOBAL)
        8) TIME RELATED CLAUSES (MWRDGC GLOBAL)
        9) DELAY (MWRDGC GLOBAL)

c) Any additional Activity Codes developed for specific projects will be Project Activity Codes.

22. Activity Code Values – Ensure that each Activity Code contains individual Activity Code Values that are then assigned to activities.

C. Early Completion Schedules

1. If the Project Schedule forecasts a Completion Date earlier than required by the Contract, or a revised Contract Completion Date resulting from a properly executed Time Extension, the difference between such an Early Completion Date and the Contract Completion Date or any other Milestone Date shall be defined as Float. Total Float and Free Float are owned by the Project and are not for the exclusive benefit of the Contractor or the MWRDGC. Total Float and Free Float are available for use by both the Contractor and MWRDGC. The Engineer may use available Total Float and Free Float for the proper interfacing of Work performed by the MWRDGC or other parties, to accommodate work added by change orders, or to mitigate any unavoidable delays.
2. The Contractor is not entitled to recover delay damages for owner-caused issues that result in delay between the early Scheduled Completion Date and the Contract Completion Date or any other contractual completion date as detailed in the contract.

3.4 AS-PLANNED SCHEDULE

A. As-Planned Schedule Requirements

1. Submit an As-Planned Schedule Draft any time after the Notice of Award, but before the As-Planned Schedule Meeting. Ensure that the Draft depicts the Contractor's original plan to complete the project based on the contract documents as of award and that the timing and sequence of the work meets the requirements of the contract. See section 3.1 "EPMD Access and Usage" for access to the system and templates.
2. Within 60 calendar days of Award, submit the As-Planned Schedule. Ensure that the As-Planned Schedule depicts all of the Work to Level 4 as described in AACEi's Recommended Practice No. 37R-06, SCHEDULE LEVELS OF DETAIL – AS APPLIED IN ENGINEERING, PROCUREMENT AND CONSTRUCTION. Ensure that this schedule depicts the Contractor's plan to complete the project based on only the Contract Documents as of Award and the timing and that the sequence of the Work meets the requirements of the Contract.
3. Once the Project Schedule has been accepted, the Contractor shall not deviate from it without first notifying the Engineer during a Progress Meeting.

B. As-Planned Schedule Narrative

1. Include a Narrative in Adobe Acrobat format that describes:
   a) The Contractor's general approach to construct the work depicted in the As-Planned Schedule. Address the reasons for the sequencing of work and describe any resource limitations, potential conflicts, and other salient items that may affect the As-Planned Schedule and how they may be resolved.
   b) If not provided in the contract plans, or if modified by the Contractor, provide copies of the appropriate contract plan sheets marked up as Key Plans, to correlate values on the contract plans (for Area of Work and Stage of Work) to the Contractor's planned breakdown of the project (i.e. - Activity Codes, Activity Names) for scheduling purposes.

c) The justification(s) for each activity with a duration exceeding 20 working days.
d) The reason for all lag durations used. All Lags must be approved in writing by the Engineer.
e) The justification(s) for Contractor imposed activity constraints used in the As-Planned Schedule. All non-contractual constraints must be approved in writing by the Engineer.
f) A list of calendars that are being used in the Project Schedule, along with the general reason for their use.
g) The Critical Path and challenges that may arise associated with the Critical Path.
h) Anticipated coordination issues related to work activities by other entities that require additional information from or action by the Engineer.
i) Appendix 1 to the Narrative shall be the "Schedule Log" (F9 report) created when the project was scheduled.
j) Include a written representation to the District that the Contractor's Project Manager has determined and verified all data on the Schedule and assumes full responsibility for it, and that the Contractor, subcontractors and suppliers have reviewed and coordinated the activities and sequences in the work schedule with the requirements of the Contract Documents.
k) If labor and equipment loading has been required by the Engineer or District, the Contractor will add a section to the written narrative to provide the details of the labor crews and equipment as stated in section 3.3.B "Detailed Schedule Requirement".

3.5 SCHEDULE UPDATE

A. Schedule Update Requirements

1. General – Maintain the schedule in a current state and prepare an update of the Project Schedule on a monthly basis. Submit a complete Schedule Update that includes all progress achieved and schedule modifications from the Data Date of previous Project Schedule submission through the last working day of the current Contract payment period.
2. Submit the monthly CPM Schedule Update prior to processing that month's application for payment. Payment applications are due on the 10th day of the following month. Ensure that the data date of the monthly Schedule Update is the first of the next month and that the Schedule Update depicts all progress achieved through the end of the current month. Schedule Updates will be checked for adequacy based on the items listed in Section 3.2.C.2. After the 10th day of the following month, or as soon as time allows, and after the requirements listed in Section 3.2.C.2 have been met, the Engineer will review the schedule and determine if any deficiencies exist. If deficiencies exist, the Contractor shall correct those deficiencies prior to the following month's submission of the payment application.
3. Ensure that the Schedule Updates shall reflect the status of activities that have commenced or have been completed, including the following items:
   a) Actual dates in activity Actual Start and Actual Finish columns as appropriate.
   b) Remaining Duration for activities that have commenced and not completed.
   c) If applicable, Suspension or Resume dates for activities that have commenced and not completed.
4. Schedule Updates are to reflect the contractor's current construction plan.

5. The Contractor shall minimize the number of modifications. Describe the reasons for each modification to the Schedule Update in the Narrative. If a modification is significant, then the Contractor shall obtain the Engineer's approval of the modification before making the modification in the Schedule Update. A significant modification is defined as a modification that results in one of the following:
   a) Alters the Critical Path(s) or Near Critical Path(s).
   b) Extends the Scheduled Completion Date or other contractual milestone dates.
6. When preparing a formal submission of the Project Schedule, export a copy of the current Project Schedule and name it according to the file naming convention provided by MWRDGC in Table 1.
7. Additional Schedule Requirements – In addition to the schedule requirements detailed for the submission of the As-Planned Project Schedule, also provide:
   a) Activity Status:
      1) Durations: Do not change the Original Duration without prior written justification by the Contractor and written approval by the Engineer. The Contractor shall edit the Remaining Durations to reflect progress made on work activities, and shall not use Duration %. If a proposed change to the Original Duration is due to additional or changed work to the Contract, the Contractor shall instead add an activity to reflect this additional work, and assign the appropriate Activity Code.
      2) Actual Start and Actual Finish Dates: For each activity where work was started during the update period, enter the date the work started. For each activity where work was completed during the month, enter the date the work finished.
      3) Calendars: To change a project calendar for activities scheduled in the future, copy the calendar and use a revised name that includes a reference to which Project Schedule Update the change was incorporated (i.e. – XX-XXX-XXX - Concrete Calendar should be revised to XX-XXX-XXX – Concrete Calendar 2). Document the reason for the change in the calendar in the Narrative.
      4) Notebook: For any activities on the Critical Path that are delayed, enter the dates the activity was delayed and the reason for such delay in the Notebook tab of that activity. Any information contained within any activity notebook does not constitute a notification of delay or entitlement to a Time Extension.

B. Data Date of the Schedule Update
1. Ensure that the Data Date of the Schedule Update is the day after the last working day of the Contract payment period. The Project Scheduler can modify the project's Data Date through the Schedule tool.
2. The Data Date of the first schedule update will be the day after the last working day of the Contract payment period during which the As-Planned Schedule was accepted.

C. Incorporating Changes to the Contract
1. When the Contractor is performing additional work that has not yet been formally added to the Contract by an executed Change Order, the Contractor should obtain the Engineer approval before inserting a fragnet representing the additional work into the Project Schedule. When adding these fragnet activities into the Project Schedule, they should assign the "At Risk Work" Activity Code Value in the CHANGED (ADDED/DELETED) MWRDGC GLOBAL Activity Code. Also, describe these

changes in the Schedule Update Narrative. When the work represented by the new activities is formally added to the Contract by an executed Change Order, change the "At Risk Work" Activity Code Value in the CHANGED (ADDED/DELETED) MWRDGC GLOBAL Activity Code to "Change Order No. XX"

2. The Engineer's direction to add activity representing additional work to the Project Schedule alone does not demonstrate entitlement to a Time Extension.
3. When adding new activities to the Project Schedule for work that has formally been added to the Contract by an executed Change Order, obtain the Engineer's approval before inserting the new activities into the Project Schedule. Ensure that these activities are assigned the "Change Order No. XX" Activity Code Value in the CHANGED (ADDED/DELETED) MWRDGC GLOBAL Activity Code. The Change Order No. XX Activity Code Value should match the corresponding Contract Change Order Number.
4. If the effect of the change results in a critical delay, then submit a Time Extension Request in accordance with the Contract. Extra work or additional work that does not affect the Critical Path will not be considered as the basis for a time extension.
5. Non approved changes shall not be tied into the existing schedule.

D. Schedule Update Narrative

1. For each Project Schedule Update submission, the Contractor shall submit a narrative in Microsoft Word, or Adobe Acrobat format that includes, but is not limited to:
   a) The Contract Number, project name, project location, and name of the Contractor.
   b) The Contract Award date, the current Contract Completion Date, and the Scheduled Completion Date.
   c) Any contractual Interim or Completion Milestone dates (I/D, B-Clock, LD, etc), and scheduled start and finish dates for those Milestone activities.
   d) In the event of the schedule indicating the project finishing after the contractual completion date, identify the activity that is the current primary delay and list all activities on the Critical Path (include Activity ID's and Activity Descriptions) where work is currently being delayed, and for each such activity provide detailed information including:
      1) The events that caused the delay.
      2) The written "Notice of Delay" that was submitted to the Engineer within three (3) business days after the commencement of said delay.
      3) The party(s) responsible for the delay event(s).
      4) The number of days the activity has been delayed.
      5) The activities in the construction schedule affected by the events.
      6) The reasonable steps needed to minimize the impact of the delay, and which party needs to take the action(s).
   e) List any other problems experienced during the previous month, the party responsible for the problems, and the Contractor's intentions to resolve the problems.
   f) List all activities for procurement of long lead time materials that are behind schedule and the reason(s) why.
   g) For major work items describe the differences between the actual work performed and the work planned for the period as represented in the preceding Schedule Update submission, including explanations for the deviations.
   h) For all suspended work activities that could otherwise logically be progressed, identify the responsible party prohibiting the progression of the work, as well as

the detailed reasons why.

i) Description of any changes to the Critical Path since the last Schedule Update submission and the impacts of such changes.
j) List of all added or deleted activities included in this Schedule Update submission, and the reason(s) for and the impact(s) of such changes.
k) List all changes in activity Original Durations, the justification for such change(s), and the impact(s) of such changes.
l) List all changes in relationships between activities included in this Schedule Update submission, and the reason(s) for and the impact(s) of such changes.
m) List any addition or deletion of activity or project constraints, and the reason(s) for and the impact(s) of such changes.
n) List all changes to the project calendars, and the reason(s) for and the impact(s) of such changes.
o) The major work elements, as defined in the WBS, to be accomplished during the next monthly update period.
p) Any potential problems that are anticipated for the next monthly work period and the proposed solutions to such problems. Identify potential problems or risks that either MWRDGC or Contractor may be potentially responsible for. Explain what action the responsible party (i.e. MWRDGC or Contractor) needs to take and the date by which time the action needs to taken to avoid the problem.
q) Any planned acceleration of activities that the Contractor anticipates to undertake within the next monthly work period that either MWRDGC directed, or that the Contractor believes is necessary. Indicate why the acceleration is necessary and if the acceleration is self-directed by the Contractor or by the MWRDGC.
r) If labor and equipment loading has been required by the Engineer or District, the Contractor will add a section to the written narrative to provide the details of the labor crews and equipment as stated in section 3.3.B "Detailed Schedule Requirement".

3.6 RECOVERY SCHEDULE

A. Recovery Schedule Requirements

1. The Engineer may require the Contractor to submit a Recovery Schedule and written description of the plan to recover all lost time and maintain the Contract Completion Date or specified Interim Milestone Date(s) if the Scheduled Completion Date forecasts that the project will finish thirty (30) calendar days or ten (10) percent of the total contract days, whichever is the greater amount of calendar days, later than that required by the Contract, as adjusted, if appropriate.
2. Refusal, failure, or neglect by the Contractor to take appropriate recovery action or submit a recovery statement when required as specified herein shall constitute reasonable evidence that the Contractor is not prosecuting the work with all due diligence, and shall represent sufficient basis for the Engineer to increase retention monies by an amount equal to the amount of potential liquidated damages.
3. The Contractor shall not be entitled to any compensation or damages from the District on account of any action undertaken by the Contractor to prevent or mitigate an avoidable delay or by the District's determination to increase retention monies.

B. Data Date of Recovery Schedule
1. Ensure that the Data Date of the Recovery Schedule is the Data Date of the Schedule Update that forecasts the late completion.

C. Recovery Schedule Narrative
1. Describe the actions that it plans to implement to mitigate the forecasted delay. This includes describing:
   a) Any additional labor or equipment resources that it plans to use.
   b) Any re-sequencing of the work that it plans to follow.
2. Or if the Contractor believes that the forecasted delay is not its responsibility, then submit a Time Extension Request in accordance with the Contract.

3.7 REVIEW AND ACCEPTANCE OF THE PROJECT SCHEDULE

A. Immediate Rejection of Progress Schedule Submissions
1. If the Contractor's Project Schedule submission does not meet the requirement specified in Subsection 3.2.C., then the Engineer will immediately reject the submission, without further review, analysis, or comments.

B. Project Schedule Meetings
1. Project schedule meetings shall be held one week prior to submission of each schedule update. The review of the Look Ahead Schedule or Monthly Work Plan serves as the forum to discuss project progress and delays, suggested remedies, necessary modifications to the Project Schedule, coordination requirements, change orders, potential Contractor time extension requests, and other relevant issues. Ensure that the Contractor is represented at a minimum by the Project Manager, Field Superintendent and Project Scheduler at the progress meeting.
2. If contract work is falling behind the Project Schedule, the responsible party (i.e. Contractor or MWRDGC) shall be ready to discuss what measures it will take in the next thirty (30) days to put the work back on schedule so as to meet the Contract Completion Date specified in the Contract.
3. One topic of the regular progress meetings held by the Engineer and attended by the Contractor will be a review of the Look-Ahead Schedule or Monthly Work Plan generated from the Project Schedule. A detailed Look-Ahead Schedule or Monthly Work Plan (MWP) may be created outside the Project Schedule using alternate software if the conditions listed below are met.
   a) Look-Ahead or MWP schedules should contain more detail than the Project Schedule and should be coordinated with and reflect the dates, logic, etc. with the latest Schedule Update.
   b) A column must be included for "Activity ID" within Look-Ahead or MWP Schedule. Each detailed activity within the Look-Ahead or MWP must have the Activity ID from the most recently submitted Schedule Update that the detailed activity is related to.
   c) A column must be included with the heading "Critical Path" in the Look-Ahead or MWP Schedule.
   d) All detailed activities that are related to a critical path activity within the most recently submitted Update Schedule will be marked with an asterisk in the "Critical Path" column.

4. At the meeting, the Contractor shall keep minutes of this meeting, and shall compile an action item list that describes who is responsible for existing or pending issues and the date by which the issue needs to be resolved to avoid delays. The Contractor shall forward a copy of the meeting minutes and action item list to the Engineer within 2 business days following the meeting.
5. Review and Acceptance of Project Schedules.
   a) The engineer shall copy a submitted schedule from current folder to a review folder in Loadspring. No schedules will be imported from outside Loadspring.
   b) The Engineer will review the Project Schedule submissions and will prepare a written response (Progress Schedule Review Report) to the Contractor's submission within five (5) MWRDGC Business Days following receipt of the Contractor's complete schedule submission. The Engineer will either "accept" the schedule, "accept as noted," or "reject" the schedule for re-submittal by the Contractor.
   c) If the Project Schedule submission is not in compliance with the Contract, the Engineer may reject the submittal and forward any comments and requests for schedule modifications to the Project Scheduler with a copy to the Contractor. The Project Scheduler shall address all comments in writing or make the requested modifications and resubmit the modified schedule within three (3) MWRDGC Business Days of the Engineer's reply. If the Engineer determines the revised submission still does not meet the contract requirements, any further modifications required thereafter shall also be submitted for acceptance within three (3) MWRDGC Business Days of the request for modifications by the Engineer.
   d) For schedules that are "accepted as noted" the Engineer shall forward any comments or requests for modifications, to the Contractor. The Project Scheduler shall address all comments in writing or make the requested modifications as part of the next Project Schedule submission.
   e) The Project Scheduler shall make adjustments to the Project Schedule in accordance with the Engineer's comments and resubmit copies for review consistent with the requirements of this section.
   f) Once accepted, the engineer will copy the reviewed schedule file from the review folder to the approved folder. An export of the contractors accepted schedule file, .XER, will be transmitted with the schedule review correspondence.
   g) The Engineer, by accepting the Project Schedule, does not warrant that the Project Schedule is reasonable or that by following the Project Schedule the Contractor can complete the work in a timely manner. If, after a Project Schedule has been accepted by the Engineer, either the Contractor or the Engineer discover that any aspect of the Project Schedule is in error, the Contractor shall correct the Project Schedule in the next Project Schedule submission and describe this modification in the Narrative report.
   h) Acceptance of Project Schedules by the Engineer shall not be construed to imply approval of any particular construction methods or sequence of construction or to relieve the Contractor from its responsibility to provide sufficient labor, equipment, and materials to complete the Contract in accordance with the contract documents.
   i) Acceptance of the Project Schedule by the Engineer does not attest to the validity of assumptions, activities, relationships, sequences, resource allocations, or any other aspect of the Project Schedule. The Contractor is solely responsible for the

planning and execution of the work.

j) Acceptance of the Progress Schedule by the Engineer shall not be construed to modify or amend the Contract or the date of completion. Completion dates can only be modified or amended by standard contractual means, through an executed Contract Order.

k) Acceptance of the Progress Schedule by the Engineer shall not be construed to means that the Engineer agrees with the accuracy or validity of any historical information placed in the progress schedule relating to the Contractor's position on any claims.

l) If any resources are included in the Project Schedule, then the Engineer's acceptance of schedule does not represent an acceptance of the Contractor's planned resources. The Engineer will only use Contractor's resource data to determine the reasonableness of achieving the Contractor's production rates. Resources included with the accepted Project Schedule shall not be misconstrued as a cost benchmark for the performance of planned or actual work.

m) If any cost data is included in the Project Schedule, then the Engineer's acceptance of schedule does not represent an acceptance of the Contractor's cost data. Cost data included with the accepted Project Schedule shall not be misconstrued as a cost benchmark for the performance of planned or actual work.

n) Upon receipt from the Contractor of the Revised Project Schedule submission, a new review period by the Engineer of five (5) MWRDGC Business Days will begin.

END OF SECTION

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SECTION 01325

PROJECT MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 GENERAL PROJECT MANAGEMENT OBJECTIVES

A. All correspondence and documentation required by the Contract shall be transmitted between the Contractor and the District in accordance with the requirements of this Section.

B. The Contractor shall use Autodesk® Constructware® project management system (Constructware) to exchange information and track all project correspondence. Constructware is an Internet/Web-based project management software used to exchange information and correspondence required by the Contract in an electronic environment. Documents that require hardcopy originals shall be scanned into Constructware when completed.

C. Use of this project management system will not replace or change terms of the Contract.

D. Each project team member of the Contractor including, but not limited to: Project Manager, Project Engineer, Scheduler, and Superintendent and any other personnel or subcontractor(s) designated by the Contractor that will correspond directly with the District on behalf of the Contractor, shall have access to the Internet and have an Internet e-mail address in order to communicate with various project team members. The Contractor shall provide, upon receipt of Correspondence No. 1, confirmation of these conditions and the names, positions, and e-mail addresses to the District. Training of these individuals and software licenses for use of the software will be provided by the District. The software contains user manuals, and there are several venues for assistance after training.

PART 2 - PRODUCTS

2.1 SOFTWARE AND HARDWARE REQUIREMENTS

A. For users designated by the Contractor, the District will arrange user access to the District's Constructware website. There is no user fee or licensing fee required of the Contractor.

B. If the Contract requires the Contractor to maintain a field office(s), the following requirements must be met. Otherwise, Constructware must be used through the Internet at the Contractor’s home office.

1. The Contractor shall maintain in its field office(s): computers, scanners, plotters, and color printers for inputting and retrieving documents from the electronic document environment for the mutual use of the Contractor, his subcontractors, and the District staff.

2. The Contractor shall procure high speed internet access for computers located in the Contractor's field office(s).

C. Additional information on Constructware may be obtained via the Internet, at www.Constructware.com or by calling (800) 892-0449.

PART 3 - EXECUTION

3.1 SYSTEM MANAGEMENT AND USE

A. The District will administer the Constructware user accounts.

B. All costs associated with utilizing this system, not specifically designated to be covered by the District, including computer hardware and high speed internet access, are the responsibility of the Contractor, for the full term of this Contract. The Contractor will not be eligible for any "extra" costs which may be claimed as necessary to comply with the requirements of this Section, including Requests for Quote (RFQs), Contract Change Orders (CCOs) and/or contract Time Extensions.

3.2 USE BY SUBCONTRACTORS

A. The District encourages the Contractor to utilize Constructware for communicating with their subcontractors. The Contractor shall inform all subcontractors of the purpose of the project management system and how it can assist them in obtaining project information.

B. The Contractor shall obtain user accounts for all MBE, WBE, SBE subcontractors to provide contract required reporting to the District's Diversity Section if desired by MBE, WBE, or SBE.

3.3 COMMUNICATION PROCESS

A. Written project communication shall take place in Constructware by creating and distributing documents and correspondence items directly within the system, or by manually entering into the system the dates and descriptions of items to track over time. All documents requiring formal signatures shall be printed with the hard copies distributed and signed. The signed hard copies shall be scanned and stored in Constructware. Examples of documents requiring formal signatures include, but are not limited to: certification statements on Payment Requests, Certified Payroll, Contract Change Orders, and contract Time Extensions.

B. The Contractor shall enter Submittals, general correspondence letters, contractor field memos, CCO proposals, Requests for Information (RFIs), Logs, Meeting Agenda, Meeting Minutes, Daily Reports, insurance documents, other correspondence and required documents in Constructware.

C. Samples, by their nature, cannot be transmitted electronically, and shall be distributed in the traditional manner but tracked in Constructware. Constructware shall be used to

track and expedite the processing of items that do not lend themselves to being in an electronic environment.

D. Support documentation in hard copy format for any document in Constructware shall be scanned into an electronic file and attached in Constructware to the document. Each submittal shall be clearly marked (highlighted, arrows, and/or crossed out) to indicate equipment, materials, etc. that are relevant to this contract. All support documentation electronic files shall be scanned and/or saved in PDF (Portable Document Format) format. Drawings can be saved in PDF or DWF (Design Web Format) format. All electronic files shall be searchable.

E. The Contractor shall distribute two (2) hardcopies of approved or final submittals, shop drawings, prints, documents, reports, etc. to the Resident Engineer.

END OF SECTION

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SECTION 01326

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 Related documents:

A. All applicable references in the following sections apply:

1. Section 01310 – Coordination and Meetings

2. Section 01325 – Project Management System

1.2 SUMMARY

A. Wherever submittals are required in the Contract Documents, submit them in constructware and as per the ENGINEER, unless noted otherwise.

1.3 PRECONSTRUCTION CONFERENCE SUBMITTALS

A. At the preconstruction conference of Section 01310, the CONTRACTOR shall submit the following items to the ENGINEER for review:

1. A preliminary schedule of Shop Drawings, Samples, and Or-Equal submittals.

2. A list of permits and licenses the CONTRACTOR shall obtain, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.

3. A preliminary schedule of values.

4. A project overview bar chart in accordance with Article 23 of the General Conditions, GC.

5. A detailed layout of the field office if used. The office shall not be shipped to the Site until the layout is approved by the ENGINEER.

1.4 SHOP DRAWINGS

A. Wherever called for in the Contract Documents or where required by the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER for review, an electronic copy of each Shop Drawing submittal per the General Specifications, in Constructware and as per the ENGINEER. This shall apply to the initial submittals as well as the revised submittal and also to various other documents to be submitted, including test procedures, installation procedures, and Operation and Maintenance procedures. Shop Drawings may include detail design calculations, shop-prepared drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the CONTRACTOR is required to submit design calculations

as part of a submittal, such calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the state wherein the project is located, unless otherwise indicated. All structural calculations must be stamped and signed by a licensed structural engineer registered in the state of Illinois.

B. Shop Drawing submittals shall be accompanied by the standard submittal transmittal form. A submittal without the form or where applicable items on the form are not completed will be returned for resubmittal.

C. Organization

1. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components. Example: if a pump section references other sections for the motor, shop-applied protective coating, anchor bolts, local control panel, and variable frequency drive, a single submittal would be acceptable. A single submittal covering vertical turbine pumps and horizontal split case pumps would not be acceptable.

2. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to specification paragraph and subparagraph, Drawing number, detail number, schedule title, room number, or building name, as applicable.

3. Unless indicated otherwise, terminology and equipment names and numbers used in submittals shall match those used in the Contract Documents.

D. Format

1. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with complete pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.

2. Each submittal shall be assigned a unique number. Submittals shall be numbered sequentially, and the submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number followed by a decimal point and a numeric digit to distinguish between the original submittal and each resubmittal. For example, if submittal 25.1 requires a resubmittal, the first resubmittal will bear the designation “25.2” and the second resubmittal will bear the designation “25.3” and so on.

E. Disorganized submittals that do not meet the requirements of the Contract Documents will be returned without review.

F. Except as may otherwise be indicated, the ENGINEER will return prints of each submittal to the CONTRACTOR with comments noted thereon, within 21 Days following receipt by the ENGINEER. It is considered reasonable that the CONTRACTOR will

make a complete and acceptable submittal to the ENGINEER by the first resubmittal on an item. The DISTRICT reserves the right to withhold monies due to the CONTRACTOR to cover additional costs of the ENGINEER'S review beyond the first resubmittal. The ENGINEER'S maximum review period for each submittal or resubmittal will be 21 Days. Thus, for a submittal that requires 2 resubmittals before it is complete, the maximum review period could be 63 Days. The ENGINEER will notify the CONTRACTOR in writing if a complex submittal will require a longer review period.

G. If a submittal is returned to the CONTRACTOR marked "APPROVED" formal revision and resubmission will not be required.

H. If a submittal is returned marked "APPROVED AS NOTED" CONTRACTOR shall make the corrections on the submittal, but formal revision and resubmission will not be required.

I. If a submittal is returned marked "REJECTED" the CONTRACTOR shall revise it and shall resubmit the required number of copies to the ENGINEER for review. Resubmittal of portions of multi-page or multi-drawing submittals will not be allowed. For example, if a Shop Drawing submittal consisting of 10 drawings contains one drawing noted as "REJECTED" the submittal as a whole is deemed "REJECTED" and 10 drawings are required to be resubmitted.

J. Resubmittal of rejected portions of a previous submittal will not be allowed. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall be identified and flagged on the resubmittal.

K. Fabrication of an item may commence only after the ENGINEER has reviewed the pertinent submittals and returned copies to the CONTRACTOR marked either "APPROVED" or "APPROVED AS NOTED." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the contract requirements.

L. Submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR prior to submission to the ENGINEER. Each submittal shall be dated and signed by the CONTRACTOR as being correct and in strict conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so dated and signed. Any deviations from the Contract Documents shall be noted on the transmittal sheet. The ENGINEER will only review submittals that have been so verified by the CONTRACTOR. Non-verified submittals will be returned to the CONTRACTOR without action taken by the ENGINEER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

M. Corrections or comments made on the CONTRACTOR'S Shop Drawings during review do not relieve the CONTRACTOR from compliance with Contract Drawings and Specifications. Review is for conformance to the design concept and general compliance with the Contract Documents only. The CONTRACTOR is responsible for confirming and correlating quantities and dimensions, fabrication processes and tech-

niques, coordinating WORK with the trades, and satisfactory and safe performance of the WORK.

1.5 SAMPLES

A. The CONTRACTOR shall submit the number of samples indicated by the Specifications. If the number is not indicated, submit not less than 3 samples. Where the amount of each sample is not indicated, submit such amount as necessary for proper examination and testing by the methods indicated.

B. Samples shall be individually and indelibly labeled or tagged, indicating the salient physical characteristics and manufacturer's name. Upon acceptance by the ENGINEER, one set of the samples will be stamped and dated by the ENGINEER and returned to the CONTRACTOR, one set of samples will be retained by the ENGINEER, and one set shall remain at the Site in the ENGINEER'S field office until completion of the WORK.

C. Unless indicated otherwise, the ENGINEER will select colors and textures from the manufacturer's standard colors and standard materials, products, or equipment lines. If certain samples represent non-standard colors, materials, products, or equipment lines that will require an increase in Contract Times or Price, the CONTRACTOR shall clearly state so on the transmittal page of the submittal.

D. The CONTRACTOR shall schedule sample submittals such that:

1. Sample submittals for color and texture selection are complete so the ENGINEER has 45 Days to assemble color panels and select color and texture dependent products and materials without delay to the construction schedule, and

2. After the ENGINEER selects colors and textures, the CONTRACTOR has sufficient time to provide the products or materials without delay to the construction schedule. The Contract Times will not be extended for the CONTRACTOR'S failure to allow enough review and approval or selection time, failure to submit complete samples requiring color or texture selection, or failure to submit complete or approvable samples.

1.6 QUALITY CONTROL (QC) SUBMITTALS

A. Quality control submittals are defined as those required by the Specifications to present documentary evidence to the ENGINEER that the CONTRACTOR has satisfied certain requirements of the Contract Documents.

B. Unless otherwise indicated, QC submittals shall be submitted:

1. Before delivery and unloading, for the following types of submittals:

a. Manufacturers' installation instructions.
b. Manufacturers' and Installers' experience qualifications.
c. Ready mix concrete delivery tickets.

d. Design calculations.
e. Affidavits and manufacturers' certification of compliance with indicated product requirements.
f. Laboratory analysis results.
g. Factory test reports.

2. Within 30 Days of the event documented for the following types of submittals:

a. Manufacturers' field representative certification of proper installation.
b. Field measurement.
c. Field test reports.
d. Receipt of permit.
e. Receipt of regulatory approval.

C. The ENGINEER will record the date that a QC submittal was received and review it for compliance with submittal requirements, but the review procedures above for Shop Drawings and samples will not apply.

END OF SECTION

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SECTION 01330
INSURANCE

PART 1 - GENERAL

1.1. INSURANCE

A. The insurance required under this Contract shall be as specified below and in accordance with Article 17 of the General Conditions:

Line of Insurance	Minimum Acceptable Limits of Liability by Grouping
1. Workers' Compensation	Statutory
2. Employers Liability	
a. Each accident	$ 5,000,000.00
b. Each employee-disease	$ 5,000,000.00
c. Policy aggregate-disease	$ 5,000,000.00
3. Commercial General Liability	
a. Per occurrence	$10,000,000.00
b. General aggregate-per project	$10,000,000.00
c. Products/Completed Operations General Aggregate	$10,000,000.00
4. Business Auto Liability	$ 5,000,000.00
5. Professional Errors & Omissions	Not Required
6. Environmental Impairment Liability	$ 5,000,000.00
7. Builder's Risk	Per Art. 17A-GC

NOTE: THE CERTIFICATION SHALL CLEARLY STATE THAT THE "WATER RECLAMATION DISTRICT, ITS COMMISSIONERS, OFFICERS, AGENTS, AND EMPLOYEES" ARE ADDITIONAL INSURED UNDER COMMERCIAL GENERAL LIABILITY INSURANCE, BUSINESS AUTO LIABILITY INSURANCE AND, IF REQUIRED, ENVIRONMENTAL IMPAIRMENT INSURANCE. THE WATER RECLAMATION DISTRICT SHALL BE THE NAMED INSURED ON THE BUILDER'S RISK POLICY CERTIFICATE.

B. If the Contractor chooses to utilize an Umbrella Policy to satisfy a portion of the above requirements, only a maximum of $ 8,000,000.00 will be allowed for said policy.

C. The Contractor shall maintain and keep in force all required insurance in accordance with Article 17 of the General Conditions.

D. If the Certificates are used as proof of insurance, the Contractor shall also furnish all insurance policies within 30 calendar days after commencing work.

E. It is strongly recommended that bidders investigate the costs of obtaining the above insurance before submitting bids.

F. ALL INSURANCE SUBMITTALS SHALL BE IDENTIFIED BY THE CONTRACT NUMBER 15-265-3D

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SECTION 01350

WASTE MANAGEMENT

PART 1 GENERAL

1.1 SCOPE OF WORK

A. This Section includes administrative and procedural requirements for the recycling and disposing of non-hazardous Construction Waste and Demolition Waste.

1.2 RELATED WORK

A. MWRDGC General Specifications

B. Division 1 – General Requirements

1.3 SUBMITTALS

A. Waste Management Plan: Submit the following as a minimum:

1. A list of all waste materials anticipated to be generated;

2. The total anticipated quantity (tons) of each material;

3. The anticipated quantity (tons) of recycled materials;

4. The anticipated quantity (tons) of landfilled materials;

5. The anticipated Recycling Rate; and

6. The location where waste material will be disposed of or recycled.

B. Waste Management Plan Progress Reports: Submit concurrent with each Application for Payment. Include the following information:

1. Waste material category,

2. Origin of waste within project,

3. Total quantity of waste for the project in tons

4. Total quantity of waste landfilled in tons,

5. Total quantity of waste recycled in tons,

6. Recycling Rate during payment period and cumulative to-date for project, and

7. Copies of recycling facility records and landfill and incinerator disposal records to support information provided.

C. Waste Management Plan Final Report: Before request for substantial completion, submit calculated rates for recycling and disposal as a percentage of Total Waste generated by the Work. Include recycling facility records and landfill and incinerator disposal records.

1.4 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations, including packaging materials.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations. Demolition Waste does not include soil.

C. Hazardous, Contaminated, or Special Waste: Building and site improvement materials which because of its quantity, concentration, or physical, chemical, or infectious characteristics may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. The Contractor shall refer to the Environmental Protection Act for requirements.

D. Disposal: Removal off-site of Construction Waste and Demolition Waste and subsequent sale, recycling, reuse, or deposit in landfills, incinerators, or other facility using the waste as fuel deemed acceptable to authorities having jurisdiction.

E. Recycle: Recovery of Construction Waste and Demolition Waste for subsequent processing in preparation for reuse.

F. Recycling Rate: The total quantity of waste recycled as a percentage of Total Waste.

G. Total Waste: The total quantity of waste generated on the project site as a result of project-related activities including Construction Waste, Demolition Waste, and waste generated by the temporary facilities (e.g., office and break room, etc.). Total Waste includes both recycled materials and landfilled materials. Total waste shall not include any shipping materials returned to the manufacturer or waste that is determined to be hazardous or contaminated.

H. Source Separation: Sorting the recovered materials into specific material types with no contamination or a minimum amount of contamination on site.

I. Commingled with Off-site Separation: Collecting all material types into a single bin or mixed collection system and separating the waste materials into recyclable material types in an off-site facility.

1.5 PERFORMANCE REQUIREMENTS

A. General: Develop a Waste Management Plan that results in a recycling rate of 60 percent by weight of Total Waste generated by the work. This plan must include how the weights of each type of debris will be calculated and documented. Weight of the waste generated by the temporary facilities must be determined by weighing the waste and cannot be calculated using a conversion factor.

B. Recycle Goals: The District's goal is to recycle as much non-hazardous Construction Waste and Demolition Waste as possible. The recycle program should utilize a combination of Source Separation and Commingled with Off-site Separation.

1.6 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: The Contractor shall identify and submit qualifications of individual designated as Waste Management Coordinator.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement Waste Management Plan as approved by the District. Provide handling, containers, storage, signage, transportation, and other items as required to implement Waste Management Plan during the entire duration of the Contract.

B. Waste Management Coordinator: Designate a Waste Management Coordinator to be responsible for implementing, monitoring, and reporting status of Waste Management Plan. Coordinator shall be present at project site full time while the work is being performed for duration of project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the work occurring at project site. Distribute Waste Management Plan to entities when they first begin work on-site. Review plan procedures and locations established for recycling and disposal.

D. Materials: The Waste Management Plan must include but is not limited to recycling of the following materials:

1. Demolition Waste:

    a. Asphaltic concrete paving
    b. Concrete, masonry and cement masonry units (CMU)
    c. Concrete reinforcing steel
    d. Structural and miscellaneous steel
    e. Piping
    f. Valves

2. Construction Waste:

    a. Concrete, masonry and cement masonry units (CMU)
    b. Lumber and wood
    c. Metals
    d. Piping
    e. Electrical conduit

f. Paper
g. Packaging: Regardless of the recycling performance requirement indicated above, recycle to the maximum extent practical the following uncontaminated packaging materials:

1) Paper and paperboard
2) Cardboard
3) Wood crates

3.2 RECYCLING CONSTRUCTION AND DEMOLITION WASTE, GENERAL

A. Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be kept by the Contractor.

B. Separate recyclable materials from other waste materials, trash, and debris. Separate recyclable waste by type at project site to the maximum extent practical.

1. Provide appropriately-marked, appropriately-sized containers or bins for controlling recyclable waste until they are removed from project site. Inspect containers and bins periodically for contamination and remove contaminated materials if found.

2. Stockpile processed waste materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover as required to prevent windblown dust.

3. Stockpile waste materials away from construction area.

END OF SECTION

SECTION 01360

SAFETY AND CONFINED SPACE ENTRY

PART 1 - GENERAL

1.1 SAFETY REQUIREMENTS

A. The Contractor shall be responsible for the safety of the Contractor's employees, Water Reclamation District personnel and all other personnel at the site of work. The Contractor shall designate a responsible member of the Contractor's organization, knowledgeable of the site(s) and work being performed daily, as the safety representative. That person shall be provided with an appropriate office on the job site to maintain and keep available safety records and up-to-date copies of all pertinent safety rules and regulations.

B. The identity and resume of the qualifications of the safety representative must be submitted to the District prior to the start of any fieldwork. This resume shall include such items as experience, education, special safety and first aid courses completed, and safety conferences attended. The Contractor shall submit alternate safety representatives to insure compliance with the intent of these specifications.

C. The safety representatives shall:

1. Have successfully completed and be currently certified in the American Red Cross Standard First Aid Course and the OSHA (Occupational Safety and Health Administration) 10-Hour Construction Safety Course or their equivalents.

2. Completely familiar with all applicable health and safety requirements of all governing legislation and ensure compliance with the same.

3. Schedule and conduct safety meetings and safety training program as required by law.

4. Be present on the job at all times whenever work is being performed unless a safe work program is established and the safety representative is assured that workers are able to perform the work in accordance with the program.

5. Post appropriate notices regarding safety and health regulations at locations which afford maximum exposure to all personnel at the site.

6. Post the name, address, and hours of the nearest medical doctor, name and address of nearby clinics and hospitals, and the local telephone numbers of the fire and police departments.

7. Post appropriate instructions and warning signs in regard to all hazardous areas or conditions.

8. Have proper safety and rescue equipments adequately maintained and readily available for any contingency. This equipment shall include such applicable items

as proper fire extinguishers, first aid kits, safety ropes and harnesses, stretchers, life ring with standard rope lanyard, resuscitators, gas detectors, oxygen deficiency indicators, explosimeters, etc.

9. Make inspection to ensure that all machines, tools and equipment are in safe operating condition; that all work methods are safe; and that all work areas are free of hazards and make available to the Engineer a daily report of all activities and findings.

10. Make available to the Engineer copies of all safety records and submit all safety inspection report and certifications from regulating agencies.

D. The Engineer shall be permitted to examine all reports, recommendations, and records of the safety representative and upon request shall be given copies of any such reports, recommendations, and records.

E. The Contractor shall report to the Engineer all accidents involving injury to personnel or damage to equipment and structures. In addition, the Contractor shall furnish to the engineer a copy of all accident or health hazard reports prepared to OSHA as well as copies of all notices of apparent violations that may be issued by OSHA and all disposition reports on any hearings, appeals findings, etc.

F. All personnel employed by the Contractor or Sub-contractors whenever entering the job site, any shaft, or tunnel headings shall be required to wear approved safety hats.

G. The Contractor shall comply with all requirements relating to noise levels as specified in OSHA.

H. The Contractor shall comply with the latest provisions of "State of Illinois Manual of Uniform Traffic Control Devices" or other pertinent governing regulations for traffic control. The Contractor shall provide all necessary traffic control for protection of the traveling public.

1.2 CONFINED SPACE ENTRY REQUIREMENTS

Confined Space Entry Requirements: This Contract may require the Contractor or his designee to work in a confined space. The Contractor must have a Confined Space Entry (CSE) procedure in place that complies with 29 CFR 146, OSHA's Permit Required Confined Space Regulation, which he shall follow. Where work is being performed in confined spaces, the Contractor shall provide all necessary and appropriate safety equipment. All equipment is subject to the approval of the Resident Engineer.

1. It shall be the responsibility of the Contractor to define a confined space and determine if a permit is required per standard normal practices and District policy. All in-ground tanks shall be classified as Permit Required Confined spaces and require air monitoring and an Attendant per District policy.

2. Known confined spaces include tunnels, sewers, pipes, utility manholes, underground structures, and excavations more than 4 feet in depth. The list of "Known confined spaces" herein shall not be interpreted to mean that no other confined spaces exist, or that no other confined spaces will be encountered during the performance of work.

3. It is the responsibility of the Contractor to verify the classification of all locations encountered during the performance of work. All costs associated thereto shall be borne solely by the Contractor.

4. The Contractor shall comply with all Federal, State and Local regulations, including but not limited to OSHA and MWRDGC regulations, with regard to entering and performing work in a confined space.

5. The Contractor shall also have a Confined Space Rescue Plan, or make arrangements with the local fire department to respond immediately in case of a CSE accident.

6. The Contractor shall maintain documentation of employee training, verification of persons competent in the above subjects and on all state and federal regulations applicable to the contract.

7. The Contractor is subject to the requirements of the Confined Spaces in Construction standard 29CFR1926.1201-1213.

1.3 PREVENTION AND PROTECTION

A. Fall Protection: Where applicable, the Contactor shall abide by the OSHA's Fall Protection Regulation, 29 CFR 1926 Subpart M.

B. Lockout/Tag out: If any electrical or mechanical equipment or any disconnect switch needs to be locked, tagged or put on hold, The Contractor must first consult with the Resident Engineer before proceeding with the job. The District's Lockout/Tag out procedure must be adhered to at all times.

C. Compressed Gases: Compressed gas containers shall be marked, labeled, stored, handled and used in accordance with the applicable OSHA standard as well as the standards of other regulating agencies.

D. Safety Equipment: The Contractor shall be responsible for his own safety equipment, including a 4-way gas meter that measures Hydrogen Sulfide, Oxygen, Flammables and Carbon Monoxide.

E. Atmospheric tests shall be taken as often as deemed necessary by the safety representative as required by applicable regulations.

F. No employee will be allowed to work in areas where concentrations of airborne contaminants exceed 2003 American Conference of Governmental Industrial Hygienists (A.C.G.I.H.) threshold limits as amended. Respirators shall not be

substituted for environmental control measures and shall be used only as prescribed by OSHA.

G. When working above and around water, fall protection and an approved floatation device shall be required.

H. Internal combustion engines other than mobile diesel powered equipment shall not be used underground. All mobile diesel powered equipment used underground shall be certified by the Bureau of Mines as prescribed in OSHA.

I. All internal combustion equipment shall be operated in such a manner as to prevent any health hazards to personnel from exhaust fumes.

J. All haulage equipment such as hoists, cages and elevators operating in excavations and shafts shall conform to all requirements described in OSHA.

K. Prior to the use of any materials, the Contractor shall provide the Engineer with an appropriate material safety data sheet for any material requiring one.

1.4 FUEL AND OIL TANK REQUIREMENTS:

A. If the Contractor or his Subcontractor plan to construct and install fuel tank on the site he must satisfy each of the following conditions and restrictions:

1. The tanks must meet the MWRDGC requirements governing above ground fuel tanks.

2. The fuel tanks shall be a minimum of double-hulled tanks.

3. The tanks shall be stored at least 150 feet away from a building.

4. No more than two storage tanks shall be grouped together. Also, there shall be a minimum spacing of 300 feet between grouped tanks at any site.

5. The tanks shall be enclosed within a two-hour fire-rated assembly. (The tank must be double walled with a UL rating of 2085)

6. The tank assembly shall provide 100% secondary containment (double wall) of the flammable liquid.

7. The tanks shall be limited to a capacity of 1000 gallons.

8. No more than two such above ground tanks shall be installed or located at one site.

9. The tanks shall be completely surrounded by a protective guardrail which is located a minimum of two feet away from the tank.

10. Dispensing of flammable liquid shall be by means of a pump that is permanently attached to the top of the enclosing assembly.

11. Such tanks shall be located 50 feet away from property line, when feasible, with the exception of tanks containing Class II or Class III liquids. Minimum distance from the property line should not be less than 10 feet.

12. Each tank shall bear the words, “FLAMMABLE – KEEP FIRE AWAY" conspicuously on each side of the tank. The coloring of the letters shall be in contrast with the color of the tank; the size of each of the letters must be a minimum of four inches high.

13. A lockable cap shall be provided.

14. The tanks shall be electrically grounded.

15. Emergency vents shall be provided for both primary and secondary containment spaces.

16. A fire extinguisher must be readily available.

17. Mobile Tanks and Tanks on Pick-up beds that are within the property of the Metropolitan Water Reclamation District must also follow the above requirements.

1.5 COMPRESSED GASES

A. Compressed gases containers shall be marked, labeled, stored, handled, and used in accordance with the applicable Occupational Safety and Health Administration standard as well as other regulating agencies.

B. Only experienced and properly instructed personnel shall use compressed gases.

C. When welding or cutting is being performed, precautions shall be taken to prevent sparks or hot metal from falling into open gratings, onto employees or flammable materials. Fireproof blankets must be used by the contractors to cover all the openings.

D. The Contractor shall furnish suitable fire extinguishing equipment, which shall be immediately available at all locations where welding and cutting is done.

E. In dusty or gaseous spaces where there is a danger of causing an explosion, welding or cutting equipment shall not be used until the space is adequately ventilated. All piping or other structure being cut or burned must be cleaned off before cutting or burning. Certain conditions shall also require wetting down the area.

F. Welding or cutting of any pipeline, tank, or empty container shall not be performed until positive proof is obtained that it is free from an explosive mixture of gases. The Contractor shall furnish the necessary equipment to test for explosive gases.

G. Before welding or cutting closed containers, they shall be vented to atmosphere to prevent and stop an explosion by expansion of trapped gases.

H. Areas or sections being worked on shall be marked with ropes or barriers to designate the working area.

I. Good house keeping shall be maintained at all times.

J. Upon completion of the day's work, all debris must be removed from the floors, and away from the work areas.

K. All fire lanes and walkways shall be kept clear at all times.

L. No flammable liquid shall be stored in the working area or building at any time.

M. A fire watch shall be maintained by the Contractor at all times during cutting, burning, and/or welding. A fire watch consist of a watchman with a fire extinguisher, monitoring the work during cutting or welding procedure, and for 30 minutes thereafter, to make sure that sparks or hot metal do not start a fire.

PART 2 – PRODUCTS

Not Applicable

PART 3 – EXECUTION

3.1 In addition to the safety requirements herein set forth, the Contractor shall comply with the health and safety laws, rules and regulations of federal, state and local governments, including but not limited to:

1. Safety Rules - Metropolitan Water Reclamation District of Greater Chicago, dated March 1, 1970 and as subsequently amended.

2. The Federal Occupational Safety and Health Act of 1970, together with all Amendments thereto and all rules and standards implementing said Act.

3. Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices current edition as issued by the American Conference of Governmental Industrial Hygienists.

3.2 Copies of the rules and regulations listed above shall be maintained at the job site, by the Contractor’s safety representative, throughout the duration of the Contract.

3.3 Where a conflict exists between any standards, the most stringent will apply.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This section covers Quality Assurance and Control requirements for this contract.

B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors, and suppliers and for assuring the quality specified in the Technical Specifications is achieved.

1.2 RELATED WORK

A. MWRDGC General Specifications

B. Refer to relevant sections of the General Conditions and General Specifications, including Articles 12, 13, 18 and 19 of the General Conditions, and Articles 3, 9, 10 and 12 of the General Specifications.

1.3 QUALITY ASSURANCE

A. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer.

B. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. The Contractor shall not use material and equipment for any purpose other than that intended or specified unless the Engineer authorizes such use.

C. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.

B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer's printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than the contract documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer's printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless approved otherwise by the Engineer.

PART 3 - EXECUTION

3.1 CONTROL

A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.

B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies shall be made available to the Engineer upon request.

C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer to supersede or void that responsibility.

D. Contractor Quality Control (CQC) is the means by which the Contractor assures that construction complies with the requirements of the Contract Drawings and Specifications. The controls shall be adequate to cover all construction operations, including both onsite and offsite operations and will be keyed to the proposed construction sequence. The controls shall include at least three phases of inspection for all definitive features of work as follows:

1. Preparatory Inspection: This shall be performed prior to beginning any definable feature of work. It shall include a review of contract requirements; a check to assure that all materials and/or equipment have been tested, submitted and approved; a check to assure that provisions have been made to provide required control testing; examination of the work area to ascertain that all preliminary work has been completed and a physical examination of materials, equipment and sample work to assure that they conform to approved shop drawings or submittal data and that all materials and/or equipment are on hand.

2. Initial Inspection: This shall be performed as soon as a representative portion of the particular feature of work has been accomplished and shall include examination of the quality of workmanship and a review of control testing for compliance with contract requirements, use of defective or damaged materials, omissions, and dimensional requirements.

3. Follow-up Inspection: These shall be performed daily to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. Such inspection shall be made a matter of record in the CQC documentation as required below. Final follow-up inspections shall be conducted and deficiencies corrected prior to the addition of new features of work.

3.2 TESTS

A. Test Procedures: Perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements. Procure the services of an industry recognized testing laboratory or establish an approved testing laboratory at the project site. A list of tests which the Contractor understands are to be performed shall be furnished as a part of the CQC plan to the District for approval. The list shall give the test name, specification paragraph containing the test requirements, testing frequency and the personnel and laboratory responsible for each type of test. Perform the following activities and record and provide the following data:

1. Verify that testing procedures comply with contract requirements.

2. Verify that facilities and testing equipment are available and comply with testing standards.

3. Verify that test instrument calibration data are checked against certified standards.

4. Verify that recording forms, including all of the test documentation requirements, have been prepared.

B. The Contractor is responsible for providing advance notice of and access for the shop and field testing specified in the technical specification sections.

C. The Contractor and its Subcontractors, manufacturers and suppliers shall permit inspections, tests, and other services as required by the Contract Documents.

D. Contractor shall provide twenty one days written notice to the Engineer so that the Engineer may schedule and witness off site and on site tests. The Engineer’s witnessing of tests does not relieve the Contractor and its Subcontractors, manufacturers and suppliers of their obligation to comply with the requirements of the Contract Documents.

3.3 MANUFACTURER'S FIELD SERVICES

A. When specified in the technical specifications sections, the Contractor shall arrange for and provide technical representation from manufacturer’s of respective equipment, items or components. The manufacturer's representative shall be a factory trained service engineer/technician with the type and length of experience specified in the technical specifications.

B. Services Furnished Under This Contract: An experienced, competent, and authorized factory trained service engineer/technician representative of the manufacturer of each

item of equipment for which field services are indicated in the specifications shall visit the site of the Work and inspect, operate, test, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's service representative shall be present when the equipment is placed in operation. The manufacturer's service representative shall revisit the jobsite as often as necessary until all problems are corrected and the equipment installation and operation are satisfactory to the Engineer.

3.4 DOCUMENTATION

A. Maintain current records of quality control operations, activities and tests performed including the work of suppliers and subcontractors. These records shall be on an acceptable form and indicate a description of trades working on the project, the numbers of personnel working, the weather conditions encountered, any delays encountered and acknowledgment of deficiencies noted along with the corrective actions taken on current and previous deficiencies. In addition, these records shall include factual evidence that required activities or tests have been performed, including but not limited to the following:

1. Type and number of control activities and tests involved.

2. Results of control activities or tests.

3. Nature of defects, causes for rejection, etc.

4. Proposed remedial action.

5. Corrective actions taken.

B. These records shall cover both conforming and defective or deficient features and shall include a statement that supplies and materials incorporated in the work comply with the requirements of the contract. Legible copies of these records shall be furnished to the District weekly.

3.5 NOTIFICATION OF NONCOMPLIANCE

A. The Engineer will notify the Contractor of any noncompliance with the foregoing requirements. After receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or representative at the site of the work, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the District may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

END OF SECTION

SECTION 01405

EVACUATION PLAN

PART 1 – GENERAL

1.1 SUMMARY

This section describes the submission of a written procedure for a Total Plant Evacuation procedure and participation to drills whenever they occur. The Contract price shall include all the costs related to the above requirement. No additional compensation shall be made for time lost and any other losses due to participation in the total plant evacuation or practice drill. The Contractor shall be fully responsible to coordinate and administrate all of his forces when requested by the District.

1.2 SUBMITTAL

A. The Contractor shall submit to the District, within two months after an award of the contract, but before you mobilize at the work site, the written procedure for a total plant evacuation for District review and approval. Some of the items to be included in the procedure shall be as follow:

1. Identify contact persons responsible for managing the evacuation for the contractor's work force. Provide a list of names, prioritized as to who to contact first. The first responsive name will be responsible for implementing the evacuation. The contact persons must be routinely at the project work site(s).

2. The Contractor must insure the Resident Engineer has all of the current office/field telephone, cell, and pager numbers for their contact personnel.

3. The Resident Engineer or other District authorized personnel will generally provide evacuation notice to the Contractor's contact personnel, when necessary.

4. Upon notification, the Contractor's contact person shall inform and implement the evacuation of all of the contractor's personnel from the plant grounds.

5. The Contractor contact person shall provide daily notice at the beginning of the work day to the Resident Engineer, of all sub-contractors working on the project, the respective locations, and type of work being performed.

6. The Contractor shall set up a procedure to determine that all personnel, including subcontractors, are accounted as being present for the day and to be able to establish that this staff is evacuated from the plant facility. It is recommended that predetermined location(s) be identified as a meeting location(s) outside the plant.

7. In the event of an evacuation, the Contractor is responsible for identifying names of all staff members and their work location. Names not accounted for in the evacuation of a plant facility shall be provided to appropriate personnel (Resident Engineer or District Police) so that appropriate action may be taken.

8. The District may utilize the gate entry/exit records maintained by the Police to determine compliance with the request for evacuation. This will not to replace or circumvent the requirement of the Contractor's responsibility for the safe evacuation of his staff.

9. The Contractor's contact person shall notify any personnel scheduled to arrive after the evacuation not to enter the plant until otherwise notified by the Contractor's contact person.

10. The Resident Engineer or other District authorized person will provide notice as to when the Contractor may return to the plant facility.

11. The Contractor shall provide updates as needed to maintain current contact information. Maximum duration between updates is quarterly.

12. Inform and train all contractor and sub-contractor personnel of the requirements and procedures of this specification.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 EXECUTION

A. Participate in total plant evacuation drill and fire drill. Typically the District will conduct a total plant evacuation drill and a fire drill once a year.

B. Participate in real situation plant evacuation.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 TEMPORARY FACILITIES

A. The Contractor shall arrange to provide his own temporary toilet facilities as required.

B. The Contractor will not be permitted to use any Water Reclamation District equipment or facilities except in case of emergency or as specified herein. If such equipment or facilities are used in case of emergency, the Engineer shall first give his permission and shall determine the cost of such use.

C. The cost for use of its facilities shall be paid to the Water Reclamation District on bills rendered monthly.

1.2 TEMPORARY UTILITIES

A. Water, Power, and Water Reclamation District Equipment.

1. The Contractor shall arrange for his own water supply, which shall be of quality to be approved by the Engineer, free from contamination.

2. The Contractor, if he so desires, will be permitted to use water from the Water Reclamation District mains where it is available and does not interfere with the work of the Water Reclamation District or the requirement of other Contractors on site. The Water Reclamation District, however, will not be responsible for any interruption of service, or possible inadequacy of the supply. The Contractor will be required to pay for the water so used from the Water Reclamation District to the various municipalities for purchase of water, and shall, at his own expense, install a meter or meters of approved type for the measurements of the water used. He will be required to make such temporary connections as he may need, subject to the approval of the Engineer, and to restore all existing facilities prior to the completion of the work at no additional expense to the Water Reclamation District.

3. The District supplies a location for tie-in of power.

1.3 CONSTRUCTION FACILITIES

A. The Contactor shall provide his own field offices and facilities. The Contractor's field offices and facilities shall be located only as approved by the District.

1.4 TEMPORARY CONSTUCTION

A. All temporary structures, including sheeting and bracing for excavations, which affect the safety of the workmen, inspectors, public and Water Reclamation District personnel, shall

be considered as structures that require structural design.

1.5 CONSTRUCTION AIDS

A. The Contractor shall determine the procedure and methods and also design and furnish all temporary structures, sheeting, bracing, tools, machinery, implements and other equipment and plant to be employed in performing the work hereunder, and shall promptly submit layouts and schedules of his proposed methods of conducting the work to the Engineer for his review and comment. The use of inadequate or unsafe procedures, methods, structures or equipment will not be permitted, and the Engineer may disapprove and reject any of same which seem to him to be unsafe for the work hereunder, or for other work being carried on the vicinity, or for work which has been completed, or for the public or for any workmen, engineers, and inspectors employed thereon, or that interferes with the work of the Water Reclamation District or other Contractors, or that will not provide for the completion of the work within the specified time, or that is not in accordance with all the requirements herein specified.

1.6 VEHICULAR ACCESS AND PARKING

A. Where the Water Reclamation District has prepared areas at the site of the work for use as parking spaces for the Contractor's forces, the parking of the cars of the Contractor's forces in locations other than in designated parking areas will not be permitted.

1.7 TRAFFIC CONTROL, TEMPORARY BARRIERS & ENCLOSURES

This section includes the furnishing, installation, maintaining, relocating, and removing of all traffic control devices used for the purpose of regulating, warning, or directing traffic during the construction of this project. The governing factor in the execution of this work is to provide the motoring public with the safest possible travel conditions along with roadway during the construction of this project.

A. Traffic Control Plan

1. When necessary, the Contractor shall design and submit Maintenance of traffic and traffic-control plans for District review. Plan shall be designed and provided by the Contractor in accordance with the General Specifications and the "Manual on Uniform Traffic Control Devices for Streets and Highways" of the State of Illinois. When required, the Contractor shall obtain permit and approval from the local authorities having jurisdiction over the roadways. Contractor is to post designated traffic control signs prior to construction.

2. The Contractor shall be responsible for furnishing, installation, arrangements, and operation of all traffic control devices. Special attention shall be given to advance warning signs during construction operations in order to keep the lane assignment consistent with barricade placement at all times.

3. Traffic control devices include signs and their supports, signals, pavement markings, barricades with sand bags, channelizing devices, warning lights, arrow boards, flaggers, or any other device used for the purpose of regulating, detouring,

warning, or guiding traffic through or around the construction zone.

B. The Contractor shall, at his own expense, provide necessary temporary blocking, supports or protection for all structures already constructed or to be constructed, with which his work comes in contact, to prevent damage to the same, and shall make good at his own expense any damage done by him to any part of said structures or their appurtenances in unloading and installing any of the work, materials, apparatus or equipment included under this Contract, or other property or in cleaning up.

C. The Contractor shall furnish all material and supplies, plant, staging, and false work, machinery, tools and implements, vehicles, in fact, all material and appliances that may be necessary for the full and complete performance of this Contract, and shall furnish and maintain, subject to the approval of the Engineer, all necessary barricades, and other protections, lights and signs, necessary for the proper protection of the public and District personnel.

1.8 TEMPORARY CONTROLS

A. Handling Water at Sites

1. The Contractor shall make all arrangements for handling and disposition of water entering the work to maintain safe, dry, and satisfactory working conditions. The Contractor shall comply with the storm water permit requirements for the construction site and prepare an erosion control plan, as required by the IEPA.

2. The Contractor will be permitted a reasonable use of existing drains and drainage ditches for the disposal of water under conditions satisfactory to the Engineer, except as otherwise specified. In using the drainage ditches and drains, the Contractor shall keep them free from concrete, clay, or other deleterious substances, and if such substances are allowed to enter the drains, their use may be forbidden altogether by the Engineer. The discharge of water containing clay or other solid matter into the drainage system will under no circumstances be allowed.

3. Sanitary lines from temporary offices shall not be connected to the existing storm drain system or any connected structures within the plant. Sewage must be discharged to sewer lines only.

1.9 SECURITY AND PROTECTION FACILITIES

A. Security and protection facilities include, but are not limited to, the following:

1. Tree and plant protection.

2. Barricades, warning signs, and lights.

3. Temporary fall protection.

B. Materials

1. General: Provide new materials. However, undamaged, previously used materials in serviceable condition may be used if approved by the District. Provide materials suitable for use intended.

C. Installation – General

1. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

D. Security and Protection Facilities Installation

1. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.

E. Temporary fall protection: Erect and maintain temporary fall protection as needed during construction.

F. Operation, Termination, and Removal

1. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

2. Termination and Removal: Remove each temporary facility when need for its service has ended, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

   a. Materials and facilities that constitute temporary facilities are the property of Contractor.

   b. At Substantial completion, clean and renovate permanent facilities used during construction period.

END OF SECTION

SECTION 01700

EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 PREPARATION

A. Site Conditions

1. Where existing site conditions are shown on the plans hereto attached, the elevations are believed to be reasonably correct but are not guaranteed, and with any schedule of quantities, are presented only as an approximation. The Contractor shall conduct an actual examination of the site of the work, as to the existing elevations and the amount of work required under this Contract.

B. Checking Plans

1. The Contractor shall check all plans furnished by the Water Reclamation District and by himself for dimensions, quantities and coordination with other parts of the work under this Contract, and shall notify the Engineer of all errors or omissions which he may discover by examining and checking the same. He will not be allowed to take advantage of any error or omission on the plans. The Engineer shall furnish full instructions, should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified. The work is to be made complete and to the satisfaction of the Engineer should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified. The work is to be made complete and to the satisfaction of the Engineer, not withstanding any minor omissions in the specifications or plans.

C. Keeping Plans and Specifications on the Work

1. The Contractor shall keep on hand at each site of work for reference a complete set of contract documents (specification & plans), copies of all plans furnished by the Contractor, revised plans furnished by the Water Reclamation District and all orders issued to the Contractor by the Engineer related to the work under this Contract.

D. Lines and Grades

1. The Contractor shall establish a horizontal and vertical control required for the complete layout and performance of the work under this Contract. The Contractor will be completely responsible for the correctness of all lines and grades, including any given by the Engineer.

2. The Engineer, at his discretion, will make occasional field checks of control work done by the Contractor. The Contractor shall correct any mistakes due to errors or omissions at his own cost and expense as ordered by the Engineer. Unless otherwise noted, all elevations shown on the plans and mentioned in the specifications are

referred to Chicago City Datum (C.C.D.). The Water Reclamation District considers Chicago City Datum to be at Elevation 579.48 above New York Mean Sea Level, USC & GS 1929 adjustment (MSL 1929 adj.).

E. Existing and Future Structures & Utilities

1. Not all of the existing service piping and utilities may be identified on the plans. The Contractor, therefore, shall satisfy himself by such means as he may deem proper as to the location of all utilities or structures that may be encountered in the construction of the work.

2. All structures and utilities encountered shall be protected and supported, and if damaged, repaired by the Contractor without charge to the MWRD. The Contractor shall arrange with the owners of said structures and utilities for the shifting, temporary removal and restoration and protection of same where necessary for the prosecution of work under this Contract, at no additional expense to the MWRD except as otherwise specified herein. The cost of all of the above described work shall be considered incidental to the contract.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCITON SEQUENCE

A. The Contractor shall plan and utilize a construction sequence as required to meet all of the requirements under TIME, in the Agreement.

3.2 CONTRACTOR'S RESPONSIBILITY

A. The acceptance or approval of any order of procedure, methods, structures or equipment submitted or employed by the Contractor shall not in any manner relieve the Contractor of any responsibility for the safety, maintenance and repairs of any structure or work, or for construction, maintenance and safety of work hereunder, or from any liability whatsoever on account of any procedure or methods employed by the Contractor, or due to any failure or movement of any structures or equipment furnished by him. When constructed, even though in accordance with the approval of the Engineer, should any structure or equipment installed hereunder afterwards prove insufficient in strength or fail on account of poor workmanship or any procedure or methods employed by the Contractor, such failure shall in no way form the basis of any claim for extra compensation for delay, or for damages or expenses caused by such failure, or for extension of time for completion of their Contract, or for material, labor or equipment required for repairing or rebuilding such structure or equipment, or for repairing or replacing any other work that may be damaged in any way by the failure or movement of any structure or equipment or by any other happening.

3.3 ENGINEERING RESPONSIBILITY

A. All structures to be provided by the Contractor (except those structures for which design details are shown on the Contract plans) which require structural design shall be designed and constructed under the supervision of a structural engineer, licensed in the State of Illinois, acting for and retained by the Contractor. Drawings and calculations for such structures shall be prepared and stamped by the structural engineer and submitted to the Engineer for approval. A clear outline of the proposed construction procedure shall be shown on the drawings. A statement in writing by the structural engineer attesting that he has visited the site of the work, that the design does satisfy the conditions as actually encountered and that the actual construction conforms to the drawings and calculations as submitted and approved must be submitted to the Engineer before the work related to such structures will be considered complete.

3.4 REUSABLE OR SALVAGEABLE ITEMS

A. Unless otherwise specified in the Detail Specifications and/or plans, all reusable or salvageable equipment and material specified to be removed in the Detail Specifications, as determined by the Engineer, shall be delivered to the Water Reclamation District storekeeper or to a location on the site designated by the Engineer.

B. The Contractor shall be responsible for the loading, transporting, and unloading of this equipment and material. Equipment, ductwork, or piping with insulating materials intact after removal may be considered, for practical purposes, as having salvage value.

3.5 CLEANING

A. Cleaning Work Sites and Restoration

1. The Contractor shall keep the site of the work and adjacent premises as free from material, debris and rubbish as is practical and shall remove from any portion of the site, if, in the opinion of the Engineer, such material, debris or rubbish that interferes with the operation of the traffic, constitute a nuisance, or is objectionable in any way to the public. The Contractor further agrees to remove all machinery, materials, implements, barricades, staging, false work, debris and rubbish connected with or caused by said work immediately upon the completion of the same and to clean all structures and work constructed under this Contract to the satisfaction of the Engineer, regrade all areas which have been rutted or disturbed so that the areas will drain without pockets and to leave the premises, upon completion of the Contract, in at least as good condition as when he entered upon them.

2. The Contractor shall provide dust control and street sweeping for all stages of his operations, including road construction and building demolition. This requirement shall apply to all areas affected by the Contractor’s operations. Street sweeping operations shall be undertaken a minimum of once every calendar week during the Contractor’s operations.

3. Restoration work shall follow construction as the work progresses and be completed as soon as possible. Restoration work shall not be delayed, and shall be completed no later than thirty (30) days after the work is in place, or as directed by

the Engineer. Any testing or further inspection necessary for final completion and inspection of the work shall not be cause for any delay of restoration work required under this Contract. This provision for restoration shall include all public, private, and District property, which were affected by the Contractor's construction operations. Such final restoration that cannot be performed within the thirty day period due to adverse weather conditions may, upon written request including a proposed procedure and time schedule, be perform as approved by the Engineer. Any delayed restoration will be contingent upon providing suitable safe temporary facilities without inconvenience or nuisance in the interim.

4. The Contractor shall maintain existing surface and subsurface drainage conditions in all areas along the line of the work, including highway ditches, storm sewers, culverts, natural terrain, field tile systems, etc.

5. Whenever public, private or District property is damaged or destroyed, the Contractor shall, at his own expense, restore such property to a condition equal to the existing before such damage or injury was done by repairing, rebuilding, or replacing it as may be directed, or he shall otherwise make good such damage or destruction in a manner acceptable to the Engineer. If he fails to do so, the Engineer may, after the expiration of a period of thirty (30) calendar days after giving him notice in writing, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof shall be deducted from any compensation due, or which may become due, to the Contractor under this Contract.

   This provision for restoration work shall apply to all work under this Contract.

B. Removal of Equipment, Material, and Debris

1. All debris consisting of loose insulation materials, firebrick, broken concrete, etc., shall be removed from the Contractor's work sites by the Contractor.

2. The Contractor shall not dispose of any material, debris or rubbish by open burning on the site of the work or any other site, and shall comply with all rules and regulations of the Illinois Pollution Control Board (IPCB) in effect and as may be amended during the course of the Contract.

3.6 PROTECTING INSTALLED CONSTRUCTION

A. The Contractor shall furnish such protection as may be necessary against damage in any way to the work and, material included under this Contract before and after the same have been installed (including all necessary protection for structures may be damaged by winter conditions), and shall be fully responsible for such work until its final acceptance.

3.7 CLOSE-OUT PROCEDURES

A. Procedure and Methods

1. The attention of the Contractor is particularly called to the time allowed for the completion of the work included under this Contract. To avoid delay in the completion of work hereunder, he shall submit the names of all subcontractors and suppliers of material and equipment within 10 days after the date of approval of his bond and shall place all orders for material and equipment within 5 days after approval by the Engineer. The Contractor's attention is further called to the fact that the Water Reclamation District may take over certain parts of the work under this Contract for permanent operation as rapidly as completed in advance of the completion of the Contract as a whole.

B. Inspection and Workmanship

1. It is the intent, under this Contract, to secure high class workmanship in all respects.

2. Any imperfect work that may be discovered before the final acceptance of the work shall be corrected immediately. The inspection of any work shall not relieve that Contractor of any of his obligations to perform proper and satisfactory work, as herein specified, and all work, which, during its progress may become damaged from any cause, or fails for any reason to satisfy the requirements of the Specifications shall be removed and replaced by good and satisfactory work without extra charge therefore.

3. The Contractor shall perform all tests which are specified under the various items of the Contract. Any changes or repairs necessary to put all work and equipment in satisfactory adjustment and operating condition (except for repairs or adjustments of equipment furnished by the Water Reclamation District), shall be done at no additional expense to the Water Reclamation District other than that specified to be paid under the various unit and lump sum prices of the Contract. Power for testing equipment will be furnished by the Water Reclamation District, to the extent permitted by the Engineer, if Water Reclamation District power is available at the site of work.

3.8 CLOSE-OUT SUBMITTALS

A. As-Built Drawings

1. Upon completion of the work under this Contract, the Contractor shall furnish As-Built drawings to the Water Reclamation District, in accordance with the requirements in the Agreement.

2. The Contractor shall keep and maintain at the construction site a working set of plans for recording as-built conditions. This set of record drawings shall be kept up to date and available for the Engineer's use. It shall have marked or noted thereon all field information, properly dated, recording as-built conditions that may differ from the plans. These drawings shall be utilized to prepare the As-Built Drawings as herein specified.

3. The Contractor shall include in the appropriate pay items of this Contract, all engineering and drafting costs required to produce the As-Built Drawings.

3.9 ADMINISTRATION OF ONE-YEAR GUARANTEE

A. For purposes of this contract, Article 36 Guarantees, of the General Conditions, will be administered as follows. The one-year guarantee on all workmanship, materials, and equipment will be applied on a per system basis, and not to the entire contract. Unless otherwise specifically established in the Detail Specifications, a system will be considered an inter-related group of infrastructure, equipment, material, instrumentation, and controls, or a combination of the aforementioned components, that function together to serve a specific purpose, such that the absence, failure, or malfunction of any one of the components would render the system unable to wholly or partially fulfill it's intended purpose.

B. The sole purpose of administering the Guarantee provisions of the General Conditions in this manner is for the benefit of the Contractor. This approach recognizes that, due to the size and duration of this contract, there may be workmanship, materials, and equipment installed during the execution of the Contract for which the District will have beneficial use prior to the completion and formal acceptance of the overall contract, and as such, it is reasonable to allow the one year guarantee period to commence with the start of beneficial use. The starting date of the one-year guarantee period will be determined by a formal written notice from the Engineer or his designee, but in any case shall not commence until successful completion of all 60-day tests, training of District staff, a determination by the Engineer that the District has exclusive and unrestricted access to the system, and approval of O&M Manuals for all of the components of the system that require same.

C. Since this provision is made for the benefit of the Contractor, the Engineer will be the sole judge in determining what constitutes a "system" and "beneficial use" for this contract. Any specific warrantees greater than one year in duration, as required in the detail specifications, will also commence at the start of the one-year guarantee period, and shall be included in the formal written notice from the Engineer.

END OF SECTION

SECTION 02225

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: All work necessary for the removal and disposal of existing sidewalk slab, subbase, and any other material or equipment shown or specified to be removed on the plans for installation of davit beams Beam-1 or Beam-2.

a. Remove existing sidewalk slab at select location.

b. Remove existing fill and/or base under existing sidewalk slab to be removed.

B. Basic Procedures and Schedule: Carry out demolition so that remaining structure, equipment and surface finishes are not damaged. Schedule the work to not interfere with the day to day operation of the existing facilities. Do not block doorways or passageways in existing facilities.

C. Additional Requirements: Provide dust control as needed.

1.2 RELATED SECTIONS

A. 01350 – Waste Management

B. 03300 - Concrete

1.3 REFERENCES

A. OSHA – Occupation Safety and Health Administration, US Department of Labor Chapter XVII, Title 29 part 1910.

1.4 SUBMITTALS

A. Procedures for submittals – as specified in Division 1 Specifications.

B. Site Inspection: Inspect area before demolition and report any defects that maybe be made worse by demolition or which may be later attributed to the demolition.

1.5 QUALITY ASSURANCE

A. Limits: Exercise care to break concrete for removal in reasonably small masses. Where only parts of a structure are to be removed, cut the concrete along limiting straight lines with a suitable saw so that damage to the remaining structure is held to a minimum.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 EXAMINATION OF EXISTING DRAWINGS

A. Drawings of existing structures and equipment will be available for inspection at the office of the DISTRICT.

3.2 PROTECTION

A. General Safety: Provide warning signs, protective barriers, and warning lights as necessary adjacent to the work as approved or required. Maintain these items during the demolition period.

B. Prevent all debris, waste, and other material due to demolition from entering into Aeration Tanks.

C. Existing Services: Undertake no demolition work until all mechanical and electrical services affected by the work have been properly disconnected. Cap, reroute or reconnect interconnecting piping or electrical services that are to remain in service either permanently or temporarily in a manner that will not interfere with the operation of the remaining facilities.

Existing air lines along sidewalk are to remain in place and in service during demolition. Conflicting air line metal supports can be temporarily replaced with wood planking supports per approval of the engineer. Reinstall and anchor air line supports after replaced concrete is hardened per applicable general concrete and Division 3 specifications. Take care and prevent any damage to air line.

D. Hazards: Perform testing and air purging where the presence of hazardous chemicals, gases, flammable materials or other dangerous substances is apparent or suspected, and eliminate the hazard before demotion is started.

3.3 DEMOLITION REQUIREMENTS

A. Explosives: The use of explosives will not be permitted.

B. Jackhammers and vibratory equipment shall not be used for demolition.

C. Protection: Carefully protect all mechanical and electrical equipment against dust and debris.

D. Removal: Remove all debris from the structures during demolition and do not allow debris to accumulate in piles.

E. Access: Provide safe access to and egress from all working areas at all times with adequate protection from falling material.

F. Protection: Provide adequate shoring, bracing railings, toe boards and protective covering during demolition to protect personnel and equipment against injury or damage.

3.4 DISPOSAL OF MATERIALS

A. Final Removal: Remove all debris, rubbish, scrap pieces, equipment, and materials resulting from the demolition unless otherwise indicated. Disposal shall be in accordance with all applicable laws including Illinois Environmental Protection Agency Clean Construction or Demolition Debris Regulations.

END OF SECTION

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SECTION 03300

CONCRETE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Contractor shall provide all labor, material, equipment, incidentals and services necessary for furnishing, fabricating and installing of cast-in-place davit beam concrete and accessories including, but not limited to the following:

a. Cast-in-place concrete AND Reinforcing steel.

b. Concrete davit beams.

c. Flush Mounted Davit Base – Furnish per section 05520 of the specification and cast into cast-in-place concrete as shown on Drawings.

d. Dowels – drilled and embedded with epoxy system into existing concrete.

e. PJF- ½" performed joint filler between existing 4" thick concrete walkway slab and cast-in-place davit beam concrete and/or as shown on Contract Drawings.

1.2 RELATED SECTIONS

A. Concrete work shall be done in accordance with General Specification – Concrete, unless modified herein.

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

C. Related requirements specified elsewhere include:

a. Section 02225 – Selective Demolition

b. Section 05520 – Safety Railing

1.3 REFERENCES

A. The reinforced concrete work shall comply with the latest edition of each of the following references and the references identified in General Specifications – Concrete. Conflicts between the references and these specifications shall be directed to the Engineer in writing for resolution.

General Specifications – Concrete (GSC)

ACI 301 – Specifications for Structural Concrete.

ACI 305 – Hot Weather Concreting.
ACI 306 – Cold Weather Concreting.
ACI 308 – Standard Practice for Curing Concrete.
ACI 315 – Details & Detailing of Concrete Reinforcement.
ACI 318 – Building Code Requirements for Structural Concrete.

ASTM C94 – Standard Spec for Ready Mixed Concrete

1.4 SUBMITTALS

A. The Contractor shall not commence any construction work until shop drawings affecting the work are reviewed and approved by the Engineer.

B. Concrete: Submit items specified in General Specifications-Concrete and the following:

a. Concrete mix design in conformance with the General Specifications.

b. Reinforcement: Submit items specified in General Specifications-Concrete.

C. Concrete Accessories: Manufacturer's specifications with application and installation instructions for proprietary materials and items including davit bases, curing materials, etc.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work 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. Manufacture Qualifications:

a. A minimum of three years experience in manufacturing ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

b. Certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

1.6 COORDINATION

A. Coordinate the placement of joint devices and other embedded items with erection of concrete formwork and placement of form accessories.

B. Coordinate size and location of all equipment pads with other trades. Refer to Drawings and Specifications for requirements.

PART 2 – PRODUCTS

2.1 CONCRETE MIX

A. Provide concrete, which is dense, watertight, has minimum shrinkage cracks, and has high durability, high impermeability and maximum resistance to natural or processing chemicals. Test conformity of aggregates and ensure that aggregates intended for use in concrete are potentially non-reactive when tested in accordance with ASTM C289.

a. Concrete for the project shall be Class R or RA, unless noted otherwise.

b. Concrete for spall repairs shall be Class TA or RA, unless noted otherwise.

c. Concrete in fillets, cradles and where used to fill voids or for foundation backfilling and as a mud mat covering or work mat for subgrade at locations specifically designated on the Drawings or as required for construction, shall be Class F.

d. Provide concrete mix designs as per General Specifications-Concrete.

B. Mix and deliver cast-in-place concrete in accordance with General Specification-Concrete, ACI 301, and ASTM C94.

a. No truck shall be loaded to excess of its rated capacity.

b. Concrete shall not be retempered.

c. The producer of ready-mixed concrete shall furnish a ticket stamped by an approved time clock with the time of leaving the plant, which shall be turned over to the Engineer or his representative upon arrival at the job site.

C. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements. Do not use calcium chloride.

D. Use set retarding admixtures during hot weather only when approved by Engineer.

E. Use high-range water-reducing, or high-range water-reducing and retarding admixture as needed to achieve workability for efficient placement of concrete. Slump shall not exceed maximum specified at point of placement.

F. Add air-entraining admixture to all normal weight concrete mixtures. Ensure average air content in field mixtures equal to 5 percent plus or minus one percent (5 percent ±1 percent) in conformance with ASTM C231. For concrete with trowel finished surfaces ensure maximum 3 percent air content.

G. The Contractor shall use the proportions of weights of the ingredients as specified in General Specifications-Concrete for each given Class of concrete used.

H. If for a special purpose the Contractor proposes to use a concrete mix different than the designs listed in General Specifications-Concrete, then he must submit the mix design to the Engineer for approval. The Contractor shall make trial batches and have the necessary tests performed as directed by the Engineer at no cost to the District. The tests shall be repeated as required until the Engineer approves the proposed mix. The concrete mix shall at all times be subject to modification by the Engineer on the basis of the character of work in which the concrete is to be used, variation in aggregates, subsequent tests, and inspection of the work performed. Where mix designs necessitate, increased water requirements (to accommodate higher slumps, increased percent of sand, special aggregates, etc.). Cement contents shall be increased proportionately for any increase in water.

I. For concrete of a given class, the cementitious materials and aggregate shall be so proportioned and mixed as to produce homogeneous concrete of such consistency that it may be placed readily under the conditions of use, completely filling the forms or space into which it is placed, without voids and without separation of the ingredients.

2.2 REINFORCING STEEL

A. Deformed reinforcement: ASTM A615, Grade 60

B. Welded wire fabric: ASTM A185.

2.3 DAVIT BEAMS

A. Contractor shall provide, combine, mix, transport, place, consolidate, finish, cure, and repair concrete consisting of Portland cement, fine and coarse aggregate, water, and approved admixtures for all davit beam types Beam-1 and Beam-2.

B. The contractor shall build into the concrete flush mounted davit bases as detailed on the Drawings and provide openings in concrete to accommodate the work under this and other sections as required.

2.4 ACCESSORIES

A. Dowels: Adhesive anchor system for drilled rebar dowels:

a. HIT-RE 500 Epoxy Adhesive anchor system by Hilti.

b. HVA capsule adhesive anchoring system by Hilti.

c. Approved equal.

B. PJF: Performed joint filler shall be performed recycled rubber joint filler and shall consists of ground tire rubber, free of steel and fabric, combined with ground scrap or water polyethylene. It shall not have a strong hydrocarbon or rancid odor and shall meet the physical property requirements of ASTM D 1752. Water absorption by volume shall not exceed 5.0 percent. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted for approval.

a. J D Russell Company

b. W R Meadows

c. Quikrete

PART 3 – EXECUTION

3.1 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to ready-mix concrete during delivery, at Project site, or during placement, unless approved by Engineer.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

D. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

E. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with the items to be embedded.

B. Provide and install embedded items at accurate locations, and at the required elevations.

3.3 FINISHING – FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.

3.4 FINISHING – DAVIT BEAMS

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Broom Finish: Apply a broom finish to interior slabs, exterior concrete slabs, platforms, steps, and ramps, and elsewhere unless otherwise specified.

a. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

3.5 CURING

A. Cure concrete in accordance with ACI 301 & ACI 308.

3.6 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases: Provide equipment bases as shown on Drawings. Set anchor bolts for equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing equipment.

3.7 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

B. Repair or replacement of defective concrete will be determined by the Engineer. If repair option is selected, Contractor shall furnish details and materials for Engineer approval.

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

D. Before final acceptance of the work, all defective concrete work and all damaged surfaces, whether such damage has resulted from the action of the elements or from injury from any cause whatsoever, shall be neatly repaired without extra charge therefore to the Water Reclamation District. Any honeycombed surfaces or damaged places where surface repairs are permitted shall be brought to a smooth, dense, watertight condition to the satisfaction of the Engineer. Broken corners, edges, and tops of walls shall be repaired by first chiseling or bush-hammering to allow a thickness of at least two inches of new material free from thin joining edges, and in such a manner as to anchor and key the new concrete to the old. The surface of the old material shall then be carefully washed with clean water and cement, suitable forms placed, and specified concrete deposited to conform to the lines of the structure and with the finish required.

END OF SECTION

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SECTION 03912

CONCRETE REMOVAL AND SURFACE PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, General Specifications, and Division 1 General Requirements, apply to this Section.

B. Related requirements specified elsewhere include:

1. Section 03937 – Concrete Repair and Patching.

1.2 SUMMARY

A. The work shall consist of providing the necessary labor, materials, equipment and supervision for the removal of unsound and sound concrete, the sandblast cleaning of newly exposed underlying sound concrete and steel, and coating of concrete and exposed steel.

B. The objective of concrete removal and sandblast and air blast cleaning is to achieve a sound, clean, porous surface similar to that of freshly-fractured, high-quality Portland cement concrete, free of unsound concrete, asphalted concrete, existing membrane and contaminants.

1.3 REFERENCES

1. ASTM A 615: Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

2. ICRI No.03730: Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion

3. ICRI No.3731A: Guide for Selecting Application Methods for the Repair of Concrete Surfaces

1.4 SUBMITTALS

A. Submit for approval, complete manufacturer's literature for the anti-corrosion coating and bonding agent including product description, procedures for application, use limitations and recommendations.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Hand-held pneumatic chipping hammers not heavier than the nominal 25-pound class for the removal of unsound concrete.

B. Hand-held pneumatic chipping hammers of nominal 15 pound class or less for removal of concrete beneath reinforcing bars.

C. Sandblasting equipment capable of removing rust from the exposed reinforcement and contaminants and laitance from newly exposed concrete surface.

D. Compressed air equipment capable of removal of dust and dirt from exposed concrete and steel surfaces.

E. Water blasting equipment capable of cleaning the reinforcement and roughened concrete, without exceeding specified water pressure.

F. All equipment and cleaning material used shall be such that neither the reinforcing steel nor the concrete substrate will become contaminated with oil.

2.2 PRODUCTS AND MATERIALS

A. Reinforcing steel : conform to ASTM A615, Grade 60

B. Anti-corrosion coating for exposed & new reinforcing bars: Sika Armatec 110 Epocem, manufactured by Sika Corporation, or an approved equal. Product utilized shall be compatible with the repair mortar that will be used.

C. Bonding agent for concrete: Sika Armatec 110 Epocem, manufactured by Sika Corporation, or an approved equal. Product utilized shall be compatible with the repair mortar that will be used, and its use shall not be in conflict with the application requirements of the repair mortar manufacturer.

D. Contractor shall use products from a single manufacturer for any construction or concrete repair system, shall be responsible to confirm compatibility of products with the manufacturer, and shall follow manufacturer’s instructions.

PART 3 - EXECUTION

3.1 CONCRETE REMOVAL

A. Prior to any concrete removal work, the Contractor shall perform the following operations:

1. Submit his plan for confining, collecting and disposing of broken concrete and other waste materials as a result of his removal operations.

2. Remove or temporarily support plumbing lines and electrical conduits and fixtures, as necessary and as approved by MWRD. All lines, conduits and fixtures shall be reattached at the completion of the work.

3. Protect light fixtures, conduits, pipes, etc. from damage and overspray or runoff of repair materials.

4. Install temporary lighting as necessary.

5. Install shoring where shown on the Drawings, or where required to support the structure, or where designated by the Engineer.

B. Identify and mark areas of concrete requiring repair, including spalled, delaminated and unsound concrete areas identified by visual inspection, sounding and other suitable means. The geometry of the marked repair areas shall be of simple rectangular pattern. The Engineer will review and approve the marked areas of unsound concrete before any concrete removal work begins.

C. Where possible, areas of concrete removal shall be rectangular in shape. Inaccessible areas shall be avoided. Saw-cut perimeter of the area to be repaired to a minimum depth of 1” without nicking or cutting existing steel reinforcement. Feather edging shall not be permitted. Do not saw through reinforcement or slab embedment.

D. Remove a minimum of 1½ inches of existing concrete facing and continue removal of additional unsound and delaminated concrete as required to expose sound aggregate. Substrate should have minimum amplitude of 1/4".

E. For vertical and overhead repair areas, remove all unsound concrete and sufficient sound concrete to provide minimum patch depth of 1½ inches for spray-applied repair, and 8 inches for formed repair. For horizontal (top surface) repair areas, provide a minimum patch depth of 3 inches.

F. When directed by the Engineer, Contractor shall remove additional depth of sound concrete at the repair areas, at no additional cost to MWRD.

G. During the chipping process, care shall be exercised to avoid cracking the underlying sound concrete. Do not damage deck embedment, such as floor drains.

H. At new floor drain locations, create holes in the deck such that the drains can be properly positioned and installed, and deck around the penetrations properly formed to receive concrete or repair mortar.

I. Where portions of reinforcing bars are exposed, the Engineer will determine if the embedded portion of the bar is soundly bonded to the remaining concrete. If, in the judgment of the Engineer, the bar is not soundly bonded, or if half or more of the diameter of the reinforcing steel is exposed, the Contractor shall remove concrete around and under the bar for a length as determined by the Engineer.

J. All fully exposed reinforcing shall be no closer than 1 inch radical distance from existing concrete.

K. The newly exposed sound concrete shall be roughened by sandblasting and cleaned by blowing away loose material with a compressed air jet.

L. The Contractor shall determine that all unsound concrete has been removed by sounding the final prepared surfaces prior to the inspection by the Engineer.

M. The Engineer shall be allowed a minimum of 24 hours for the inspection of properly prepared concrete surfaces and reinforcement before the scheduled concrete placement. The Contractor shall inspect all prepared concrete surfaces and reinforcement, and complete surface preparation work prior to the inspection by the Engineer.

N. The Contractor shall not exceed the rated capacity of the slab when storing debris from concrete removal, equipment or other materials.

O. The concrete and rebar surfaces for repair shall be prepared in accordance with the International Concrete Repair Institute Guideline Number 03730 whenever the procedures of the guidelines are more stringent than the specifications herein.

3.2 REINFORCEMENT CLEANING AND/OR REPLACEMENT

A. Exposed steel bars, embedments, etc. shall be thoroughly cleaned by sandblasting to remove all rust, contaminants and attached concrete pieces.

B. Bars that are damaged, mislocated, fractured or that have lost more than 15 percent of their original area at any point along the length shall be brought to the attention of the Engineer. Remedial action will be at the direction of the Engineer.

C. If during the removal of unsound concrete, the Contractor encounters existing reinforcing with less than 1/2 in. of cover from the member surface, he shall notify the Engineer.

D. Splice existing reinforcement bars where corrosion has depleted the cross-section area by more than 15 percent, unless otherwise directed by the engineer. The lap length shall conform to ACI 318, class B, or as shown on typical details for repair of spalled concrete on the contract plans, and/or as directed by the Engineer.

E. If additional concrete removal is required for providing proper lap length, additional concrete removal shall extend for a length as required, and a width of 3 inches on each

side (total 6 inches width) of the reinforcement bar to be spliced. Newly exposed concrete and reinforcement surfaces from additional removal shall also be thoroughly cleaned by sandblasting.

F. Reinforcement shall be secured in position so as to be unaffected by concreting operations.

3.3 ANTI-CORROSION COATING AND BONDING AGENT

A. Thoroughly clean the roughened surface and exposed reinforcement of rust, dirt, loose chips, and dust using high-pressure water jet at a pressure not exceeding 3,000 psi. Contractor shall test for a suitable water pressure to use, on a small test area. If pressure utilized erodes and damages concrete surface to be patched, contractor shall further reduce water pressure, as approved by the Engineer.

B. Maintain substrate in a saturated, surface dry condition. Concrete shall not be placed on any surface with standing water. Prior to patching, coat exposed reinforcing steel with anti-corrosion coating and surrounding exposed concrete with bonding agent, with the following exception. For formed repairs, if the open time, between coating the steel/concrete and placing the patching material, is expected to exceed the time recommended by the manufacturer, or if the patching material cannot be placed on the same day the steel/concrete coating is applied, the concrete and reinforcing steel shall not be coated unless otherwise directed by the Engineer. Follow manufacturer's recommendations for use as stated in the manufacturer's current printed literature.

3.4 CLEAN-UP

A. The Contractor shall remove all loose concrete from the site and leave the area broom clean.

B. Debris shall not be flushed down the existing floor drains.

END OF SECTION

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SECTION 03937

CONCRETE REPAIR AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, General Specifications, and Division 1 General Requirements, apply to this Section.

B. Related requirements specified elsewhere include:

1. Section 03912 – Concrete removal and surface preparation.

1.2 SUMMARY

A. This Section specifies cement-based, high early strength, pre-packaged structural repair mortars for repairing horizontal surfaces, floor slabs, formed or unformed vertical surfaces, and overhead concrete surfaces.

B. Patching material shall be applied by low pressure spraying, forming and pouring, or hand troweling, as specified and as recommended by the manufacturer for the specific application.

C. The Contractor shall use products of a single manufacturer for the contract to maintain compatibility of the products, and follow instructions of the manufacturer in their applications.

D. Where specifically noted on the drawings, concrete of class indicated shall be used for the repair and patching instead of pre-packaged repair mortars. For all such repairs, all requirements of this section shall apply except for the following Parts – 1.4, 1.7A. 2.1B, 3.3, 3.4 and 3.5C.

1.3 REFERENCES

A. International Concrete Repair Institute (ICRI):

1. ICRI No.3731 - Guide for Selecting Application Methods for the Repair of Concrete Surfaces

B. American Society of Testing Materials (ASTM):

1. ASTM C 109-99 - Test Method for Compressive Strength of Hydraulic Cement Mortars

2. ASTM A 185-97 - Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

3. ASTM C 348-97 - Test Method for Flexural Strength of Hydraulic-Cement Mortars

4. ASTM C 469-87 - Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression

5. ASTM C 596-96 - Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement

6. ASTM C 666-97 - Test Method for Resistance of Concrete to Rapid Freezing and Thawing

7. ASTM C 806-87 - Test Method for Restrained Expansion of Expansive Cement Mortar

8. ASTM C 882-99 - Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by slant shear

9. ASTM C 1012-89 - (Modified) Test Method for Length of Change of Hydraulic Cement Mortars Exposed to a Sulfate Solution.

10. ASTM C 1202-97 - Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Repair-Mortar-A (For low-pressure spraying and hand-troweling): Provide a repair mortar that when cured produces the following properties:

1. Compressive Strength: Minimum, 1-day 3,500 psi, 28-day 8,000 psi.

2. Flexural Strength: Minimum, 1-day 650 psi; 28-day 1,300 psi.

3. Slant Shear Bond Strength: Minimum, 1-day 1,000 psi; 28-day 3,000 psi.

4. Permeability: 500 Coulombs Maximum.

5. Drying Shrinkage: Maximum 0.09% shrinkage at 28 days.

6. Freeze-Thaw Resistance (300 cycles): Minimum RDF 85%.

7. Sulfate Resistance (15 weeks): 0.09% expansion (maximum difference between control bars in water and test bars).

8. Modulus of Elasticity: 4.0×10^6 psi minimum.

B. Repair-Mortar-B (For forming and pouring): Provide a repair mortar that when cured produces the properties as for Repair Mortar A, except as noted below:

1. Compressive Strength: Minimum, 1-day 2,500 psi, 28-day 7,000 psi.

2. Slant Shear Bond Strength: Minimum, 1-day 700 psi; 28-day 2,500 psi.

1.5 PROJECT CONDITIONS

A. Weather Conditions: Apply repair mortar only when ambient and surface temperatures are 50°F (10°C) and rising. Do not make the repair if the ambient temperature is expected to fall below 40°F (5°C) within 24 hours after placement. Do not apply repair mortar when ambient and surface temperatures are 100°F (38°C) and above.

B. Follow manufacturer's recommendations regarding additional installation information (hot weather or cold weather installation).

1.6 MEASUREMENT

A. Method of measurement of concrete repair for payment purposes is indicated on the contract drawings.

B. All work shall be performed under unit price basis. See unit price item number in the proposal.

1.7 SUBMITTALS

A. Submit complete manufacturer's literature for the patching material including product description, composition, material and performance properties, installation and application procedures, use limitations and recommendations.

B. The contractor shall submit his procedure for placement of patching material.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Contractor shall use concrete products from a single manufacturer for concrete repair system including repair mortar, anti-corrosion coating & bonding agent, curing compound, etc. Contractor shall be responsible for ascertaining compatibility of products with the manufacturer, and for following manufacturer's instructions.

B. Repair Mortars:

1. Repair-Mortar-A (For low-pressure spraying and hand-troweling): A blend of Portland cement, silica fume, specially graded aggregates, synthetic fibers, and set-control admixtures including shrinkage compensating additives. Repair mortar shall be "Sika Repair 224" by Sika Corporation, or an approved equal.

2. Repair-Mortar-B (For forming and pouring): A two-component, polymer-modified, cementitious, fast-setting, screed mortar. Repair mortar shall be "SikaTop 111 Plus" by Sika Corporation, or an approved equal. For patch thickness over 1 inch, repair mortar shall be extended using 3/8" non-reactive coarse aggregate other than limestone, if so recommended by repair mortar manufacturer. Aggregate type and quantity per unit volume of repair mortar shall be only as recommended by the repair mortar manufacturer.

C. Welded Wire Mesh: ASTM A 185, 4x4-W1.4xW1.4, where required unless noted otherwise.

D. Reinforcing steel: conform to ASTM A615, Grade 60

E. Anti-corrosion coating for exposed & new reinforcing bars: As specified in Section 03912.

F. Bonding agent for concrete: As specified in Section 03912.

G. Water: Drinkable

H. Curing Compounds: See provisions of Article 19 of General Specifications - Concrete.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. See Section 03912 - Concrete removal and surface preparation.

B. Build forms for vertical repair surfaces, where required.

3.2 USE OF MESH

A. When applying product in repairs greater than 5 lineal feet in the longest direction at depths of 1" or greater and for overhead applications of the same size, 4" x 4" low gauge mesh (10 - 12 gauge) must be firmly tied to the properly prepared substrate.

B. Locate the mesh no closer than 1/2" and no more than 1" from the finished surface, using spacers and concrete anchors. A minimum cover of mortar over the mesh should be 1/2".

C. Mesh is not necessary in applications where side restraint exists, or where existing reinforcement will provide adequate restraint.

3.3 MIXING

A. Comply with mortar manufacturer's recommendations for water quantity and mixing procedures.

3.4 MATERIALS AND METHODS OF APPLICATION

A. Repair-Mortar-A shall be utilized for vertical and overhead patches, and for all patches that will be in contact with wastewater during normal service.

B. Repair-Mortar-A shall be spray-applied except as noted below. Repair-Mortar-A may be trowel-applied only when individual patch surface area is smaller than 2 square feet, and patch does not extend to a depth below any exposed reinforcement.

C. Where Repair-Mortar-A is not required to be used, Repair-Mortar-B shall be utilized for formed or unformed repairs at the top of horizontal surfaces, at floor slabs, and for formed vertical repairs.

3.5 APPLICATION

A. Maintain substrate in a saturated, surface-dry condition.

B. For hand applications, a bond scrub coat may be required, if recommended by the mortar manufacturer.

C. For low pressure wet spraying or hand troweling on horizontal, vertical or overhead surfaces, apply repair mortar as follows:

1. Vertical Applications: Repair mortar can be applied on vertical applications up to a 2" depth in one lift.

2. Overhead Applications: Do not exceed 1.5" thickness per pass. For depths greater than 1.5", limit succeeding lifts to 1" thickness.

3. Multiple Passes: Place succeeding lifts after repair mortar has developed initial set. Scarify the surface of the first lift to ensure integral bond between successive layers.

4. Follow manufacturer's recommendations for application of the repair mortar.

D. Follow repair mortar manufacturer's recommendations on repair thickness limits. Obtain specific recommendations for actual thickness of intended repair.

3.6 FINISHING (for unformed surfaces)

A. Finished concrete surface shall be even and flush with adjacent concrete surfaces. All corners and edges shall match the existing concrete in the area.

B. Level surface of repair mortar using a float or screed.

C. Apply final finish when mortar has begun to stiffen using a wooden, plastic, or synthetic sponge float or trowel.

D. Spray applies evaporation reducer, "Sikafilm" by Sika Corporation or approved equal, lightly to reduce surface moisture evaporation, especially in windy, hot conditions. Follow manufacturer's printed instructions.

3.7 CURING

A. Protect fresh mortar from premature evaporation. Cure finished repair mortar by one of the following methods:

1. Preferred Method: Keep area continuously moist with water as soon as mortar surface has hardened (thumb print hard), for a minimum of seven days.

2. Acceptable Method: Apply two coats of curing compound. Apply the first coat immediately after completing finishing operations. Apply the second coat about 24 hours later.

3. Curing compound shall not be used where additional layers of patching material are to be placed, or where protective coatings are to be installed.

3.8 QUALITY CONTROL TESTING

A. Testing agency: MWRD may engage a qualified, independent, testing and inspection agency to sample materials, perform laboratory and field testing, and submit test reports.

B. The Contractor shall assist MWRD or its testing lab in taking concrete test samples for 1, 7 and 28 day compressive strength, slump, air entrainment and bond pull-off tests.

C. Contractor shall patch all test areas suitably with repair mortar.

D. All unsatisfactory repair work not conforming to specified requirements shall be replaced as directed by the Engineer at contractor's expense, and at no additional cost to the District (MWRD). Contractor shall also pay for any related re-testing costs associated with the replacement.

3.9 BOND PULL-OFF TESTS

A. Repair work shall exceed a minimum bond pull-off value of 100 psi at the prepared concrete surface. Bond pull-off tests may be conducted by the District, at locations selected by the Engineer.

END OF SECTION

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SECTION 05520

SAFETY RAILING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Hot-dip galvanized steel safety railing.

B. Swing Gates

C. Davit Bases.

D. Concrete Anchors.

E. Accessories.

1.2 RELATED SECTIONS

A. 01100 - Summary.

1.3 REFERENCES

A. ASTM A36 – Structural Steel

B. ASTM A53 Grade B – Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.

C. ASTM A123 – Zinc-Coating (Hot Dip) on Iron and Steel Products.

D. ASTM A153 – Zinc-Coating (Hot Dip) on Iron and Steel Hardware

E. ASTM A276, Type 304 – Stainless Steel

F. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural tubing in Round and Shapes

G. ASTM A501 – Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

H. ASTM A990 – Structural Steel

I. AWS A2.0 – Standard Welding Symbols

J. AWS D1.1 – Structural Welding Code

K. OSHA – Occupation Safety and Health Administration, US Department of Labor

Chapter XVII, Title 29 part 1910.

L. Pipe Railing Systems Manual, NAAMM AMP 521-01, 4th edition

M. International Code Council (ICC) concrete anchor evaluation reports

1.4 SUBMITTALS

A. Procedures for submittals – General Specifications.

B. Shop Drawings: The contractor shall submit shop drawings of the safety railing, swing gates, sizes, connection attachments, anchorage, size and type of fasteners, and accessories for the Engineer's review and approval.

C. Submit product data.

D. Shop drawings shall be approved prior to fabrication.

E. Indicate weld connections using standard AWS A2.0 welding symbols.

F. Manufacturer's Certificates: Certify that Steel Products are made in the USA in compliance with all provisions of the "Illinois Steel Procurement Act".

G. Welders' Certificates: Submit welders' certificates certifying welders employed on Work verifying AWS qualification within the previous 12 months.

1.5 SAFETY RAILING DESIGN CRITERIA

A. Occupancy: Industrial occupancy not accessible to the public and an occupant load not greater than 50.

B. Safety Railing Design Loads: Safety railing assembly and attachments are designed to resist a single concentrated load of 200 pounds at any point along the top applied in any direction without damage or permanent deflection.

C. OSHA chapter XVII, Title 29 part 1910.

D. Pipe Railing Systems Manual, NAAMM AMP 521-01, 4th edition.

1.6 CONCRETE ANCHOR DESIGN CRITERIA

A. Design strength of anchors shall be determined in accordance with ACI-318-14 chapter 17 and an International Code Council (ICC) evaluation report.

B. Uncracked concrete.

C. Seismic design category B.

D. Specified compressive strength of concrete: 3,000 psi

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with a minimum five years of experience.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.1 STANDARD STEEL SAFETY RAILING SYSTEM

A. Safety Rails and Posts: 1-1/2 inch diameter schedule 40 steel pipe (1.9 inch O.D. and 0.145 inch minimum nominal wall thickness): welded joints. Pipe shall be carbon steel ASTM A53 Grade B, ASTM A501, or ASTM A500 Grade B. Base plates for attaching to concrete with expansion anchors shall be ASTM A36 steel continuously welded to posts.

B. Post spacing:

a. Aeration Tanks: Center to center post spacing shall be 5 foot maximum.

C. Standard Safety Railing: A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of 42 inches nominal, from upper surface of top rail to floor, platform, runway, or ramp level. The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway or ramp. The ends of the rails shall not overhang the terminal post if it constitutes a projection hazard.

D. Plates, shapes and bars: ASTM A36

E. Galvanizing: 2.0 oz/sq ft zinc coating, minimum, in accordance with ASTM A123 for products and ASTM A153 for hardware. Safety railing shall be hot-dip galvanized after fabrication. Plug vent and drain holes after hot-dip galvanizing with zinc plugs installed flush with the outer surface of railing.

F. Cold galvanizing compound (for field touch up): 95% zinc in dry film, system 7000 by Rust-Oleum, or Z.R.C. or approved equal.

G. Ninety degree fully welded mitered bends with welds ground smooth prior to galvanizing may be used in lieu of the ninety degree rounded bends that are shown on plan details for safety railing end corners.

2.2 FABRICATION

A. Fit and shop assemble components in largest practical sizes, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Continuously seal joined pieces by continuous welds, prior to galvanizing.

D. Accurately miter and cope intersections of posts and rails and weld all around. Make exposed joints butt tight. Welded joints in top rail shall match NAAMM Type 2 joint or better, for other areas welded joints shall be NAAMM Type 3 or better.

E. Accurately form components to each other and to structure.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

G. Terminate steel railing sections at expansion joints in the concrete structure and continue after the joints to provide a maximum 4” gap between railing sections.

H. Terminate steel railing sections at ends of fabricated railing sections. Expansion sleeves are not acceptable.

I. Permanently attach one end of chain sections to end post at top and bottom rail heights. Provide fixed eyes on opposite post at same heights.

J. Pipe ends shall be sealed watertight with welded end caps. Plastic plugs are not acceptable.

K. All welding shall be continuous and in accordance with AWS D1.6. Weld materials shall be of the same material as components being welded.

L. All steel and stainless steel connections shall be isolated to prevent galvanic corrosion.

M. All dimensions must be verified in field before fabrication.

2.3 CONCRETE ANCHORS

A. Concrete anchors shall be single cone wedge type or multiple cone wedge type expansion anchors.

B. Expansion anchors, nuts and washers shall be stainless steel. Provide 1/16" neoprene gasket between stainless steel surfaces in contact with other dissimilar metals.

C. Product and Manufacturer: Provide anchors by one of the following:

1) Hilti Kwik Bolt TZ (Type 304 Stainless Steel)

2) Or equal. Proposals to substitute equal anchors shall have structural calculations sealed by a Licensed Structural Engineer in the state of Illinois demonstrating that proposed anchors have equal or better capacity for anchor spacing and edge distance detailed on drawings and that the anchors meet concrete anchor design criteria.

D. The minimum embedment length, as indicated on the Plans, is the minimum nominal embedment length per the manufacturer's specifications.

2.4 SWING GATES

A. Swing gates shall be fabricated of same material and members as safety rails and posts of the standard steel safety railing system.

B. Hinges with torsion spring and hardware shall automatically close gate and be configuration shown on drawings, or approved equal fabricated of galvanized steel.

C. Gates shall have a positive latch to keep gates from accidentally opening as shown on drawings, or approved equal.

2.5 DAVIT BASES

A. Davit bases, as indicated on the Plans, shall be center mount sleeve type (top mounted) and deck mount sleeve type (flush mounted) fabricated of stainless steel.

B. Davit bases shall be compatible with DBI-SALA advanced davit masts and extensions with a rated working load capacity of 450 lbs and a vertical load capacity of 5,000 lbs.

C. Each base shall have a stainless steel sleeve cap to keep water and debris out.

D. Manufacturer: DBI-SALA

E. Davit base product number: DBI-SALA part number 8516563 (top mounted base) and DBI-SALA part number 8515834 (flush mounted base).

F. Heavy duty sleeve cap product number: DBI-SALA 8510827

G. Material: Stainless steel

H. Concrete Anchors for center mount sleeve type (top mounted) davit base: Hilti Kwik Bolt TZ (Type 304 Stainless Steel)

2.6 ACCESSORIES

A. Chain Sections - 1/4 inch welded links with positive latching device at one end, ASTM A304 Stainless Steel.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 PREPARATION

A. Clean items to bare metal where site welding is required.

3.3 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide flanges, anchors, plates and angles, required for connecting railings to structure.

C. All safety railing and railings shall be provided with a clearance of not less than 3 inches between the handrail or safety railing and any other object. Provide a gap between continuous railing sections of not more than 4 inches.

D. Repair damaged galvanized surfaces with zinc rich cold galvanizing compound. If more than 3% of the hot-dip galvanized coating of a safety railing section is damaged then cold galvanizing will not be allowed and the section will be rejected.

E. Hot dip galvanized safety railings are not to be painted.

3.4 ERECTION TOLERANCES

A. Maximum Offset From True Alignment: 1/8 inch.

END OF SECTION