City of Salisbury
Jacob R. Day, Mayor

CONSTRUCTION
&
MATERIAL SPECIFICATIONS

FOR UTILITY AND ROADWAY CONSTRUCTION

Issued January 2, 2018

Department of Infrastructure & Development
125 N. Division St., #202 Salisbury, MD 21801
410-548-3170 (fax) 410-548-3107
www.salisbury.md

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Latest revision 01-02-18

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PREFACE

This book of "Construction and Material Specifications for Utility and Roadway Construction" has been prepared by the City of Salisbury – Department of Infrastructure and Development to provide Engineers, Contractors and Developers with a catalog of Construction Methods and Material Specifications for Roadway and Utility Construction authorized by the City of Salisbury.

Any Specifications previously issued by the City of Salisbury are herewith superseded as of the latest revision date shown on the pertinent Specification.

All Engineers, Land Surveyors, and Contractors involved with the construction of roadways and utilities authorized by the City of Salisbury should become thoroughly familiar with contents of this book.

All materials shall be new, standard production, and made in the United States of America unless otherwise approved as a substitute by the City of Salisbury before use of the material.

These Specifications may be revised periodically to reflect changes in regulations and technology. Items may be added or deleted at the City's discretion. These Specifications are not intended to cover all materials purchased, or construction performed by the City of Salisbury or its Contractors. The City of Salisbury reserves the right to default to the Maryland Department of Transportation State Highway Administration Standard Specifications for Construction and Materials Manual (Current Edition) for clarification and reference.

Any obvious errors found or any comments that you may have regarding these Standards are welcome and will be given due consideration. Please submit them to:

City of Salisbury
Department of Infrastructure and Development
125 North Division Street
Room 202
Salisbury, MD 21801- 4940
Telephone: 410-548-3170

Effective Date:	07-14-94
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GENERAL CONDITIONS

Latest revision 01-02-18

1. OUTLINE SPECIFICATIONS

   A. Some sections of the Contract specifications have been written in outline form to facilitate reading and locating information. Only key words, product designations and phrases have been used. Contractors will resolve any questions arising from the outline form specifications prior to submitting a Bid Document. By its Bid Document submission, the Contractor agrees to accept the City Engineer's interpretation of the specifications in case of discrepancy or misunderstanding.

2. LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

   A. Definition of Contractor - hereinafter "Contractor" will refer to any Contractor currently under contract with the City, or any Contractor or person performing construction to City utilities, roadways, etc. or other appurtenances owned and/or maintained by the City, for which no contract has been awarded by the City.

   B. Responsibility for Damage Claims - Contractor will indemnify and save harmless the City and all its representatives from all damage resulting from the construction or non-compliance with any law, ordinance, regulation or by-law in effect.

   C. Contractor is responsible for public safety.

   D. Contractor is responsible for preservation of all public and private property, trees, monuments, highway signs, markers, fences, curbs and appurtenances.

   E. Contractor is responsible for storm water drainage, management and soil erosion control relating to the completion of the Work.

   F. "Engineer" or "Inspector" shall be the authorized representative(s) of Salisbury Department of Infrastructure and Development.

3. PROSECUTION OF CONTRACT & LIQUIDATED DAMAGES

   A. Contract time may be accrued using working days or calendar days. Calendar days will be used unless designated as working days elsewhere in the contract.

   B. Determination of working day will be any normal calendar day when the weather or soil conditions are suitable for work for five (5) hours.

   C. Saturdays, Sundays, and legal Holidays will not be considered a working day unless it is used as a productive work day (See Section 20), but are considered Calendar days for the purpose of assessing liquidated damages.

   D. Calendar days will begin at start of construction or "Notice to Proceed" date and will be continuous until completion of Work.

   E. Time extensions will normally be granted when it can be shown that the Contractor has been unavoidably detained in completing the Work.

   F. Liquidated damages for each calendar day the Work is not complete beyond the allotted time will be as follows:

Amount of Contract	Liquidated Damages per Day
Less than $10,000	$100.00
$10,000 or less than $100,000	$250.00
$100,000 or less than $500,000	$750.00

$500,000 or more	$1,000.00

Or will be based on actual cost to the City, whichever is greater.

4. CONTROL OF MATERIAL
   A. Source of supply subject to approval of the City Engineer.
   B. City Engineer may require samples of materials.
   C. Only materials conforming to these specifications will be approved.
   D. Manufacturers and suppliers listed in these specifications or on the City construction standard drawings are pre-approved for the convenience of the Contractor.
   E. Plans prepared by agencies other than the City's Department of Infrastructure and Development will require approval of materials and/or approved substitutes by the City Engineer or representative.
   F. Approved substitutes will conform to City Contract specifications and meet requirements as stated in the Approved Substitute section of Instructions to Contractors or "Approved Substitute" on record at the City's Department of Infrastructure and Development or use the "Construction and Material Specifications for Utility and Roadway Construction" manual where applicable.
   G. All rejected materials, damaged in shipment or otherwise not conforming to the specifications or samples, will be removed immediately from the vicinity of the Work.

5. PAYMENT REQUESTS
   A. Partial (periodic) payments
      1. Made approximately each month in an amount equal to the estimated amount less any Retainage.
      2. The City Engineer will make out the monthly estimate based on estimated quantities submitted in writing by the Contractor, and agreed upon by the City.
   B. Final Payment
      1. Final payment will not be made until Final Acceptance is issued.
      2. Retainage amounts will be withheld (unless replaced by a Maintenance Bond) until final acceptance of Work at the end of the guarantee period.
      3. Maintenance bond will be in the amount of 5% of the total Contract amount.
      4. At completion of the guarantee period, a final inspection will be made by the City Engineer.
      5. Any items of non-acceptance will be listed on a "Final Punch List" for the Contractor. Items on this Final Punch List must be corrected or completed before final acceptance can be made.
      6. Items on the "Final Punch List" not completed by the Contractor will be done by the City, or the City will cause the Work to be done.
      7. The cost of any Work required by the "Final Punch List" not done by the Contractor will be charged to the Contractor's retainage account or maintenance bond.

C. Retainage Payment

1. Retainage payment will be made upon conditional acceptance and receipt of a maintenance bond.

2. If no maintenance bond is provided, the Retainage amount will not be paid until a satisfactory final inspection is performed and final acceptance is issued.

3. Any unused portion of the Retainage account will be returned to the Contractor after all repairs have been made.

4. Unless otherwise specified in the Contract, Retainage will be withheld on all Contracts.

5. Retainage will be made at 10% of the estimated amount with the maximum retainage being 5% of the total Contract amount.

D. Payment for Stored Materials

1. In making estimates of the value of the Work done and materials incorporated in the Work, the Contractor may, subject to the approval of the City or as required by law, include in the current estimates the delivered cost, as modified below, of equipment and non-perishable materials which have been tested for adequacy and which have been delivered to the site or other such location approved by the City and adequately protected from fire, theft, vandalism, the effect of the elements, and any damage whatsoever, or similarly placed in approved storage facilities adjacent thereto. Such materials and equipment will at all times be available for inspection by the City Engineer and the City. No progress payment will be made for said material and equipment until each of the following conditions has been fulfilled:

a. The Contractor will furnish to the City Engineer invoices establishing the value of said materials and equipment with an indication of the amount the Contractor requests the City to pay for said materials and equipment. Such invoices will be furnished at least ten days in advance of the date of preparation of monthly estimates as established by the City Engineer;

b. The City Engineer will inspect said material and equipment and recommend payment therefore;

c. The Contractor will furnish the to the City fire insurance policies, as provided in this Contract and with the broad form extended coverage endorsement, for said material and equipment in an amount equal to one hundred percent of the value thereof and which policies will be maintained, at the sole cost and expense of the Contractor, until said material and equipment has been incorporated into the Work;

d. Within sixty (60) days of the submission to the City of any progress payment, including payment for said materials and equipment, or within thirty days of the date of payment to the Contractor by the City, whichever is longer, the Contractor will furnish to the City Engineer satisfactory evidence that the funds included in the progress payment for said materials and equipment have been paid to Contractors supplying such items. Satisfactory evidence will be: a cancelled check in the correct amount and including identification of the invoice or invoices paid; a letter or telegram, from the Contractor and signed by his properly authorized employee, stating the amounts and invoices that have been paid; or a receipted invoice;

e. Should the above evidence of payment not be furnished, the City Engineer will recommend the deduction of any funds included in previous estimates for such materials and equipment for which said evidence has not been furnished from the current estimate or subsequent current estimates;

f. Any payment made for materials and equipment delivered will not relieve the Contractor of any responsibility for furnishing all the necessary equipment and materials required for prosecution of the Work in the same manner as if such payments had not been made.

6. INSPECTION

A. Competent inspectors will be supplied by the City.

B. The City Engineer will be notified by the Contractor at least three (3) days prior to starting new work.

C. Inspectors will have access to all Work at all times. The Inspector's duty is to ascertain all Work being performed in accordance with specifications.

D. Contractor has final responsibility for acceptability of finished Work.

E. Contractor will consult with City Engineer concerning:

1. Method of Work;
2. Equipment to be used;
3. Point of beginning Work.

F. The City Inspector will not act as Construction Foreman.

G. No inspection or supervision, no failure to inspect or supervise, nor the presence of any employees of the City during the execution of the Work, and no approval or acceptance of any part of the Work herein contracted for, or of the materials and equipment used therein, will relieve the Contractor of any of its obligations to fulfill this Contract, or will prevent the rejection of said Work, materials, and equipment in whole or in part, at any time thereafter should said Work, materials, or equipment be found by the City to be defective or not in accordance with the requirements of the Bid Documents.

H. No inspection, or any failure to inspect, at any time or place, will relieve the Contractor from its obligation to perform all the Work strictly in accordance with the specifications. The City's Construction Inspectors are not authorized to revoke, alter, enlarge, relax, or release any requirement of these specifications, nor to issue instructions contrary to the drawings and specifications, nor to authorize any changes to the Scope of Work without an approved, written change order signed by the Director of Procurement issued prior to the additional Work being initiated.

7. DISCREPANCIES

A. The Contractor will immediately stop Work and notify the City Engineer of any discrepancies discovered between the drawings and existing conditions.

B. Errors or omissions in drawings or layout will be treated as a discrepancy (above).

C. The City Engineer or authorized representatives will review the Contractor's findings to confirm the discrepancy.

D. The City Engineer will issue new instructions as soon as possible to relieve the discrepancy.

E. The Contractor will resolve any questions before start of Work or continuation after the discrepancy or question arises.

8. OTHER CONTRACTS WITHIN CONSTRUCTION LIMITS
   A. The City may let other contracts within construction limits.
   B. Utility companies and others may work within construction limits.
   C. Contractor will cooperate and coordinate with others.
   D. Contractor will inform City Engineer of delays being caused by other Contractors.
   E. City Engineer will resolve conflicts over working space and sequence in the best interests of the Work.

9. SUPERINTENDENCE
   A. The Contractor will keep on its work site, at all times during its progress, a competent superintendent and/or responsible assistant.
   B. Contractor's field representative will have an approved, signed copy of the Contract and plans at the construction area, during working hours. Personnel working outside of a City contract will have a current copy of the "Construction and Material Specifications for Utility and Roadway Construction" manual at the construction area during working hours.
   C. The superintendent or his/her assistant will be available on an around-the-clock emergency basis.

10. PROTECTION OF THE PUBLIC
    A. Contractor will comply with "Maryland Department of Transportation - New Work Zone Traffic Control" (Latest Revision).
    B. Any restriction or diversion of traffic at any time will be subject to the approval of the City Engineer and the requirements of that agency having jurisdiction over the road in which the Contractor is working (See also #23: Maintenance of Traffic).
    C. During the progress of the Work, sidewalks and crossings will be kept open for the passage of pedestrians unless otherwise authorized. Streets will not be unnecessarily obstructed, and unless the City Engineer and/or the City as applicable, will authorize the complete closing of a street. The Contractor will take such measures at its own expense as may be necessary to keep the street open for traffic. This will include but not necessarily be limited to the provision, erection, and maintenance of all necessary signs, barricades, lights, and flagmen or uniformed traffic directors.
    D. The Contractor will construct and maintain without extra compensation such adequate and proper bridges over excavations as may be necessary or directed for purpose of accommodating pedestrian and/or motor vehicles.
    E. Construction activities that may temporarily interfere with property access will be coordinated in advance with the individual property owners.
    F. The Contractor will so schedule its Work as to minimize the time period during which vehicular access to each dwelling along the Work route is prevented. At no time will

vehicular access be prevented to any dwelling for longer than twenty-four (24) hours. The Contractor will provide, at all times, safe pedestrian access to all dwellings, whether residential, commercial, or other.

G. Vehicular access on side streets, in the proximity of the route of the Work, will not be encumbered by the Contractor.

H. The Contractor will not totally bar vehicular access from more than one block of the route of the Work at any given time.

I. Access to fire hydrants will be possible at all times and, wherever possible, one lane of traffic will be maintained to accommodate access by emergency vehicles.

J. Contractor responsible for the damage caused due to lack of reasonable protective precautions.

11. CARE AND PROTECTION OF WORK
    A. Contractor solely responsible for protection and care of:
        1. Materials delivered to job site;
        2. Equipment;
        3. Work under this Contract;
        4. Existing structures near the Work.
    B. Damage or loss will be made good at Contractor's expense.
    C. During construction, the open ends of Work will be effectively closed with temporary covers or plugs to prevent the entry of foreign material.
    D. Where permanent equipment called for under this Contract is installed before the erection of adequate protective structures, the Contractor without additional compensation therefore, will provide approved effective and durable covers for fully protecting such equipment against damage from the elements or from any other cause.
    E. Electrical equipment will be carefully and effectively covered with waterproof material and otherwise protected at all times from the elements.

12. SUBCONTRACTORS
    A. Awarded Contractor must submit names of subcontractors prior to the Contract start.
    B. City reserves the right to reject unsatisfactory subcontractors.

13. MATERIALS
    A. Manufacturer's and trade names specified are used to establish standard of quality.
    B. Will be new, standard production, and made in the USA unless otherwise approved by City Engineer.
    C. Substitutes must be:
        1. Approved by City Engineer before delivery to project site;
        2. Equal in all respects to specified material;
        3. Submitted with Bid Document so City Engineer may evaluate prior to Contract award.

14. WORKMANSHIP
    A. Construction will be performed by a Contractor previously approved by the City, for specific construction.
    B. First class material and workmanship demanded.
    C. Unsatisfactory Work or material will be removed and replaced at Contractor's expense.
    D. Contractor will be responsible to obtain workmanship requirements from the City before start of construction or delivery of materials to jobsite or to the City for City ownership.

15. CLEAN-UP & ACCESSIBILITY TO PROPERTY
    A. Clean-up on block-by-block basis.
    B. Keep working area in public streets to minimum.
    C. Keep inconvenience to traveling public and nearby residents to a minimum. Unless previous arrangements have been made with homeowners and/or businesses, all will be accessible. Clean up working area before Holidays and each Friday afternoon prior to any non-working period.
    D. Paper, trash, and refuse will not be allowed to collect on project site.
    E. Upon completion of the Work and before Final Acceptance will be made, the work site, storage areas, and other areas occupied by the Contractor during construction thereon by the Contractor, will be removed by the Contractor. The Contractor's storage area will be top soiled, seeded, and mulched in accordance with City standards. No separate payment will be made for the Work as all such costs will be included in the lump sum price bid.

16. WORK PERFORMED BY CITY ON CONTRACTOR'S BEHALF
    A. City will take appropriate measures independent of Contractor when:
        1. Contractor is not performing Work timely or properly;
        2. Contractor cannot be reached during an emergency.
    B. City will deduct bills for services from payments to Contractor or invoice the Contractor at City's option.
    C. City will not be responsible for the cost of materials purchased by the Contractor and not used due to Work performed by another Contractor of the City on the Contractor's behalf.

17. CONSTRUCTION IN RIGHT-OF-WAY AND EASEMENTS
    A. Work confined to Easement areas.
    B. Restore original condition to satisfaction of City Engineer.

18. WATER SUPPLY AND SANITATION
    A. Contractor to supply at its expense.
    B. Location of facilities to be approved by City Engineer.
    C. If available, the City may supply water via a temporary hydrant connection, at Contractor's expense. Contractor must apply for service, before construction, using the

proper form available at the City Government Office Building, 125 N. Division Street, Room 202, Salisbury, Maryland 21801.

19. SURPLUS MATERIAL

A. All excavated and excess material are the property of the City until declared surplus in writing.

B.Contractor must dispose of all surplus material in an approved manner.

20. WORKING TIME

A. The City observes the following holidays:
   1. New Year's Day
   2. Martin Luther King's Birthday
   3. President's Day
   4. Good Friday
   5. Memorial Day
   6. Independence Day
   7. Labor Day
   8. Veteran's Day
   9. Thanksgiving Day
   10. Day after Thanksgiving Day (Friday)
   11. Christmas Day

B. Written permission of City Engineer required for Contractor to:
   1. Work more than ten hours per day or 40 hours per week;
   2. Work between 6:00 P.M. and 7:00 A.M;
   3. Work on Saturday, Sunday and Holidays;
   4. Discontinue Work or leave site before project completion.

C. City Engineer may require Contractor to make certain utility tie-ins at night to minimize inconvenience to customers. No extra cost will be permitted in such circumstances nor will any time be charged against the Contract time.

   a. Utility connections requiring disruption of service to customers will be performed between 10:00 P.M. and 5:00 A.M., unless otherwise approved by City's PW Department. The Contractor will be responsible for notification to all properties or businesses who are directly affected by disruption of service 48 hours in advance. Contractor will submit sample of proposed notification to City's PW Department for approval prior to distribution to customers. Notice to customers will include the following:
      i. Utility(s) affected;
      ii. Date & Time of disruption of service(s);
      iii. Date & Time of restoration of service(s);
      iv. Brief description of planned Work;
      v. Contractor's company name and Point of Contact (Name & Phone Number).

21. REFERENCED SPECIFICATIONS BY OTHER ORGANIZATIONS
    A. When standard specifications of national organizations are referenced, the latest revision will be assumed, unless otherwise noted.
    B. Following is a list of organizations, by abbreviation, referenced in these specifications:
        1. AASHTO or AASHO.....American Association of State Highway and Transportation Officials
        2. ACI.....American Concrete Institute
        3. AISI.....American Iron and Steel Institute
        4. AISC.....American Institute of Steel Construction
        5. ANSI.....American National Standards Institute
        6. ASTM.....American Society for Testing and Materials
        7. AWS.....American Welding Society
        8. AWWA.....American Water Works Association
        9. CIPRA.....Cast Iron Pipe Research Association
        10. CS.....Commercial Standard
        11. MD.SHA.....Maryland State Highway Administration
        12. MD.SRC.....Maryland State Roads Commission (Synonymous with Maryland State Highway Commission)
        13. MIL.....United States Military
        14. NIST.....National Institute of Standards & Technology
        15. NCMA.....National Concrete Masonry Association
        16. NCPI.....National Clay Pipe Institute
        17. NEC.....National Electrical Code
        18. NFPA.....National Fire Protection Association
        19. PPI.....Plastic Pipe Institute
        20. UL.....Underwriter's Laboratories, Inc.
        21. USDA.....United States Department of Agriculture
        22. WPCF.....Water Pollution Control Federation
        23. IBC..... The International Building Code

22. GUARANTEE AND MAINTENANCE BOND
    A. Maintenance Bond:
        1. Unless otherwise specified in the Contract, the Contractor must post a Maintenance Bond, or the City will retain a percentage of the Contract cost for the maintenance warranty period;
        2. Contractor may post a Maintenance Bond for 5% of the Contract amount in lieu of a retained percentage during the guarantee period;
        3. When retained percentage is held for surety the guarantee period will begin after final acceptance by the City and notification from the Contractor that no Maintenance Bond will be posted.
        4. It will be the Contractor's responsibility to repair all items found unacceptable during the guarantee period, even if the Maintenance Bond expires before repairs are completed.

B. Repair items which are discovered during the guarantee period but are not repaired satisfactorily by the Contractor may be done by the City or the City's agent.
C. The cost of any Work required by the repairs, performed by the City or its agent will be charged to the Contractor's retained percentage or Maintenance Bond.
D. Unless otherwise specified guarantee period will last for two years from date of Final Acceptance and City's release of Retainage or receipt of Maintenance Bond.
E. In addition to any other guarantee obligation contained herein, the Contractor will be responsible for any settlement caused by improper compaction, backfill, or other project related Work and for any damage caused by such settlement during the full length of the guarantee period.

23. MAINTENANCE OF TRAFFIC

A. Prior to construction, the Contractor will designate and submit to the City the name of the person designated as the traffic manager for this Work.
B. The Contractor is required to submit a traffic control plan (TCP) to the City's Department of Infrastructure and Development for approval. Traffic control must be maintained at all times. The site specific TCP must be submitted on a separate 24" x 36" sheet with the approved 911 address. The TCP must be approved by the City's Department of Infrastructure and Development and will have a signature block for the Director of the Department of Infrastructure and Development in the lower right hand entering upon or approaching roadways maintained by either jurisdiction. The Contractor will be responsible for notification to all properties or businesses directly affected by detours or changes in traffic patterns before beginning of construction and as determined by City, at least 48 hours in advance of detour or change. The TCP sheet will include the following statement accompanied by a signature block containing the signature of a registered professional engineer or professional land surveyor (registered in Maryland):

1. "I hereby certify that this plan has been prepared under my supervision and in accordance with the 'Manual on Uniform Traffic Control Devices for Streets and Highways for Maryland' requirements, latest edition. I further certify that, to the best of my ability, the plan features the minimum amount of traffic disruption necessary to complete the Work in and along the public roadway."

C. Contractor will be responsible for all traffic maintenance and detouring. All signs, arrow boards, barricades, lights, flagmen, etc., needed for maintenance of traffic, will be furnished by the Contractor. All traffic control devices will be properly maintained to insure that the general public's safety is never jeopardized. All traffic control devices are to conform and adhere to those specified and set forth in the Maryland Department of Transportation "New Work Zone Traffic Control" and/or "Manual on Uniform Traffic Control Devices for Streets and Highways." This manual is approved by the U.S. Department of Transportation - Federal Highway Administration and a copy can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Any Contractor who is unsuccessful in obtaining this publication may review our office copy by visiting the Department of Infrastructure and Development, Government Office Building, 125 N. Division Street, Room 202, Salisbury, Maryland 21801.

D. No item has been included in the Bid Document for the aforementioned items and no additional payment will be made for them. Items will be incidental costs to the Contract.

24. SUBSTANTIAL COMPLETION

A. Upon completion of all Work under the Contract, including the Preliminary and Final testing of any equipment, the Contractor will request, in writing, Substantial Completion by the City.

B. Prior to this request, all specified operation and maintenance instructions and training will have been provided for the City personnel and all certificates, spare parts, test equipment, record drawings, and other items required to be delivered will have been provided.

C. Inspection Procedures: Upon receipt of Contractor's request, City Engineer will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, City Engineer will either prepare certificate of substantial completion, or advise Contractor of Work which must be performed prior to issuance of certificate; and repeat inspection when requested and assure that work has been substantially completed. Results of complete inspection will form punch-list for final acceptance.

25. COMPLETION OF PUNCH LIST ITEMS

A. At the time of Substantial Completion, the City Engineer and City will prepare a punch list of items remaining to be completed or corrected prior to final acceptance. The punch list will fix the time within which, and a retainage amount equal to one and one half times the estimated cost, for which such items will be completed or corrected. Said time is to be within the Contract Time.

B. Contractor will complete all items of Work on the punch list, plus any new items that may be added to it, as soon as possible after the date of Substantial Completion but within the Contract Time.

C. No partial payments or monthly progress payments will be allowed between the Substantial Completion Payment and the Final Payment.

26. FINAL ACCEPTANCE

A. General: prior to requesting City's final inspection for certification of final acceptance and final payment, as required by General Conditions, the Contractor will complete the following and list known exceptions:

1. Submit final payment request with final releases and supporting documentation not previously submitted and accepted. Include certifications where required;
2. Submit updated final statement, accounting for additional (final) changes to Contract Sum;
3. Submit copy of City's final punch list of itemized Work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance;
4. Submit Consent of Surety;
5. Submit all warranties;

6. Submit Maintenance Bond in amount of 5% of total Contract amount or City will hold 5% Retainage for guarantee period of two (2) years.

B. Re-inspection Procedure: upon receipt of Contractor's notice that Work has been completed, including punch-list items resulting from earlier inspections, and accepting incomplete items delayed because of acceptable circumstances, City will re-inspect work. Upon completion of re-inspection, City will either prepare certificate of final acceptance or advise Contractor of Work not completed or obligations not fulfilled as required for final acceptance. If necessary, procedure will be repeated.

C. The guarantee period starts with the date of Final Acceptance.

27. ERRORS OR OMISSIONS IN DRAWINGS AND SPECIFICATIONS

A. Should the Contractor find any errors or omissions in the specifications or other Bid Documents or should there be any conflict between such specifications or other Bid Documents, the Contractor will be required, prior to submission of the signed Bid Document, to notify the City in writing and to have such specifications or other Bid Documents explained and adjusted.

B. If such notice is not furnished to the City as herein provided, the Contractor will be deemed to have found such specifications or documents in proper form for execution and the Contractor will bear any costs of defect in the Work caused by such omission, error or conflict.

C. Where a conflict occurs between or with standards, specifications, drawings, codes, and ordinances, the more stringent or higher quality requirements will apply.

28. CONSTRUCTION STAKEOUT/SURVEYS/LINE & GRADE

A. The Contractor will, within the prices bid and without extra cost to the City, perform stakeout of line and grade required to properly construct the items shown on the plans and provided for in the specifications, including, but not necessarily limited to, the following efforts:

1. The general site Contractor will engage an independent, licensed, Maryland Professional Land Surveyor or Property Line Surveyor, qualified in various types of survey work specified herein. The surveying firm will have a trained staff large enough to perform the specified duties. Within fifteen (15) days after the award of the Contract, the Contractor will submit the name of his licensed, Maryland surveyor including his/her qualifications. The surveyor's duties will be as outlined herein;
2. Surveyor will survey, set, and maintain guide stakes required for earth movement and levels and will establish the baseline of construction. The Bid Documents may indicate a benchmark. The Contractor will use this benchmark in the execution of the Work;
3. Contractor is responsible for protection of stakes;
    a. Damaged stakes are to be replaced at Contractor's expense, or replaced by Contractor's engineer.
4. Contractor is responsible for detailed layout;

5. City will provide vertical control in the form of benchmarks. Work benchmarks are normally shown on the contract drawings. If the benchmark is not designated on the plan, it will be the Contractor's responsibility to obtain an approved benchmark from the City;
6. Copy of cut sheet (record of actual grade per station) will be provided to the City Engineer three (3) days prior to construction for approval by the City Engineer. Construction WILL NOT begin until the cut sheet(s) is approved in writing by the City Engineer;
7. The Surveyor will establish the locations and grades of all structures and establish the limit of disturbed area, in the field;
8. The surveyor will check grades, contours and levels throughout earth movement operation;
9. The surveyor will inform the City Engineer immediately if, during the survey, deviations from the Bid Documents are uncovered.

29. SEQUENCE OF CONSTRUCTION

A. The Contractor is responsible for all construction sequencing. The Contractor will submit and obtain approval of its detailed sequence of construction. Acceptance of this plan by the City Engineer or the City denotes only lack of objection at the time and in no way implies that the City Engineer or the City guarantees that particular sequence of construction as proposed by the Contractor will in fact work. Also, any approval given is done so with the stipulation that all Work done will comply with the plans and specifications.

B. As construction proceeds, should the Contractor's sequence of operation cause operational problems that were unforeseen at the time of approval, the City reserves the right to withdraw the previous approval and require the Contractor to submit and obtain approval of an amended Sequence of Construction.

30. CONSTRUCTION SCHEDULE

A. The Contractor will submit a construction schedule in accordance with the General Conditions, plotting work increments against time, indicating anticipated date of beginning and completion of each Work increment and indicating completion of all increments by the scheduled date. The Contractor will assign such work forces as are necessary to accomplish all increments of the Work within the time allotted on the construction schedule.

B. The Construction schedule will be submitted within ten (10) days after the effective date of the Contract. This schedule is in addition to any other schedule required under the General Conditions.

31. INTERFACE WITH EXISTING FACILITIES

A. Connections to existing pipes and structures will be scheduled and coordinated in advance with the City Engineer and City. It may be necessary to make connections during the night hours or weekends. No claim for extra compensation or extension of Contract time will be allowed on account of the necessity for connections to be made during normal

"off" hours. Permission of the City Engineer and City will be obtained by the Contractor prior to making any connections to existing systems.

B. When the Contractor desires certain electrical and/or mechanical functions to be interfaced, it will inform the City Engineer, in writing, a minimum of five (5) working days prior to the date the Contractor desires those interfaces to be made. The Contractor will not alter the settings of or connect or disconnect any electrical or mechanical equipment without the approval of the City Engineer.

32. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Shop drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills or material and other data prepared by the Contractor, Contractor's subcontractors, suppliers or manufacturers which illustrate the manufacturer, fabrication, construction and installation of the Work, or a portion thereof.

B. All costs necessary for compliance with the requirements of this Section of the specifications will be included within the Vendor's submittal price.

C. Detailed shop drawings, data, literature for fabricated materials or equipment to be incorporated in the Work will be submitted to the City Engineer for review for general compliance with the Bid Documents before fabrication. The Contractor will obtain and check manufacturer's shop drawings, certified prints, and other pertinent data for conformance with all requirements of the Plans and Specifications and in ample time to permit satisfactory progress of the Work. After completion of such checking and verification by the Contractor, the Contractor will sign or stamp such drawing, which stamp will state as follows:

Checked by _____
(Contractor's Name)

Signed by _____
(Checker's Name)

D. All data, shop drawings, and correspondence from subcontractors, manufacturers or suppliers will be routed through the Contractor. The City will review only such data and details as are sent by the Contractor. All correspondence, including shop drawings, data, and literature for fabricated materials or equipment will comply with the following requirements: it WILL BE submitted to the City for review, clearly labeled with the title of the product/service which is being submitted and the specific corresponding specification section, part, sub-part, paragraph, or drawing sheet and detail listed, as applicable. Failure to include all relevant identification information will be cause for the submittal to be returned to the Contractor without it having been reviewed.

E. All shop drawings will be in conformity with all requirements of the plans and specifications. All shop drawings except diagrams, brochures, schedules, and illustrations will be to an appropriate scale, no smaller than 1/8 inch = 1 foot 0 inches, and will give all dimensions necessary for installation and incorporation in the Work. All shop drawings will

be accurate and complete, showing outline and section views, details, materials, accessories, appurtenances, and related items. Shop drawings showing piping and conduit systems will incorporate sufficient views to show all fittings and specialties including locations and spacing of hangers and supports. Piping and/or conduit systems 3-inches in diameter and smaller may be shown as a single line. Equipment and specialties installed within and/or connected to piping and conduit systems will be cross-referenced to equipment and specialty shop drawings by shop drawing identification number, manufacturer name, catalog or model number and equipment numbers shown on the plans. Electrical shop drawings will include, but are not necessarily limited to, complete terminal identification diagrams and schedule, complete point-to-point interconnection diagram, complete single line and elementary wiring diagrams, for all power, signal, control and lighting systems, together with panel layout drawings. Terminal point and wire identification on all working drawings will be identical to related terminal point and wire identifications on equipment and panels, and absolutely no deviation from this requirement will be permitted.

F. The Contractor will submit to the City a minimum of eight (8) copies of shop drawings and approval data plus any additional number required for the Contractor's use. The City will retain four (4) copies of each submittal and return four (4) copies to the Contractor. The City's notation of the action taken will be noted on all of the returned copies. At the time of each submission, the Contractor will call to the City's attention, in writing, any deviations that the shop drawings may have from the requirements of the Plans and Specifications.

G. Upon review by the City of the above drawings, lists, specifications samples and other data the same will become a part of the Contract, and the fabrications furnished will be in conformity with the same, provided that the review of the above drawings, lists, specifications sample, or other data will in no way release the Contractor from its responsibility for the proper fulfillment or the requirements of the Contract.

H. Corrections or comments made on the shop drawings during the City's review do not relieve the Contractor from compliance with the requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the Work and general compliance with the information given in the Bid Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, and in performing its work in a safe manner. If the shop drawings deviate from the Bid Documents, the Contractor will advise the City of the deviations, in writing accompanying the shop drawing, including the reasons for the deviations, and will request deviation from the Bid Documents.

I. The shop drawings are intended to be utilized by the Contractor for additional fabrication, assembly and erection data. The shop drawings do not change or supersede the Plans and Specifications except in specific cases when the Contractor requests in writing and receives approval in writing for a deviation from the Plans and Specification. The Contractor's request for a change will give, in detail, the specific change requested and will state the reason for the change. Changes requested by the Contractor and approved by the

City will not be construed to include approval of any change except the changed details specifically requested and approved.

J. The Contractor will also submit to the City for review with such promptness as to cause no delay in Work, all samples required by the Bid Documents. All samples will have been checked by and stamped with the approval of the Contractor, identified clearly as to material, manufacturer any pertinent catalog numbers and the use for which intended.

K. The Contractor's attention is specifically directed to the fact that no Work will be fabricated, nor equipment or materials ordered, nor any construction performed, prior to approval by the City of shop drawings applicable thereto. Construction performed in violation of this requirement will be neither approved nor certified for payment until applicable shop drawings have been submitted and approved. If the City so directs, the Contractor will disassemble and remove any such construction performed prior to approval by the City of shop drawings applicable thereto, and the Contractor will be allowed no additional compensation or extension of Contract time. If any equipment or materials are ordered by the Contractor prior to submission and approval of shop drawings, he does so at its own risk.

L. It will be the responsibility of the Contractor to make all necessary changes in other items, which result from deviations or changes requested by the Contractor and approved by the City, so that all items perform the requirements and intent of the Bid Documents.

M. After review by the City, shop drawings will be returned to the Contractor marked as follows: APPROVED, APPROVED AS NOTED, REVISE AND RESUBMIT, OR REJECTED. Unapproved shop drawings (i.e., REVISE AND RESUBMIT or REJECTED) will be returned to the Contractor for necessary modifications: only two (2) copies of unapproved shop drawings will be returned. Subsequently, the Contractor will submit a minimum of eight (8) copies of complete, revised shop drawings to the City for approval.

N. Within fourteen (14) days of the pre-construction conference, the Contractor will submit a list of all shop drawings to be submitted. This list will include the title of the product/service which is being submitted and the specific corresponding specification section, part, sub-part, paragraph, or drawing sheet and detail, as applicable. This list can then be used as a check to ensure that all items are submitted.

O. Timing of Submittals:

1. Make submittals promptly and in such sequence as to cause no delay in the Work;
2. In scheduling, allow fifteen (15) working days for City's review of Mechanical and Electrical shop drawings following receipt of the submittal. Allow 10 working days for City Engineer's review of all other shop drawings following receipt of the submittal;
3. Delays caused by tardiness in receipt of submittals will not be an acceptable basis for extension of the Contract Time.

33. OPERATION AND MAINTENANCE MANUALS FOR EQUIPMENT AND PRODUCTS

A. General:

1. The Contractor will furnish Operation and Maintenance Manuals for all products and equipment provided under the Contract;

2. Prior to completion of the Work, and at least thirty (30) days prior to the 50% payment, the Contractor will furnish for the City Engineer's review three (3) Operation and Maintenance Manual draft copies;

3. Prior to completion of the Work, and at least sixty (60) days prior to the 85% payment, the Contractor will furnish for the City Engineer's review three (3) copies of the final Operation and Maintenance Manual. The final manual must be approved by the City Engineer before a final inspection of the Work will be conducted and prior to the issuance of the Certificate of Substantial Completion.

B. Manual Preparation:

1. Manuals will include operation and maintenance information on all systems and items of equipment. The data will consist of: catalogs, brochures, bulletins, charts, schedules, approved Shop Drawings corrected to as-built conditions and assembly drawings and wiring diagrams describing location, operation, maintenance, and other information necessary for the City to establish an effective operating maintenance program. The following data will also be included:

a. Title page giving name and location of facility, Contract Drawing Nos. where shown and Specification Section where described;

b. Performance curves for all pumps and equipment;

c. Approved Shop Drawings of each piece of equipment;

d. Manufacturer's cuts and dimension drawings of each piece of equipment and details of all replacement parts;

e. Manufacturer's erection, operation and lubrication instructions for all equipment and apparatus, and complete listing of nameplate data;

f. Complete wiring diagrams of all individual pieces of equipment and systems including one line diagrams, schematic or elementary diagrams, and interconnection and terminal board identification diagrams;

g. Complete piping and interconnecting drawings;

h. Complete parts list with parts assembly drawing (preferably by exploded view,) names and addresses of spare parts suppliers, recommended list of spare parts to be kept "in stock" and sample order forms for ordering spare parts. Lead time required for ordering parts will be estimated;

i. Instructions with easily understood schematics or diagrams for disassembling and assembling the equipment for overhaul or repair;

j. The Contractor will complete the three Forms A, B and C entitled "Equipment Registration, Parts List, and Maintenance Procedures Sheet" for each piece of equipment furnished under the Contract. These forms will be included in the Operation and Maintenance Manual at the proper place.

i. All items listed above that are of a sheet size of 8-1/2 by 11 inches or can be folded (no more than twice) to this size will be bound in 4 inch maximum loose-leaf three-ring-d-post type binders with black plastic-coated covers. The contents will be fully indexed.

ii. Shop Drawings 24" by 36" in size will be folded to approximately 12" by 9" with drawing title box exposed along either edge. Shop Drawings descriptive of

a single item of equipment will be grouped together. All Shop Drawings will be placed in accordion-type folders, and fully indexed on the outside of the folders in a neat and uniform manner.

iii. All Shop Drawings included in the binders and/or folders will be those copies previously submitted for review and approval and will bear the City Engineer's stamp of approval and comments as originally noted thereon.

C. Approval:

1. Subsequent to the City Engineer's approval and return of the final manual, the Contractor will submit four (4) complete sets of manuals to the City Engineer;

2. Substantial Completion certification will not be undertaken until approved Operation and Maintenance Manuals have been submitted. Partial approvals of the final manual will not be made;

3. Delivery of manufacturer's service (O&M) manuals and installation instructions satisfactory to the City Engineer is an essential part of the equipment delivery. Incomplete or inadequate manuals will be returned for correction and/or resubmission.

34. AS-BUILT DRAWINGS

A. During the progress of the Work, the Contractor will keep a careful record at the job site of all changes and corrections to the information shown on the Drawings. The Contractor will enter such changes and corrections on one set of Contract Drawings immediately. The as-built drawings will indicate, in addition to all interior changes and corrections, the actual location referenced from two permanently fixed surface structures of all subsurface utilities installed or uncovered by the Contractor. At the time of beneficial occupancy of each facility involved under the Contract, the Contractor will submit to the City one set of as-built drawings showing the aforementioned data. If the Contractor fails to maintain the as-built drawings as required herein, final payment, with respect to the Contract as a whole, will be withheld until proper as-built drawings have been furnished to the City.

B. The Contractor will keep one copy of all Contract Drawings and approved Shop Drawings at the site in good order with redlined revisions and annotated notes to show all changes made during the construction process. These will be available to the City and will be delivered to the City upon completion of the Work.

C. Contractor will submit final as-built drawings in Computer Aided Drafting (CAD) form, using the ACAD–Release 2010 or earlier, conforming to standards outlined in the Construction Standards and submittals, one Mylar copy, and one paper copy of same.

35. CONTRACTOR SAFETY REQUIREMENTS

A. SAFETY: the Contractor will comply, within the bid price and without extra cost to the City, with all safety regulations or determinations issued by any agency of the Federal Government, including OSHA, the State of Maryland, and the City.

B. Before a Notice to Proceed is issued for any Work, the Contractor must provide to the City a site specific safety plan, material safety data sheets, and a hazardous communication policy. These items will be reviewed by the City. No Work may begin until these items have been provided.

C. Contractor must also designate an on-site safety contact person from their company. This person must be available at all times.

D. Contractor must provide all subcontractors with a copy of this requirement. Adherence is required of all subcontractors, regardless of tier.

E. A representative of the Contractor and applicable subcontractors must be present at all site progress meetings.

F. Failure to comply with these requirements could result in a finding of DEFAULT on the part of Contractor.

G. The Contractor will promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Bid Documents) to property referred to in Item B as the Work caused in whole or in part by the Contractor, a subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible.

H. In an emergency affecting safety of persons or property, the Contractor will act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency will be determined by the City.

36. SEDIMENT CONTROL

A. Contractor is responsible for control of erosion due to the Work.

B. Wire mesh, filter cloth, and stone will be placed around all storm water inlet structures for protection until such areas are stabilized.

C. Pipe outfalls will be protected by silt fence and filter cloth.

D. Sediment control will be in accordance with "Standards and Specifications for Soil Erosion Control, and Sediment Control in Developing Areas" by USDA Soil Conservation Service.

E. Sediment Control Plan, latest revision, will be approved by the Soil conservation Service BEFORE the start of Work.

37. SUBSURFACE INFORMATION

A. Test borings by City will be open to Contractor's inspection when available.

B. Test borings by Contractor are subject to City approval of location and type of exploration.

C. Testing of materials will be made at the Contractor's expense, by a certified testing laboratory.

D. The Contractor will cooperate with and assist the City in taking samples and packing them for shipment to a laboratory.

38. CHANGE ORDERS & UNAUTHORIZED WORK

A. No claims may be made by anyone that the scope of the project or the Contractor's services have been changed (requiring changes to the amount of compensation to the Contractor or other adjustments to the Contract) UNLESS such changes or adjustments have been made by an approved, written amendment (change order) to the Contract, signed by

the Director of Procurement (and the City Council, if required), prior to extra Work being initiated.

B. Extra Work performed without the City's approval of lines and grades, Work performed beyond the lines and grades shown on the drawings or as given, and extra Work performed without prior, approved, written Change Order will be considered unauthorized, and at the expense of the Contractor. Such Work will not be measured by the City, nor will payment be made by the City. Work so performed may be ordered removed by the City and replaced at the Contractor's expense.

C. No oral conversations, agreements, discussions, or suggestions which involve changes to the scope of the Contract made by anyone, including any City employee, will be honored or valid.

D. No written agreements or changes to Contract made by anyone, including any City employee, other than the Director of Procurement (with City Council approval if required) will be honored or valid.

39. VARIATIONS IN ESTIMATED QUANTITIES

A. Where the quantity of a pay item in any City contract is an estimated quantity and where the actual quantity of such pay item varies more than twenty-five percent (25%) above or below the estimated quantity stated in the Contract, an equitable adjustment in the Contract price will be made upon demand of either party. The equitable adjustment will be based upon any increase or decrease in costs due solely to the variation above one hundred twenty-five percent (125%) or below seventy-five percent (75%) of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the City Department of Infrastructure and Development Engineer will, upon receipt of a written request for an extension of time within ten (10) days from the beginning of the delay or within a further period of time which may be granted by the City Department of Infrastructure and Development Engineer before the date of final settlement of the Contract, ascertain the facts and make the adjustment for extending the completion date as in his/her judgment the findings justify.

40. DIFFERING SITE CONDITIONS

A. The Contractor will promptly, and before such conditions are disturbed, notify the City Department of Infrastructure and Development Department Engineer in writing of (1) subsurface or latent physical conditions at the site differing materially from those indicated in the Contract, or (2) unknown physical conditions at the site of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in Work of the character provided for in the Contract. The City Department of Infrastructure and Development Engineer will promptly investigate the conditions, and if he/she finds that such conditions do materially differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work

under the Contract, whether or not changed as a result of such conditions, an equitable adjustment will be made and the Contract modified in writing accordingly.

B. No claim of the Contractor under this clause will be allowed unless the Contractor has given the notice required in (A) above; provided, however, the time prescribed therefore may be extended by the City.

C. No claim by the Contractor for an equitable adjustment hereunder will be allowed if asserted after final payment under this Contract.

END OF SECTION

UTILITY DESIGN GUIDELINES

Latest revision 01-02-18

Page

UTILITY DESIGN GUIDELINES

Latest revision 01-02-18

Foreward: The following design information contains guidelines relating to some of the most commonly asked questions submitted to the City by various persons in the process of designing utilities inside the Salisbury City Limits. This information in no way intends to cover all aspects of design of any item or process. The City of Salisbury Department of Infrastructure and Development should be contacted when questions arise which are not covered in the design guidelines listed in this specification booklet. See City of Salisbury "Construction Standards" manual for standard details. In case of conflict with other specifications or standards, the City of Salisbury shall be contacted by the designer to resolve the difference. The following design criteria refer to utilities, which will be accepted by the City for ownership and/or maintenance. These guidelines are subject to future modifications and revisions based upon operational experience and technological development.

1. BENCHMARKS

   A. All utilities shall be established, designed, and constructed using City of Salisbury vertical datum available at the City Infrastructure and Development.
   B. The developer shall establish a City approved project benchmark for utility construction. This should be shown and/or referenced on the contract plan. All utilities shall be established, designed, and constructed using the project benchmark.

2. HORIZONTAL CONTROL

   A. All horizontal control shall be established, designed, and constructed using the Maryland State Coordinate system datum, 1927 NAD.
   B. The City will supply horizontal control datum, when requested.

3. ESTIMATING UTILITY QUANTITIES

   A. Developer shall submit quantities to the City, using a format established by the City. Estimate examples are available at the City Infrastructure and Development Department.
   B. The City reserves the right to establish prices on some items to avoid unbalanced bidding procedures.
   C. The City estimates trench materials i.e.; borrow, unsuitable material removal, pea gravel, using total trench volumes.

4. CITY UTILITY CONTRACT PLAN DRAWINGS

   A. Shall be drawn similar to as-built contract drawings currently on record in the City Infrastructure and Development Department.

B. Generally shall be drawn using 1"= 40' horizontal scale, 1" = 4' vertical scale for profile or 1" = 50' horizontal scale, 1" = 5' vertical scale for profile. City Engineer must approve other scales.
C. Shall be drawn on 11" x 25" reproducible Mylar.
D. Shall use City contract border, which shall not be altered, and City conventional signs and format. See standard detail 600.21.
E. Developer shall submit final utility contract plan in Computer Aided Drafting (CAD) form using the ACAD – Release (Varies). Contact City for the latest CAD release number. A diskette is available, to the developer, which has a file containing the format for the borders of a blank City contract plan using ACAD. When using computer option, developer must send draft version of plan (on paper) to City for review before sending final plan in ACAD form.
F. All water utility valves and valve boxes, including main line, fire service, combination fire/domestic, fire hydrant, tapping valves and domestic service valves (1 ½" and above) shall be stationed and shown on the contract drawings.
G. All water meter pits and vaults shall be stationed and shown.
H. All water and sewer utility fittings shall be stationed and shown.

5. UTILITY CONTRACT AS-BUILT

A. All utilities which will be owned or maintained by the City, or which are located in a City R/W, easement, street bed, etc. shall be as-built on the contract plan after construction.
B. The developer's approved utility contractor performing the work shall provide a contract plan showing any changes to the original signed and approved contract drawings, such as but not limited to, changed stations and additional fittings.
C. Accurate and reliable "as-built drawings" shall be provided to the City of Salisbury. A registered land surveyor or professional engineer shall do these drawings and have their State of Maryland stamp on them. In our view the "as-built drawings" must depict the work actually accomplished under the specific project. The practice of placing a note on the construction plans, changing the tense of instructions or otherwise generalizing that all work has been accomplished as shown on the construction plans, does NOT satisfy the requirement for an accurate record of the work "as-built". An accurate record of the in-place facilities is essential. The "as-built drawings" shall reflect actual sizes, grades, inverts, elevations, profiles and cross sections, stations of all water distribution, wastewater collection and storm water system pipes, fittings, services, valves, sewer laterals, manholes, hydrants and other relevant information.
D. Shall be drawn similar to as-built contract drawings currently on record in the City Infrastructure and Development Department. All as-built contract drawings shall follow specifications noted herein.

6. DESIGN CRITERIA CALCULATIONS FOR WATER AND SEWER

Shall include the following:

A. Present population to be served.
B. Projected future population to be served.
C. Average daily flows.
    1. Domestic
    2. Commercial
    3. Industrial
    4. Others
D. Peak flows
E. Design hydraulic flow
F. Value of "n" used for applications to the Manning's formula.
G. Diameters and slopes of the critical sewers (with minimum hydraulic capacities) between specified manholes.
H. Hydraulic capacities of the critical sewers.

7. PERMITS

A. Contractor/Developer is responsible for obtaining all necessary permits for the project from agencies outside of City jurisdiction including but not limited to:
    1. State Highway Administration
    2. Maryland Department of the Environment (NOI, Water/Sewer Construction)
    3. Wicomico County Soil Conservation District (Sediment and Erosion Control)
    4. Forest Conservation
    5. Critical Areas
    6. Floodplain Alteration

8. CUSTOMER SERVICE FOR WATER & SEWER

A. The City will allow one water service with meter and one sewer service per building. If one person owns two or more buildings on one lot, these buildings may be required to be connected jointly or independently to the public water supply and public sewer system. If the lot is subdivided, any residential or commercial building on a subdivided lot shall be connected directly and independently to the public water supply and sewer system, respectively.

9. SANITARY SEWER

A. Flow: The sewer capacity should be greater than or equal to design hydraulic flow.
B. Minimum Size

1. No sewer main shall be less than 8" in diameter.
2. No sewer laterals (from sewer main to property line at street) shall be less than 6" diameter.

C. Depth
1. Depth of gravity feed mains vary, but the top of the sewer main shall be lower than the bottom of the accompanying water main. The depth of the gravity main should allow for a minimum of 1/4"/ft slope from the customer's sewer service line at the structure. Depth shall not be less than or deeper than manufacture's recommendation for the type material used. See below, concerning sewers which cross or parallel water mains.
2. Laterals shall be placed at depths specified in Construction Methods - Utilities of this manual.

D. Slopes
1. All sewers shall be designed and constructed to provide mean velocities when flowing full, of not less than 2.0 feet per second. Based on Manning's formula an "n" value shall be determined, by the pipe manufacturer, per pipe construction material.
2. In flat areas where excessive excavations are needed to maintain minimum slopes, slopes slightly less than those required for the 2.0 feet per second velocity when flowing full may be permitted.
3. Percent of grade shall be designed to the center of each manhole and shall have only one (1) elevation per manhole, unless the sewer main changes size.

E. Alignment
1. Sewers should be laid with straight alignment between manholes.
2. Except on curved streets and where it is not possible, the sewer mains shall be laid parallel or perpendicular to the street, building, or other prominent features, and/or parallel to the water mains and storm drain utilities. Skewed alignment of mains and laterals is not permitted.

F. Size Change: When a smaller pipe joins a larger one, the tops of the mains should be placed at the same elevation, causing the larger pipe to always have a lower invert. The larger pipe shall be in the downstream direction.

G. Materials
1. Pipe materials shall be specified by the City. See Sewer Material specifications of this manual.
2. No recycled Polyethylene materials shall be allowed.

H. Manholes & Clean-outs
1. Manholes: See "Construction Standards" manual
   a. Locate at the end of each sewer main; at all changes in grade, size or alignment; at all sewer main intersections; and at distances not greater than 400'.
   b. Drop connections may be required when the inlet pipe elevation

exceeds the manhole invert.

c. Watertight manhole inserts shall be used on all sanitary sewer manhole frames.

d. Steps shall be required in all manholes.

e. Stubs for future use are not permitted.

f. A maximum of four pipe penetrations permitted in a manhole.

2. Street Clean-outs: Street type Clean-outs may be constructed at the end of sewer mains when approved by City.

3. Customer Clean-outs

a. Required at all customer service laterals

b. When service is extended from a sewer main located in a City street, the customer clean out should be located 2’ back of sidewalk or 2’ back of street R/W if sidewalk is not required.

c. Additional clean-outs to building may be required by Plumbing Inspector.

I. Protection of potable water supply.

1. Clearances: Where specified crossing clearance cannot be obtained, sewer pipe shall be encased in concrete 10' each side of water main. For crossings of other utilities, sewer shall be encased with limits of the utility trench. See "Construction Standards" manual for encasement details. Design engineers shall investigate clearance between sewer and other utilities, both existing and future.

a. Sewers crossing water mains shall have a minimum clearance of 12" below water main or shall be encased.

b. Sewers, which are parallel to water mains, and are less than 10' apart sewer shall be 6' below water main or shall be encased.

c. Sewers shall have minimum of 6" clearance when crossing other utilities.

J. Force Mains.

1. Material

a. Ductile Iron

b. C-900 PVC

c. Extra high molecular weight high-density polyethylene, (HDPE).

2. Depth: 42" to top of main unless otherwise approved by City Engineer.

3. Access manhole: See "Construction Standards" manual.

4. Air valve access manhole: See “Construction Standards” manual, at all high points.

5. Minimum size shall be 4”

6. Testing: The force main shall be tested in accordance with City “Testing Procedures” in this manual.

10. WATER MAIN

A. Domestic Service to Customer
   1. See "Construction Standards manual" for various services.
   2. City of Salisbury designates size of meter based on Water Customer Data Sheet submitted to the Infrastructure and Development Department. Water service size is to be designated by developer and shown on site plans and contract drawings.
   3. Water meter type designated, supplied and installed by the City.
   4. Locate meter pits and vaults in center of sidewalk when possible or locate next to curb in grass plot.

B. Fire Service to Customer
   1. City of Salisbury designates size of meter (when fire service is metered) based on demand requirements provided by developer and submitted to the Infrastructure and Development Department fire service line size determined by developer based on fire system demand and code requirements. Fire service line and valve shall be shown and stationed on site plan and contract drawing. Fire service stubs installed to serve unimproved lots where future demand is unknown shall be 4" minimum. Metered fire service not recommended. When approved, fire service meter shall be shown on site plan and contract drawing.
   2. Water meter (when applicable) supplied and installed by the City.
   3. Combination domestic/fire service is recommended in most situations. See "Construction Standards" manual.
   4. High pressure (pumped) mains shall be separated from other fire or domestic mains. Designate on plan.

C. Minimum Size
   1. No water main shall be less than 6" in diameter.
   2. Water mains shall normally be 8" minimum diameter, except 6" diameter hydrant leads and short sections of 6" diameter dead end mains may be allowed.
   3. No water service shall be less than 1" diameter.
   4. Minimum 4” water service for all commercial, unimproved lots.

D. Depth: Depth of water mains shall be 42" from the finish grade to the top of the water main unless otherwise approved by City Engineer.

E. Alignment
   1. On curved streets, water mains must be laid using bends to achieve alignment. Deflection of water mains shall be per the Water Main Materials section of the City of Salisbury’s Construction & Material Specifications for Utility & Roadway Construction.
   2. Water mains shall be laid parallel or perpendicular to the street, building or other prominent features and/or parallel to the sanitary sewer mains and

storm drain utilities. Skewed alignment of mains and services is not permitted.

F. Materials
   1. Pipe materials shall be specified by the City. See Water Material specifications of this manual.
   2. No recycled polyethylene materials shall be allowed.
   3. ANSI/NSF Standard 61 certification shall be required for all components that come in contact with drinking water.

G. Protection of potable water supply – Clearances
   1. Where specified crossing clearance, 12”, cannot be obtained, sewer pipe shall be encased in concrete 10' each side of water main. For crossings of other utilities, sewer shall be encased with limits of the utility trench. See "Construction Standards" manual for encasement details. Design engineers shall investigate clearance between sewer and other utilities, both existing and future.
   2. Sewers crossing water mains shall have a minimum clearance of 12" below water main or shall be encased.
   3. Sewers which are parallel to water mains and are less than 10' apart sewer shall be 6' below water main or shall be encased.
   4. Water mains shall have minimum of 6" clearance when crossing other utilities.

H. Hydrants
   1. See "Construction Standards" Manual and the Construction and Material Specifications Manual, Water Main Materials and Construction Methods sections.
   2. Hydrants shall be spaced a maximum span of 500' apart, based on the lay of fire engine hoses. Obstacles, which may cause a barrier for laying of hoses, must be considered for the placement of hydrants. Distance shall be around pedestrian obstacles. Maintain 3-ft. clearance from center of hydrant for all above ground objects. Hydrant lead shall be ductile iron pipe. Hydrants shall not be placed in the quadrant/radius area of a curb return for street intersections and driveway entrances.
   3. Hydrant tee and 6" valve required at all hydrants.

I. Blow-off Hydrants
   1. Shall be required at all dead-end lines, which extend past the last customer service and do not have a fire hydrant past the last customer service.
   2. Shall be required at all dead-end lines, which do not have a hydrant within 100' of termination of water main.
   3. See "Construction Standards" manual.

J. Main line Valves
   1. See "Construction Standards" manual
   2. Shall be located at all hydrant tees, intersections (one valve for main line and

one valve for each direction branching off from main line), terminations of mains, fire services and at some customer services. Valves shall be spaced with consideration for emergency shut-off of customers, so as to cause the least amount of inconvenience to the customer. Valves shall be placed so that emergency repairs may be isolated on a block-by-block basis.

3. Shall be located at new customer services using a main line tee (or tapping tee) and service is constructed of ductile iron or PVC material.
4. All valves shall be shown and stationed on site plan and contract drawing.
5. All branch valves shall be installed as close to the branch point as practical.
6. Use ductile iron mechanical joint swivel tees whenever possible.

11. STORM DRAIN UTILITIES

A. Flow: The storm drain pipe capacity should be greater than or equal to design hydraulic flow.
B. Minimum Size: No storm drain pipe shall be less than 15" in diameter.
C. Depth
   1. Depth of pipes varies, but should not be less than manufacturers recommendation for the type of material used.
   2. Minimum cover for Class IV RCP shall be 24”.
   3. Minimum cover for Class V RCP shall be 12”.
D. Design Procedure
   1. General: All design information including drainage area delineation; time of concentration flow path delineation and all calculations shall be submitted to the City Engineer's office for review. Any deviation from the methodologies explained below shall be subject to approval of the City Engineer's office.
   2. Hydrology
      a. The Rational Method shall be used for all hydrologic computations. Refer to the latest edition Maryland State Highway Administration's Highway Drainage Manual for procedural details.
      b. All storm drain inlets shall be designed to limit gutter spread in accordance with the latest edition of the Maryland State Highway Administration's Highway Drainage Manual. All closed storm drain systems shall be designed to convey the 10-year storm without surcharging.
   3. Hydraulics: The Manning’s Formula shall be used for friction loss computations. "N" value shall be in accordance with those values listed in the latest edition Maryland State Highway Administration's Highway Drainage Manual. All closed storm drains shall be designed to provide a minimum full flow velocity of 2.0 feet per second. Minor losses shall be estimated in accordance with the procedures and values contained in the latest edition Maryland State Highway Administration's Highway Drainage

Manual.

4. Slopes
    a. Percent of grade shall be designed to the center of each manhole on smaller diameter pipe and shall have only one (1) elevation per manhole. Larger diameter pipe may require more than one invert per manhole. Changes of pipe direction will require inverts designated at each pipe.
    b. Submission of data and calculations shall be on standard forms found in the latest edition of the Maryland State Highway Administration's Highway Drainage Manual.

E. Alignment
1. Storm drain pipes should be laid with straight alignment between manholes.
2. Except on curved streets and where it is not possible, the storm drain pipes shall be laid parallel or perpendicular to the street, building, or other prominent features, and/or parallel to the water mains and sanitary sewer utilities. Skewed alignment of storm drain pipes is not permitted.
3. Inlets should not be used as a junction (manhole) except for small diameter pipe utilized for inlet leads, normally placed perpendicular to main line or street.

F. Size Change: When possible, where a smaller pipe joins a larger one, the tops of the mains should be placed at the same elevation, causing the larger pipe to always have a lower invert. The larger pipe should be in the downstream direction.

G. Materials: Pipe materials shall be specified by the City. See Storm Drain Material specifications of this manual.

H. Manholes
1. Manholes: See "Construction Standards" manual
    a. Inlets should not be used as junctions (manholes), except for smaller diameter pipes, normally placed perpendicular to street.
    b. Locate manhole at the termination of each storm drain, unless end is open outlet or open inlet; at all changes in grade, size or alignment; at all storm drain intersections; and at distances not greater than 400'.
    c. Stubs for future use are not permitted.

I. Inlets
1. See "Construction Standards" manual.
2. Unless otherwise approved, use type "A-1" inlet(s) at low points (sump conditions).
3. Unless otherwise approved, use type "NR" open throat inlet(s) as a pickup inlet in a non-low point condition.
4. Inlet protection requirements for sediment control must be adhered to during construction.

12. ROADWAY

A. Intersecting streets or driveways: The gradients of intersecting streets should be as flat as possible on those sections that are to be used for storage space for stopped vehicles. Grades in excess of 3% may not be allowed on the landing grade (first 50 feet) of administration. This allows for a normal maximum grade break of 5% between the normal 2% preference road cross slope and the profile grade of the non-preference road. Grades beyond the landing grade shall be in accordance with currently accepted engineering practices, but may not exceed 6%.

UTILITY CONSTRUCTION METHODS

Latest revision 01-02-18

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1. EXCAVATION

   A. Excavate to lines and grades shown on drawings:
      1. Contact "Miss Utility" at least 48 hours prior to excavating.
      2. All excavation to be open cut. Protect trench walls as required for safety.
      3. Trenches to be excavated by hand or machine at contractor's option.
      4. Saw pavement before opening trench. See Specifications section entitled Roadway Repair. Hand excavation may be required by City Inspector at any time and Contractor will not be permitted any extra compensation for hand excavation.
      5. Any excavation beyond standard trench width shall be included in Contractor's price bid per linear foot of pipe.
   B. Material excavated on the job which is unsuitable for backfill shall be removed and disposed of by Contractor in an approved manner:
      1. The unsuitable material is defined as clay, wet soil, silt, etc., which would not, in the City Inspector's opinion, provide adequate pipe bedding and compact properly.
      2. Removal and disposal of unsuitable material are included in the proposal as a separate bid item.
   C. If directed by City Inspector, the excess suitable material shall be stockpiled for use on the project. No additional payment will be made for additional handling. When directed by City Inspector, excess suitable material remaining on the project after completion of work may be removed by the City at no charge to the Contractor.
   D. Excavation is unclassified and includes material of all character, type or condition.

2. REMOVAL AND/OR STORAGE OF SURFACE MATERIALS

   A. Contractor shall clear, grub and dispose of cleared materials as necessary to complete construction. Unless otherwise specified, this shall be considered incidental to construction costs.
   B. Upon authorization of City Inspector, suitable paving materials removed from excavated area may be stockpiled for re-use by the Contractor as trench stabilization.
   C. If directed by City Inspector, topsoil shall be stockpiled for later re-use or removal by the City at no extra charge to the Contractor.

3. SALVAGE OF MATERIALS

   A. Materials suitable for re-use shall be stockpiled as necessary for the proposed construction.
   B. All salvaged materials are the property of the City unless declared by the City Inspector to be unsuitable for re-use.

C. The Contractor is responsible for removal and disposal of all unsuitable material.
D. Contractor shall have no rights to any materials except upon direction or written permission of the City Inspector.
E. All salvaged material retained by the City shall be delivered to the City Service Center by Contractor.

4. RELOCATION OF STRUCTURES

A. Poles and other structures in the City Right-of-way shall be moved by others when their presence does not permit construction or future maintenance of this project.
B. Contractor shall support and preserve as necessary all poles, structures and other property as required to construct the project.
C. Contractor shall not be entitled to recover damages caused by delay in the relocation of structures by others.
D. Contractor shall not disturb property outside City Right-of-way unless he receives written permission from property owner.

5. TRENCH DIMENSIONS

A. Per standard details or as directed by City Inspector.
B. Protect trench in accordance with MOSHA requirements.
C. Construct to minimize loads on the pipe as authorized by City Inspector.

6. PIPE LAYING

A. Construct to the line and grade shown on drawings or per City Inspector instructions.
B. Provide materials in accordance with drawings and specifications.
C. Construct pipelines in accordance with the best workmanship and quality of the industry.
D. Pipe interior including bell and spigot ends to be kept free of dirt and debris.
E. Cut pipe where required:
    1. Ends to be finished smooth, where required.
    2. No extra compensation for pipe cutting.
F. Pipe shall not be placed on the frozen foundation.
G. Plug lifting holes in RCP with approved non- shrink grout.
H. Provide pipe bedding in accordance with City Standard Details.
I. Plug pipe ends upon completion of work each day.
J. Cover on all water mains shall be (42) forty-two inches unless otherwise noted on City approved Plans.
K. Operating Nuts on valves shall have a maximum depth of 48” and a minimum depth of 24” from the top of the nut to the finish grade.

L. Pipe shall be installed with the minimum amount of joints possible. Sleeves and/or repair couplings will not be permitted, except in facilitation of tying into existing pipe.
M. Begin laying gravity sewer and storm drain pipe at the lowest point and install the pipe so that the spigot ends point in the direction of flow.
N. Pipe joints are not permitted within the interior of any doghouse manhole. No pipe joints are permitted within 2' from any exterior wall of any doghouse manhole.

7. REFILLING OF TRENCH (BACKFILLING)

A. City Inspector may require the contractor to backfill at any time, no extra cost permitted.
B. The only suitable material shall be used in backfilling trenches.
C. Backfill shall maintain pace with pipe laying and shall be brought to subgrade within 100 feet of the end of the last pipe laid at all times. (Within fifty (50) feet at nights and weekends.)
D. Refer to City Standard Details.
E. Compaction shall meet specifications as designated in "Testing Procedures".
F. Backfill found not meeting above requirements shall be removed and recompacted by the contractor at their own expense.

8. STEEL PLATES FOR ROADWAY CONSTRUCTION

A. Steel plates must be able to withstand H-20 traffic loading without any movement.
B. Steel plates shall be fabricated to meet ASTM A36 steel requirements.
C. When two or more plates are used, the plates shall be tack welded together at each corner to reduce or eliminate vertical movement. Alternative methods to accomplish this, such as metal connectors, will be considered for approval on a case by case basis.
D. Steel plates shall be installed to resist bending, vibrations, etc., under traffic loads and shall be anchored securely to prevent movement. If these conditions are not met, the contractor will be required to backfill and pave the excavation daily.
E. All steel plates shall be properly. marked with the utility and contractor name, after-hours contact phone number in the event the plates need to be secured.
F. All steel plates within the right-of-way, whether used in or out of the traveled way, shall be without deformation. The plate surface must not deviate more than 1/4 inch when measured with a 10-foot straight edge along the length of the plate.
G. It is the responsibility of the contractor to perform and document daily inspections of all active plate(s) or unattended plate(s) location(s), and where necessary take appropriate measures to protect the public safety until work is completed. This documentation shall be available to the City Inspector upon request. No un-plated excavation shall be left unattended overnight.

H. In the event of improper installation of the steel plates that presents a nuisance or a public safety problem, the contractor shall respond to all excavation restoration requests by the City immediately upon notification.
I. Steel plates must extend a minimum of 24-inches beyond the edges of the excavation.
J. Before steel plates are installed, the excavation shall be adequately shored to support the bridging and traffic loads.
K. Temporary paving with a cold asphalt mix should be used to feather the edges of the plate to form a wedged taper to cover the edges of the steel plate. Other alternative methods to accomplish this will be considered for approval.
L. Wedges or other non-asphaltic devices shall be used for leveling as required to eliminate rocking of the plates. Compacted temporary asphalt shall be used to fill all gaps between the plates and existing pavement surfaces.
M. Proper advance warning signs shall be used. For example, “Steel Plate Ahead”, or “Bump”.
N. During months when snowfall may be expected, mark steel plates with 2-inch square stake painted orange and extending at least 4 feet above the ground, placed adjacent to the edge of the roadway and notify proper authorities of plate locations.

9. DEWATERING EXCAVATION

A. Excavations shall be kept free of water for a minimum of (2) two inches below subgrade of excavation.
B. The cost of dewatering shall be included in prices bid for pipe or structures.
C. Water shall be disposed of in an approved manner at Contractor's expense.

10. EXCAVATION BELOW SUBGRADE

A. Where directed by City Inspector.
B. Defined as excavation which is deeper than, (4) four inches below underside barrel of the pipe or structure as constructed.

11. BRACING OR SHEETING

A. In accordance with MOSHA and best practice of construction.
B. Shall be withdrawn except:
    1. Where directed by Engineer - extra work order or pay item in the schedule of prices.
    2. Where permitted by Engineer upon request of Contractor:
        a. No extra payment will be made.
        b. Sheeting to be cut off (12) twelve inches below finished grade of the street.

12. ROADWAY REPAIR

A. Incidental to other items of construction:
   1. Contractor to include in price for the pipe.
   2. Includes the replacement of curb, gutter and sidewalk damaged during construction. Must be constructed by approved Concrete Contractor.
   3. No additional payment to be made.
   4. Repair roadway per City of Salisbury Detail STD 400.35.
   5. Repave roadway per the latest version of the City of Salisbury Roadway Paving Policy.

B. Accomplish repaving within (3) three weeks after construction is complete within a street unless otherwise directed by Engineer.

C. Cut back existing pavement with saw a minimum of (24) twenty-four inches on each side of excavated trench and remove sections of pavement damaged during construction. Minimum repaving width to be (48) forty-eight inches plus trench width. All cuts will be perpendicular or parallel to the center line of the road or as directed or approved by the Engineer.

D. Preparation of Subgrade:
   1. Fine grade and compact to density specified in Testing Procedures.
   2. Top of subgrade to be graded four and one-half (4 ½) inches below finished street grade.

E. Repaving
   1. Repair of bituminous roadway paving shall be performed by City approved Contractor.
   2. Paver to be automatic control type meeting Maryland SHA Specifications.
   3. Roller to be approved type capable of achieving 92% - 97% compaction of hot mix.
   4. Hot mix asphalt meeting Maryland SHA requirements for Surface Course required.

F. Trench Settlement
   1. Trench settlement during guaranty period is not acceptable.
   2. If settlement occurs during guaranty period the Engineer may require the Contractor to re-compact and repave as necessary to eliminate settlement at no extra cost to City.

13. MISCELLANEOUS UTILITY CONSTRUCTION NOTES

A. The approved utility contractor shall be aware of and/or responsible for:
   1. All public improvements including, but not limited to, public water mains, sewer mains, storm drains, roadway, street lights, curb, gutter, and sidewalks shall be constructed to City of Salisbury Construction Standards, and

Construction and Materials Specifications.

2. The City reserves the right to require structural modifications to the site work following contract drawing approval if, in the opinion of the City, such modifications are necessary to correct deficiencies in the plan.
3. All stabilization, paving, and road patching in the public roadway, which is necessitated by the construction of this project, shall be performed by a paving contractor that is approved by the City of Salisbury and shall be the responsibility of the developer.
4. A written "Notice to Proceed" must be obtained and a Pre-Construction meeting scheduled with the City of Salisbury, Department of Infrastructure and Development, before beginning construction in City public R/W's, easements and/or City maintained utilities or roadways. Contact the City of Salisbury Department of Infrastructure and Development, Room 202, 125 N. Division St., Salisbury, Maryland, 21801, Telephone 410-548-5460 to schedule a Pre-Construction meeting and obtain a written "Notice to Proceed".
5. The contractor shall designate and submit to the City the name of the person designated as the Maryland Certified Traffic Control Manager, and a copy of the manager's Maryland Certification Card for this project, prior to construction. The contractor shall furnish all signs, arrow boards, barricades, lights, flagmen, etc. needed for maintenance of traffic. All traffic control devices shall be properly maintained to ensure that the general public's safety is never jeopardized. All traffic control devices are to conform and adhere to those specified and set forth in the Maryland Department of Transportation "New Work Zone Traffic Control" and/or "Manual on Uniform Traffic Control Devices for Streets and Highways" latest edition.
6. The Contractor will be responsible for notification to all properties or businesses directly affected by detours or changes in traffic patterns before beginning of construction and as determined by the City of Salisbury.
7. The Contractor is responsible for submitting to, and obtaining from the City, shop drawing and cut sheet approval for structures, equipment, and materials prior to beginning construction.
8. Testing/disinfections of water mains and testing of sewer mains shall be performed prior to placing utilities in service and shall be conducted according to City of Salisbury Standard Details, and Construction Materials and Specifications.
9. The Contractor shall field verify all dimensions of existing public utilities.
10. Utility connections requiring disruption of service to customers shall be performed between 10:00 PM and 5:00 AM. The contractor will be responsible for notification to all properties or businesses 48 hours in advance who are directly affected by disruption of service. Contractor shall submit a sample of proposed notification to City for approval prior to

distribution to customers. Notice to customers shall include the following:

a. Utility(s) Affected
b. Date & Time of disruption of service(s)
c. Date & Time of restoration of service(s)
d. Brief description of planned work
e. Contractors company name, Point of Contact (Name & Phone#)

14. TERMINATION OF SERVICES

This section presents information related to removing or abandoning existing water services and removing sanitary sewer services (including property line cleanouts).

A. Termination of Services: Water (2'' and Smaller)
   1. Shall be terminated at the main per City Inspectors recommendations.
   2. The termination procedure depends upon the size and type of joints/ fittings.
   3. Service line shall be abandoned in place. Service line shall be capped, plugged, or crimped at a point 2 inches from termination at main per City Inspectors recommendations.
   4. Service line shall be capped, plugged, or crimped per City Inspectors recommendations at a point 2 feet from existing meter pit.
   5. Contractor shall coordinate removal of meter from meter pit with City. Contractor shall not remove the meter from meter pit.
   6. Once City removes the meter from meter pit, the contractor shall remove meter pit in its entirety.
   7. All disturbed areas in public ROW and/ or easement(s) shall be restored per applicable City Specs and Details.

B. Removal of Service: Water (2'' and larger)
   1. Existing water service including pipe, vault/ pit, and valves shall be removed in their entirety to the water main.
   2. The service connection at the main shall be terminated per City Inspectors recommendations.
   3. All disturbed areas in public ROW and/ or easement(s) shall be restored per applicable City Specs and Details.

C. Termination of Services: Sanitary Sewer Lateral (Outfall to Existing Brick Manhole)
   1. Services that outfall into manholes shall have the pipe(s) removed in their entirety from the manhole penetration(s).
   2. Voids from penetrations shall be filled with grade MM sewer bricks to match the existing bond and thickness of the existing manhole. Joints shall be type S mortar struck on inside and outside of the manhole and parging is not permitted.
   3. Existing service pipe(s) (including property line clean out) shall be removed in their entirety.
   4. Existing service flow channel (if applicable) shall be filled to match existing

bench elevation with concrete, anchors, and/ or bonding agent per City Inspectors recommendations.

5. All disturbed areas shall be restored per applicable City Specs and Details.

D. Termination of Services: Sanitary Sewer Lateral (Outfall to Precast Concrete Manhole)
   1. Services that outfall into manholes shall have the pipe(s) removed in their entirety from the manhole penetration(s).
   2. Voids from penetrations shall be filled per City Inspector recommendations.
   3. Existing service pipe(s) (including clean out) shall be removed in their entirety.
   4. Existing service flow channel (if applicable) shall be filled to match existing bench elevation with concrete, anchors, and/ or bonding agent per City Inspectors recommendations.
   5. All disturbed areas shall be restored per applicable City Specs and Details.

E. Termination of Services: Sanitary Sewer Lateral (Outfall to Existing Wye or Saddle)
   1. Existing service laterals shall be removed in their entirety from the main too (and including) the cleanout.
   2. Plug/cap at the existing Wye/ Saddle per City Inspectors recommendations.
   3. Existing service flow channel (if applicable) shall be filled to match existing bench elevation with concrete, anchors, and/ or bonding agent per City Inspectors recommendations.
   4. All disturbed areas shall be restored per applicable City Specifications and Details.

SANITARY SEWER MATERIALS

Latest revision 01-02-18

SANITARY SEWER MATERIALS

Latest revision 01-02-18

1. BRICK AND MORTAR FOR EXISTING BRICK MANHOLES

   A. All new manholes shall be precast concrete. This section shall only apply to repairing annular space between an existing brick manhole and new pipe, to fill an abandoned penetration, or to repair an existing brick flow channel where permitted by City.
   B. Brick shall conform to ASTM C32, Grade MM Sewer Bricks.
   C. Six brick absorption shall not exceed 14%.
   D. The brick sample shall be provided for approval one week prior to use.
   E. Mortar shall be an approved type S mortar.
   F. Mortar joints shall be struck.
   G. Brick shall be laid to match the existing bond of the structure.
   H. Parging is not permitted.

2. ADJUSTMENT RINGS

   A. Only pre-cast concrete adjustment rings will be accepted.
   B. Brick is not permitted.
   C. An approved type S mortar shall be installed between concrete rings, ring and structure, and ring and frame per City Standard Details. Parging of concrete rings is not permitted.

3. MANHOLE FRAMES AND COVERS

   A. Size and type per standard details.
   B. East Jordan Iron Works # 154514 Frame or approved City substitute.
   C. East Jordan Iron Works # 154523 Cover or approved City substitute.
   D. Neenah Foundry R-1565 frame and cover or approved City substitute.
   E. Only 9” Frames are permitted.
   F. Rated for H 20 loading.
   G. Frames shall be anchored to structure per City Standard Details.
   H. Frames shall be set in ½” minimum bed of mortar.
   I. Brick shall not be permitted to bring the frame to finish grade. Only precast concrete rings will be allowed.
   J. An approved type S mortar shall be installed between concrete rings, ring and structure, and ring and frame per City Standard Details. Parging of concrete rings is not permitted.

4. PRECAST MANHOLES

   A. Size per standard details.
   B. Per ASTM C-478.
   C. Contractor to provide detailed drawings of each manhole, when required to do so,

prior to shipment and installation.

D. Joints shall be provided with rubber O-ring gasket meeting ASTM C-361 and shall be watertight when installed.

E. Annular space between pipe and pipe openings, including future stubs, shall
   1. Have no mortar placed between the pipe and the wall of the concrete structure, except as necessary to create a smooth transition from the pipe to the flow channel.
   2. Be provided with a flexible rubber pipe to manhole seal that:
      a. Shall be watertight.
      b. Meets the requirements of ASTM C923.

F. Annular space between pipe and pipe openings for doghouse manholes shall be filled with an approved non-shrink grout.

G. Lifting holes shall be provided to assure a "safe" lift without slippage. If lifting hole projects through a manhole, grout flush with non-shrink grout.

H. Steps shall be vibrated in place when casting into walls and shall be set vertically per OSHA requirements.

I. Install in accordance with City Specifications.

J. Flow channels shall be pre-cast from manhole manufacturer.

K. Shall be furnished with an approved bituminous exterior coating.

L. No field cutting or altering of precast manholes is permitted

M. Penetrations for future use and abandoned penetrations shall be sealed per City inspector's recommendations.

5. MANHOLE STEPS

A. Reinforced polypropylene plastic.
   1. Per City standard details.
   2. Per OSHA standards.

6. CLEAN OUT STACKS

A. Per standard City details.

B. Approved Plastic Pipe and fittings.

C. Combination 6"x 4" wye and 1/8 bend may be used instead of separate parts.

D. Place 6" Spigot Plug No. 483065 or City approved substitute in the unused hub.

E. Install 4" vertical stack from 6" x 4" wye and 1/8 fitting rising to a depth of 2ft. below finished grade with SDR 35 glue cap.

F. Cleanouts installed in driveways and unpaved areas shall be furnished with a round concrete collar extending 1.0' beyond the frame of the cleanout cap. The collar shall be 6'' thick and be supported by a 6'' base of CR-6 aggregate which in turn shall be supported by suitable soil compacted to 95% proctor. Concrete collars shall be installed after the top of the cleanout caps are adjusted to finished grade.

G. Cleanouts within unpaved City streets (where paving is to be installed in a future phase) shall be furnished with a round concrete collar extending 1.0' beyond the lamp hole frame. The collar shall be 6'' thick and be supported by suitable soil compacted to 95% proctor. Concrete collars shall be installed after the lamp hole frame is adjusted to finish grade. The concrete collar shall be removed entirely prior to paving.

7. POLYVINYL CHLORIDE (PVC) SEWER PIPE

A. SDR 35. Manufactured per ASTM D 3034, SDR 35 for 4" – 15" or ASTM F 679 for 18" –27".
   1. Rubber ring joints to provide for expansion and contraction.
   2. Pipe and fittings shipped with gaskets not in place will not be accepted.
   3. Maximum SDR of 35.
   4. Minimum pipe stiffness F/Y = 46 psi.
      a. at 5% deflection.
      b. when calculated in accordance with ASTM D2412.
   5. All pipe must be protected from UV rays immediately upon delivery to project site.
   6. UV protection must be approved by City Inspector.
   7. Pipe bleached or discolored by UV rays will not be accepted.

B. Joints.
   1. Integral bell type or approved substitute to Johns-Manville Ring-Tite.
   2. Solid cross-section rubber O-ring gasket securely locked in place to prevent displacement.
   3. Shall withstand 25-psi internal pressure without leakage.
   4. Rubber gaskets.
      a. shall comply with ASTM D1869.
      b. lubricant shall have no detrimental effect on gasket or pipe.
   5. Manhole connections must be made with elastomeric gasket to provide flexibility and water tightness.

C. Pipe Markings.
   1. The following information is to be marked on pipe at five-foot intervals:
      a. Manufacturer's name or trademark.
      b. Nominal pipe size.
      c. PVC Cell classification.
      d. The legend (e.g., "Type PSM SDR 35 PVC Sewer Pipe").
      e. Date and location of manufacture.

D. Installation.
   1. SDR 35 to be in accordance with ASTM D2321 and TR-614A by the Johns-Manville Company for SDR 35.
   2. Backfill and Bedding per City Standard Details and Specifications.

E. Deflection.
   1. Deflection of Sanitary Sewer Pipe is not permitted.

F. Wye Branches and House Connections.
   1. Per City standard details.
   2. Shall be PVC, where main is PVC.
   3. Install 4” vertical stack from 6” x 4” wye and 1/8 rising to a depth of 2 ft. below finished grade, with SDR 35 glue cap. Terminate 1 ft. back of sidewalk when applicable or 1ft. back of the property line.

8. MOLDED PVC SEWER FITTINGS

A. Size 4’’ through 15’’ shall have no seams or cemented joints.
B. All gasketed sewer fitting 4’’ through 15’’ shall be injection molded as manufactured by multi- fittings or approved equal and comply with ASTM D3034 and F1336 standards.

9. MANHOLE INSERTS

A. Watertight manhole inserts shall be used on all sewer manholes. This is not a pay item, to be incidental to the cost of the manhole.
B. Shall fit the City of Salisbury Std. Manhole frame, 23-3/4" ID. x 24-3/4" OD.

10. DUCTILE IRON PIPE

A. Conform to AWWA/ANSI C151/A21, latest revision.
B. Thickness Class per AWWA/ANSI C150/A21, C151/A21.
   1. 4-inch: Class 51 minimum.
   2. 6-inch and above: Class 50 minimum.
   3. Unless otherwise specified or indicated on drawings.
C. Cement lined per AWWA/ANSI C104/A21, double thickness.

11. FITTINGS FOR DUCTILE IRON PIPE

A. Shall be ductile iron.
B. 4" through 24” ductile iron compact fittings conforming to AWWA/ANSI C153/A21, latest revision.
C. 30” through 48" ductile iron standard fittings conforming to AWWA/ANSI C111/A21, latest revision.
D. Pressure rating 350-psi minimum.
E. Mechanical joint.
F. Outside coating per AWWA/ANSI C110/A21, C153/A21.

12. JOINTS FOR DUCTILE IRON PIPE

A. Push-on type.
   1. Rubber gasket.
   2. Tyton by U.S. Pipe and Foundry Company or City approved substitute.
B. Mechanical joint.
C. Joints per AWWA/ANSI C111/A21.

13. OUTSIDE COATING FOR BURIED IRON PIPE

A. Outside coating on pipe and fittings per AWWA/ANSI C151/A21.

14. OUTSIDE COATING FOR EXPOSED IRON PIPE

A. Manufactured by TNEMEC CO. INC. (or approved City substitute).Substitutions must be of a same generic type and meet or exceed ASTM test standards.
B. Outside coating on the pipe, fittings, and valves to be per AWWA/ANSI C151/A21.
C. Exposed Ductile Iron pipe Fittings and appurtenances and other metals shall be coated with the following:
   1. Tnemec Series 1 Omnithane. (Modified Aromatic Polyurethane Primer)
   2. Tnemec Series 66HS Hi-Build Epoxoline. (Polyamide Epoxy)
   3. Tnemec Series 750 UVX. (Modified Polycarbamide)

15. MECHANICAL JOINT RETAINER GLANDS

A. Conform to AWWA/ANSI C110/A21, C111/A21, C153/A21.
B. Manufactured by American Cast Iron Pipe Company or U.S. Pipe and Foundry Company, or approved substitute.

16. CASING SPACERS AND END SEALS

A. Bands shall have a minimum 14 gauge 304 stainless steel bands. Bands shall be two segments, 8 inches wide. For carrier pipes, 26-inch diameter and larger, bands shall be three or more segments and 12 gauge 304 stainless steel.
B. Steel Riser shall be high grade 304 stainless steel, minimum 10 gauge thickness and shall be fabricated to support the carrier pipe, and its liquid load. Riser shall be sized to position the carrier pipe in the casing, support all loads and provide a proper contact for the isolation function.
C. Casing spacers shall have ample riser height to limit vertical movement of the carrier pipe within the casing pipe. A maximum of 1-inch clearance shall be provided between the top runner and the ID of the casing pipe for carrier sizes of 6 inch through 12 inches. A maximum of 2-inch clearance shall be provided between the

top runner and the ID of the casing pipe for carrier pipe sizes of 18 inch through 64 inches.

D. The liner around the carrier pipe shall have a flexible PVC liner of 0.09-inch thickness with a Durometer "A" 85-90 hardness and a minimum 58,000-volt dielectric strength.

E. Runners shall be of high-pressure molded glass-reinforced polymer with a minimum compressive strength of 18,000 psi, 2 inches in width and a minimum of 8 inches long. Polyethylene runners are not an acceptable alternative.

F. The runners shall be attached to the band or riser by 3/8 inch welded stainless steel studs and lock nuts, which shall be recessed far below the wearing, surface on the runner.

G. The band section shall be bolted together with 304 stainless steel studs, nuts and washers. Hardware shall be 5/16 inch for carrier pipes up to 36-inch diameter and 3/8 inch for carrier pipes 36 inches and larger.

H. A minimum of three casing spacers shall be required for each joint of carrier pipe (each end and middle) within casing pipe.

I. End seals shall be a pull-on or wrap around with stainless steel bands. End-seals shall be made of 1/8 inch compounded synthetic rubber.

J. Approved Manufacturers:
   1. Advance Products & Systems, Inc.
   2. Power Seal Pipeline Products, Inc.
   3. CCI Pipeline Systems, Inc.
   4. J-Four Pipeline Products, Inc.

WATER MAIN MATERIALS

Latest revision 01-02-18

WATER MAIN MATERIALS

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1. DUCTILE IRON PIPE

   A. Conform to AWWA/ANSI C151/A21, latest revision.
   B. Thickness Class per AWWA/ANSI C150/A21, C151/A21.
      1. 4-inch: Class 51 minimum.
      2. 6-inch and above: Class 50 minimum.
      3. Unless otherwise specified or indicated on drawings.
   C. Cement lined per AWWA/ANSI C104/A21, double thickness.
   D. Outside coating for buried ductile iron pipe per AWWA/ANSI C110/A21, C153/A21

2. FITTINGS FOR DUCTILE IRON & PVC PIPE

   A. Shall be ductile iron.
   B. 4”through 24” ductile iron compact fittings conforming to AWWA/ANSI C153/A21, latest revision.
   C. 30” through 48" ductile iron standard fittings conforming to AWWA/ANSI C110/A21, latest revision.
   D. Pressure rating 350-psi minimum.
   E. Mechanical joint.
   F. Outside coating per AWWA/ANSI C110/A21, C153/A21.
   G. Couplings are not permitted, except as necessary to tie into existing pipe.
   H. Where permitted couplings shall be either approved standard alpha or alpha transition restrained couplings, manufactured by Romac Industries, Inc. or manufactured by EBAA Iron, Inc. or approved equal.
   I. End caps shall be alpha wide range restrained end cap manufactured by Romac Industries, Inc. or approved equal.

3. JOINTS FOR DUCTILE IRON PIPE

   A. Push-on type.
      1. Rubber gasket.
      2. Fastite by American Cast Iron Pipe Company or Tyton by U.S. Pipe and Foundry Company, or approved substitute.
   B. Mechanical joint.
   C. Joints per AWWA/ANSI C111/A21.

4. COUPLINGS FOR JOINING PIPES OF DISSIMILAR MATERIALS

   A. Shall be Alpha transition restrained coupling manufactured by Romac Industries, Inc. or Series 3800 Mega-Coupling manufactured by EBAA Iron, Inc. or approved equal.

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5. OUTSIDE COATING FOR EXPOSED IRON PIPE

   A. Suitable for Potable Water applications.
   B. Manufactured by TNEMEC CO. INC. (or approved substitute). Substitutions must be of a same generic type and meet or exceed ASTM test standards.
   C. Outside coating on the pipe, fittings, and valves to be per AWWA/ANSI C151/A21.
   D. Exposed Ductile Iron pipe Fittings and appurtenances and other metals shall be coated with the following:
      1. Tnemec Series 1 Omnithane. (Modified Aromatic Polyurethane Primer)
      2. Tnemec Series 66HS Hi-Build Epoxoline. (Polyamide Epoxy)
      3. Tnemec Series 750 UVX. (Modified Polycarbamide)

6. MECHANICAL JOINT RESTRAINTS FOR DUCTILE IRON FITTINGS

   Restraint devices for mechanical joint fittings and appurtenances to conforming either ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53, shall conform to the following:

   A. Design
      1. Restraint devices for nominal pipe size 4 inches through 48 inches shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10.
      2. The devices shall have a working pressure rating of 350 psi for 4-16 inch and 250 psi for 18-48 inch. Ratings are for water pressure and must include a minimum safety factor of 2 to 1 in all sizes.
   B. Material
      1. Gland body, wedges, and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.
      2. Ductile iron gripping wedges shall be heat treated with a range of 370 to 470 BHN.
      3. Testing for tensile, yield and elongation shall be done in accordance with ASTM A536 and ASTM E8.
   C. Traceability
      1. Traceability shall meet manufacturer certification. An identification number consisting of year, day, plant and shift (YYDDD) (plant designation) (Shift number), shall be cast into each gland body.
      2. All physical and chemical test results shall be recorded such that they can be accessed via the identification number on the casting. These Material Traceability Records (MTR's) are to be made available, in hard copy, to the purchaser that requests such documentation and submits his gland body identification number.
      3. Production pieces that are too small to accommodate individual numberings, such as fasteners and wedges, shall be controlled in segregate inventory until such time as all quality control tests are passed. These component parts may then be released to a general inventory for final assembly and packaging.

4. All components shall be manufactured and assembled in the United States. The purchaser shall, with reasonable notice, have the right to plant visitation at his/her expense.

D. Installation
   1. Mechanical joint restraint shall require conventional tools and installation procedures per AWWA C600 while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly.
   2. Proper actuation of the gripping wedges shall be ensured with torque-limiting twist off nuts.

E. Approvals
   1. Restraint devices shall be Listed by Underwriters Laboratories (4'' through 24'' inch size) and Approved by Factory Mutual (4'' through 12'' inch size).
   2. Mechanical joint restraint shall be Megalug Series 1100 produced by EBAA Iron Inc. or approved equal.

F. Coating: Coating for restraint devices shall consist of the following:
   1. All wedge assemblies and related parts shall be processed through a phosphate wash, rinse and drying operation prior to coating application. The coating shall consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.
   2. All casting bodies shall be surface pretreated with a phosphate wash, rinse, and sealer before drying. The coating shall be electrostatically applied and heat cured. The coating shall be a polyester based powder to provide corrosion, impact, and UV resistance.
   3. The coating system shall be MEGA-BOND by EBAA Iron Inc. or approved equal. Requests for approved equal must submit coating material and process details for review prior to bid.

7. <u>BELL RESTRAINTS FOR C900 PVC PIPE (4'' THROUGH 12'')</u>

A. Shall be installed for all new construction of water mains and applicable appurtenances.

B. The bell restraints shall be installed per the latest version of the Restraint Length Calculator at `www.ebaa.com`, using a 2 to 1 safety factor, a type 5 trench, and a test pressure of 150 PSI.

C. Restraint for AWWA C900 PVC Pipe shall consist of the following: The restraint shall be manufactured of ductile iron conforming to ASTM A536. The restraint devices shall be coated with MEGA-BOND. The combination of the restraint(s) and fasteners shall have a pressure rating to the full pressure rating of the pipe. The restraint shall have a two to one safety factor.

D. A split serrated ring shall be used to grip the plain end of the pipe. A split serrated ring shall also be used to grip the barrel of the pipe behind the bell, and a sufficient number of bolts shall be used to connect the restraint rings. The combination shall be the Series 1900 manufactured by EBAA Iron, Inc., or approved equal.

8. BELL RESTRAINTS FOR C905 (CI O.D) PVC PIPE (14'' THROUGH 48'')

   A. Shall be installed for all new construction of water mains and applicable appurtenances.
   B. The bell restraints shall be installed per the latest version of the Restraint Length Calculator at www.ebaa.com , using a 2 to 1 safety factor, a type 5 trench, and a test pressure of 150 PSI.
   C. Restraint for PVC pipe (ANSI/AWWA C905-10) at the bell shall consist of the following: The restraint shall be manufactured of ductile iron conforming to ASTM A536. A backup ring shall be used behind the PVC bell. A restraint ring, incorporating a plurality of individually-actuating gripping surfaces, shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The restraint devices shall be coated with MEGA-BOND. The restraint shall be the Series 2800, as manufactured by EBAA Iron, Inc., or approved equal.
   D. For pipe sizes 42-48 inch, refer to Series 2200.

9. BELL RESTRAINTS FOR DUCTILE IRON PIPE

   A. Shall be installed for all new construction of water mains and applicable appurtenances.
   B. The bell restraints shall be installed per the latest version of the Restraint Length Calculator at www.ebaa.com , using a 2 to 1 safety factor, a type 5 trench, and a test pressure of 150 PSI.
   C. Ductile iron pipe bell restraint shall consist of a wedge action restraint ring on the spigot joined to a split ductile iron ring behind the bell. The restraint ring shall have individually actuated wedges that increase their resistance to pull-out as pressure or external forces increase. The restraint ring and its wedging components shall be made of ductile iron conforming to ASTM A536. The wedges shall be heat treated to a minimum hardness of 370 BHN. Torque limiting twist off nuts shall be used to ensure proper actuation of the restraining wedges. The split ring shall be made of ductile iron conforming to ASTM A536. The restraint devices shall be coated using MEGA-BOND. The connecting tie rods that join the two rings shall be made of low alloy steel that conforms to ANSI/AWWA C111/A21.11. The assembly shall have a rated pressure with a minimum two to one safety factor of 350 PSI in the sixteen-inch size and below 250 PSI in the eighteen through thirty-six-inch sizes. The product shall be the Series 1700 MEGALUG restraint harness, manufactured by EBAA Iron, Inc., or approved equal.

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10. POLYVINYL CHLORIDE (PVC) WATER TRANSMISSION PRESSURE PIPE

A. 4"-12" Diameter Pipe.
   1. Shall be designated C-900 or approved substitute.
   2. Conform to ANSI/AWWA C900, all sections, latest revision.
   3. Integral bell and spigot conforming to ASTM D3139.
   4. Thickness Class per DR 18.
   5. Pressure Class - 150-psi minimum. Hydrostatic design basis (HDB) of 4000 psi.
   6. Outside diameter - Ductile iron or Cast Iron pipe (C.I.O.D.) size compatible.
   7. Unless otherwise specified, the pipe shall be furnished in standard laying lengths of 20'(+/- 1") for all sizes.

B. 14"-36" Diameter Pipe.
   1. Shall be C-905 or approved substitute.
   2. Conform to ANSI/AWWA C905, all sections, latest revision.
   3. Integral bell and spigot conforming to ASTM D3139.
   4. Thickness Class per DR 18.
   5. Pressure Class - 150-psi minimum. Hydrostatic design basis (HDB) of 4000 psi.
   6. Outside diameter - Ductile iron or Cast Iron pipe (C.I.O.D.) size compatible.
   7. Unless otherwise specified pipe shall be furnished in standard laying lengths of 20'(+/- 1") for all sizes.

C. Joints.
   1. Integral bell and spigot push on elastomeric gasket type conforming to ASTM F477 for Joint Plastic pipe.
   2. PVC couplings, saddles, and other fittings are not allowed.
   3. Ductile iron mechanical joint fittings shall be used.

D. Pipe Markings.
   1. The following information is to be marked on pipe at five-foot maximum intervals:
      a. Manufacturer's name or trademark.
      b. Nominal pipe size.
      c. Thickness Class (e.g., DR 18).
      d. Pressure Class (e.g., PC 150).
      e. The legend (e.g., "Type AWWA C900 PVC Pressure Pipe").
      f. Date and location of manufacture.

E. Tapping PVC Mains.
   1. Direct tapping is not allowed.
   2. All service taps for PVC water pipe shall be provided with saddles per City Standard Details.

11. TRACER WIRE

A. All new non-metal Water Mains and appurtenances shall be installed with tracer

wire. In open trench installations, the wire shall be 12 AWG (min.) solid copper, coated with a 30-mil (min.) polyethylene jacket designed specifically for buried use. In directional bore installations, the wire shall be 8 AWG (min.) solid copper, coated with a 30-mil (min.) polyethylene jacket designed specifically for buried use.

B. Splices in the tracer wire shall be connected by means of an Ilsco IK10 connector, or an approved corrosion proof split bolt or compression type connector to ensure continuity. After installation, the tracer wire shall be tested to verify continuity of the tracer wire system (refer to testing procedures).

12. FIRE HYDRANTS

A. Hydrants shall meet or exceed all requirements of AWWA C-502, latest revision for dry barrel fire hydrants, and the following detailed specifications. Hydrants approved are the American Flow Control B-62-B, the Kennedy K-81-D Guardian, or the Mueller Co. A423 Super Centurion “250”, provided each complies with the City of Salisbury detailed specifications. Alternates will not be considered.

B. Operating Nut: Size, shape, and direction of opening shall be the same as those presently in the City of Salisbury Water System, shall open to the right, be 1 1/2" in size, and pentagon in shape.

C. Bonnet Assembly: Shall be constructed so that disassembly may be accomplished with "conventional" hand tools.

D. Hose Nozzles: The upper barrel shall provide two hose and one pumper outlet. The nozzles shall be cast of AWWA Bronze and the threading shall be the same as those presently in the City of Salisbury Water System, consisting of 1 (one) 4 1/2" Pumper nozzle, and 2 (two) 2 1/2" hose nozzles. Shall be National Standard threads on all nozzles. The nozzles shall be connected to the upper barrel by means of a quarter turn system and held in place with a 304 Stainless Steel Screw.

E. Paint, Traffic Safety Feature & Major Casting: The primary castings; bonnet, upper barrel, lower barrel and shoe shall be made of either cast or ductile iron. The lower barrel shall be ductile iron. The hydrant shall be primed and painted yellow by the manufacturer in accordance with City specifications. Hydrants installed with chips, scratches, etc. shall be repainted with Rustoleum 3400 System DTM 340 VOC Alkyd Enamel, Product # 3446402 Yellow, or approved substitute. Partial or touch-up painting is not permitted. Hydrants shall be provided without chains. The traffic safety feature shall be designated to break clearly upon impact and will consist of a two-part breakable safety flange located on the top of the lower barrel flange, or incorporate a "Quick Fix" Coupling Design. It shall also have a cast iron breakable stem coupling. The design shall permit 360° rotation of the upper barrel without assembly.

F. Depth of Bury: The depth of bury shall be as shown in City "Construction Standards" booklet. Hydrants are to be extendable in 6" increments, at the ground line, without excavation.

G. Main Valve Assembly: The main valve opening shall be 5 1/4". The hydrant shall

open against and close with the line pressure. The rubber valve shall be made of a synthetic rubber confined between the upper and lower valve plate. The upper valve plate, seat ring, and seat ring bushing shall be made of AWWA Bronze and be made to ASTM or CDA alloy specifications. All pressure seals shall be made by use of rubber o-rings. The main valve assembly must be removable through the upper barrel by use of a short lightweight wrench. A Bronze-to-Bronze seating arrangement is required.

H. Inlet Shoe Connection: The inlet shoe connection will be 6" mechanical joint, complete with glands, bolts, nuts and gaskets. Hydrants must use a standard M.J. Accessory Set for Installation. The distance from the face of the shoe connection inlet flange shall be great enough to allow the insertion of mechanical joint tee head anti-rotation bolts or tie rods without interference from the shoe casting or other hydrants parts.

13. HYDRANT LEADS

A. 6" Ductile Iron pipe between the hydrant valve and the fire hydrant. PVC pipe is not allowed.
B. Mega lug restraints required on all fittings.
C. Any pipe joints must have approved restraining gaskets or alpha couplings.

14. GATE VALVES

A. All gate valves to be mechanical joint resilient seated wedge gate valves. Shall be American Flow Control or approved substitute. Other than American Flow Control shall require approval by Engineer before delivery to the project site.
B. Shall meet AWWA C515 specifications for gate valves.
C. Hub ends for mechanical joints, square wrench nut.
D. Open counter-clockwise.
E. The depth of valve operating nut shall be a minimum of 24” and a maximum of 48”from the finish grade to the top of the operating nut.

15. VALVE BOXES

A. Refer to City Standard Details
B. Buffalo screw type, three pieces.
C. 5 1/4" shaft.
D. Only Bingham-Taylor, Tyler/Union, or East Jordan Iron Works cast iron three piece (lid extra) screw type valve boxes or approved substitute will be permitted.
E. Base to be size and shape recommended by the manufacturer for the diameter of pipe specified.
F. Lids.
    1. Extra deep.

2. Two holes.
3. Word "WATER" cast in the upper surface.

G. # 4 Base shall not be permitted.

H. Only # 6 or # 160 Bases will be accepted.

16. TAPPING SLEEVES AND VALVES

A. Ford stainless steel tapping sleeve FTSS, ROMAC stainless steel tapping sleeve SST III or approved substitute.

B. American Flow Control or approved substitute, resilient seated wedge-tapping valve.

C. Outlet flange shall be 304 stainless steel.

D. Tap must be one pipe size smaller than existing main.

E. Tapping tees must be installed with a minimum of 2' separation from any pipe joints or fitting.

17. WATER SERVICE CONNECTIONS

A. Fittings
1. Shall be "No Lead Brass".
2. For 1" and 2" service connections.
3. For 1" service refer to Standards drawing 300.14.
4. For 2" service refer to Standards drawing 300.27.

B. Plastic Pipe for 1" and 2"service connections shall be Polyethylene (PE) tubing class 200, SDR 9 CTS OD (copper tube size) 200 PSI.
1. Stainless Steel (SS) insert fittings shall be used with all fittings used for P.E. tubing.
2. #12 solid copper coated wire shall accompany all PE Tubing. The copper wire shall be duct taped to the top of the PE tubing every (5) feet. It shall be connected to the tracer wire on the water main and terminate and connect to the supply side angle valve of pit setter, provide sufficient length of wire to facilitate testing a minimum of 2' above frame and cover.
3. PE Tubing shall be cut with ratchet or scissor cutter designed to cut plastic pipe, saws are not permitted.
4. Service connections must be installed with a minimum of 2' separation from any pipe joints, fittings, or service connections.

C. Meters.
1. Supplied and installed by the City, unless otherwise specified by the City.
2. Meter type: Approved meter, as approved by City. No others considered. The City shall install meters.
3. Size of meter.
a. The size of the meter to be determined by the City. Meters will be sized by the City using the Water Customer Data Sheet available from Infrastructure and Development. Plumbing layout or fixture count

must be available.

b. The City reserves the right to supersede meter size designations on plans, drawings, or specifications when it is in the best interest of the City.

18. CASING SPACERS AND END SEALS

A. Casing spacers are required for all carrier pipes regardless of casing or carrier pipe materials.

B. The band shall have a minimum 14 gauge 304 stainless steel band. Bands shall be two segments, 8 inches wide. For carrier pipes, 26-inch diameter and larger, bands shall be three or more segments and 12 gauge 304 stainless steel.

C. Steel Riser shall be high grade 304 stainless steel, minimum 10 gauge thickness and shall be fabricated to support the carrier pipe and its liquid load. Riser shall be sized to position the carrier pipe in the casing, support all loads and provide a proper contact for the isolation function.

D. Casing spacers shall have ample riser height to limit vertical movement of the carrier pipe within the casing pipe. A maximum of 1-inch clearance shall be provided between the top runner and the ID of the casing pipe for carrier sizes of 6 inch through 12 inches. A maximum of 2-inch clearance shall be provided between the top runner and the ID of the casing pipe for carrier pipe sizes of 18 inch through 64 inches.

E. The liner around the carrier pipe shall have a flexible PVC liner of 0.09-inch thickness with a Durometer “A” 85-90 hardness and a minimum 58,000-volt dielectric strength.

F. Runners shall be of high-pressure molded glass-reinforced polymer with a minimum compressive strength of 18,000 psi, 2 inches in width and a minimum of 8 inches long. Polyethylene runners are not an acceptable alternative.

G. The runners shall be attached to the band or riser by 3/8 inch welded stainless steel studs and lock nuts, which shall be recessed far below the wearing, surface on the runner.

H. The band section shall be bolted together with 304 stainless steel studs, nuts and washers. Hardware shall be 5/16 inch for carrier pipes up to 36-inch diameter and 3/8 inch for carrier pipes 36 inches and larger.

I. A minimum of three casing spacers shall be required for each joint of carrier pipe (each end and middle) within casing pipe.

J. End seals shall be a pull-on or wrap around with stainless steel bands. End-seals shall be made of 1/8 inch compounded synthetic rubber.

K. Approved Manufacturers:
   1. Advance Products & Systems, Inc.
   2. Power Seal Pipeline Products, Inc.
   3. CCI Pipeline Systems, Inc.
   4. J-Four Pipeline Products, Inc.

WATER MAIN MATERIALS

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19. METER PITS

A. For 1” Services

1. Ford Pit Setter PSBHC- 488-20-36-NL, no bypass with Ford single lid frame A-3 and Nicor lid # 21.25 PSALN-NTH.
2. Mueller 1’’ rigid single meter, part # 330RC52130FVBN000590N with Ford single lid frame A-3 and Nicor lid # 21.25 PSALN-NTH.

B. For 2’ Services

1. Ford pit setter PMBHH-788-36-42-NL, no bypass with Ford FL-36 flange PR(ring) and Nicor lid # 21.25 PSALN-NTH.

STORM DRAIN MATERIALS

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STORM DRAIN MATERIALS

Latest revision 01-02-18

1. REINFORCED CONCRETE PIPE

   A. In accordance with AASHTO M-170.
   B. Joints to be bell and spigot for pipe sizes 30'' and below.
   C. Joints to be tongue and groove for pipe sizes above 30''.
   D. Joints shall be watertight under full flow conditions.
   E. No grouting of any kind will be permitted on RCP joints.
   F. All storm drain pipe installed below roadbed and curb shall be reinforced concrete pipe.
   G. Class IV minimum for applications with more than one foot of cover. Class V minimum for applications with one foot or less of cover.

2. CORRUGATED STEEL PIPE (GALVANIZED STEEL)

   A. Material: The galvanized steel coils shall conform to the applicable requirements of AASHTO M 218 or ASTM A 929.
   B. Pipe: The CSP shall be manufactured in accordance with the applicable requirements of AASHTO M-36 or ASTM A 760. The pipe sizes, gauges, and corrugations shall be as shown on the project plans. All fabrications of the product shall occur within the United States.
   C. Handling & Assembly: Shall be in accordance with NCSPA's (National Corrugated Steel Pipe Association) recommendations.
   D. Installation: Shall be in accordance with AASHTO Standard Specifications for Highway Bridges. Section 26, Division II or ASTM A 798 and in conformance with the project plans and specifications. If there are any inconsistencies or conflicts, the contractor must bring them to the attention of the project engineer. It is always the contractor's responsibility to follow OSHA guidelines for safe practices.

3. CORRUGATED STEEL PIPE (ALUMINIZED)

   A. Material: The ALUMINIZED type 2 STEEL coils shall conform to the applicable requirements of AASHTO M 274 or ASTM A 929.
   B. Pipe: The CSP shall be manufactured in accordance with the applicable requirements of AASHTO M-36 or ASTM A760. The pipe sizes, gauges, and corrugations shall be as shown on the project plans. All fabrications of the product shall occur within the United States.
   C. Handling & Assembly: Shall be in accordance with NCSPA's (National Corrugated Steel Pipe Association) recommendations.
   D. Installation: Shall be in accordance with AASHTO Standard Specifications for Highway Bridges, Section 26, Division II or ASTM A 798 and in conformance with the project plans and specifications. If there are any inconsistencies or conflicts the contractor should discuss and resolve with the project engineer. It is always the contractor's responsibility to follow OSHA guidelines for safe practices.

4. CORRUGATED HDPE PIPE (ADS N12 or approved substitute)

A. Not accepted for use below roadbed and curb.
B. 15" and larger, inside diameter.
C. Pipe Requirements: ADS N-12 ST IB pipe (per ASTM F2648) shall have a smooth interior and annular exterior corrugations.
   1. 15 through 60- inch (100 to 1500 mm) shall meet ASTM F2648.
   2. Manning's "n" value for use in the design shall be 0.012.
D. Joint Performance: Pipe shall be joined using a bell & spigot joint meeting ASTM F2648. The joint shall be soil-tight and gaskets, when applicable, shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.
E. Fittings: Fittings shall conform to ASTM F 2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the soil tight joint performance requirements of ASTM F 2306.
F. Material Properties: Material for pipe production shall be an engineered compound of virgin and recycled high density polyethylene conforming with the minimum requirements of cell classification 435420C (ESCR Test Condition B) for 15- through 60-inch (300 to 1500 mm) diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. The design engineer shall verify compatibility with an overall system including structural, hydraulic, material and installation requirements for a given application.
G. Pipe Dimensions:

Nominal Diameter, in (mm)

Pipe I.D in (mm)	15 (375)	18 (450)	24 (600)	30 (750)	36 (900)	42 (1050)	48 (1200)	60 (1500)
Pipe O.D in (mm)	18 (457)	22 (559)	28 (711)	36 (914)	42 (1067)	48 (1219)	54 (1372)	67 (1702)

5. POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. SDR 35: Manufactured per ASTM D 3034, SDR 35 for 15" and or ASTM F 679 for 18" – 48".
   1. Rubber ring joints to provide for expansion and contraction.
   2. Pipe and fittings shipped with gaskets not in place will not be accepted.
   3. Maximum SDR of 35.
   4. Minimum pipe stiffness F/Y = 46 psi.
      a. At 5% deflection when calculated in accordance with ASTM D2412.
B. Joints
   1. Johns-Manville Ring-Tite integral bell type or approved substitute.

2. Solid cross-section rubber O-ring gasket securely locked in place to prevent displacement.
3. Shall withstand 25-psi internal pressure without leakage.
4. Rubber gaskets shall comply with ASTM D1869.
5. Manhole connections must be made with elastomeric gasket to provide flexibility and water tightness.

C. Pipe Markings
1. The following information is to be marked on pipe at five foot intervals:
   a. Manufacturer's name or trademark
   b. Nominal pipe size
   c. PVC Cell classification
   d. The legend (e.g., "Type PSM SDR 35 PVC Sewer Pipe")
   e. Date and location of manufacture

D. Installation
1. SDR 35: To be in accordance with ASTM D2321 and TR-614A by the Johns-Manville Company for SDR 35.
2. The lubricant must conform to the wash test for subaqueous lubricants in accordance with ASTM C-497, and both the Underwater and Regular Lubricants meet the Durometer and volume change test requirements in accordance with ASTM C-497, Section 12.2, and ASTM D-2240.

E. Deflection of storm drain pipe is not permitted.

6. BRICK AND MORTAR FOR EXISTING BRICK MANHOLES AND INLETS

A. All new manholes and inlets shall be precast concrete. This section shall only apply to repairing annular space between an existing brick manhole or inlet and new pipe, to fill an abandoned penetration, or to repair an existing brick flow channel where permitted by City.
B. Brick shall conform to ASTM C32, Grade MM Sewer Bricks.
C. Six brick absorption shall not exceed 14%.
D. The brick sample shall be provided for approval one week prior to use.
E. Mortar shall be an approved type S mortar.
F. Mortar joints shall be struck.
G. Brick shall be laid to match the existing bond of the structure.
H. Parging is not permitted.

7. MANHOLE FRAMES AND COVERS

A. Size and type per standard details.
B. East Jordan Iron Works # 154514 Frame or approved City substitute.
C. East Jordan Iron Works # 154524 Cover or approved City substitute.
D. Neenah Foundry R-1565 frame and cover or approved City substitute.
E. Only 9” Frames are permitted.

F. Rated for H 20 loading.
G. Frames shall be anchored to structure per City Standard Details.
H. Frames shall be set in ½" minimum bed of approved Type S mortar.
I. Brick shall not be permitted to bring the frame to finish grade. Only precast concrete rings will be allowed.
J. An approved type S mortar shall be installed between concrete rings, ring and structure, and ring and frame per City Standard Details. Parging of concrete rings is not permitted.

8. PRECAST CONCRETE MANHOLES

A. Size per standard details.
B. In accordance with ASTM C-478.
C. Contractor to provide detailed drawings of each manhole prior to shipment and installation.
D. Joints shall be provided with rubber O-ring gasket meeting ASTM C-443 and shall be watertight when installed.
E. Annular space between pipe and pipe openings, including future stubs, shall
    1. Have no mortar placed between the pipe and the wall of the concrete structure, except as necessary to create a smooth transition from the pipe to the flow channel.
    2. Be provided with a flexible rubber pipe to manhole seal that:
        a. Shall be watertight.
        b. Meets the requirements of ASTM C923.
F. Lifting holes shall be provided to assure a "safe" lift without slippage. Fill lifting hole with approved non-shrink grout.
G. Steps shall be vibrated in place when casting into walls and shall be set vertically per OSHA requirements.
H. Flow channels shall be constructed of SHA concrete Mix #2.
I. Field cutting/altering of pre-cast manholes is not permitted.
J. Penetrations for future use and abandoned penetrations shall be sealed per City inspector's recommendations.
K. Annular space between pipe and pipe openings for doghouse manholes shall be filled with an approved non-shrink grout.

9. MANHOLE STEPS

A. Reinforced polypropylene plastic.
    1. Per City standard details.
    2. Per OSHA standards.

STORM DRAIN MATERIALS

Latest revision 01-02-18

10. INLET FRAMES AND GRATES

A. Class "NR" shall in accordance with City Standard Details.
B. Type “A-1” and “B-1” frames and covers.
   1. Cover shall be pre-cast concrete with a cast iron sidewalk frame and cover.
   2. Sidewalk cast iron frame - 4" deep with 20" clear opening.
   3. Shall meet ASTM A-48.
   4. In accordance with City Standard Details.

11. RIP-RAP

A. Shall be stone.
B. Rip-rap shall be underlain by a Class "C" geotextile and installed in accordance with the approved plan.

Class of RipRap	Specific Gravity -SSD (C127)	Absorption (C127)	LA Abrasion (ASTM C535)	Soundness NaSO4 (ASTM C-88)	Freeze-Thaw (CRD-C144)	Size In Weight	Approximate Diameter	Percent Of Total By Weight
Class I	2.81	0.46%	15.9 %	0.1 %	0.0 @ 20 cycles	Heavier Than 150lb. Heavier Than 40lb. Less than 2lb.	12 Inches 8 Inches 3 Inches	0 50 10 max
Class II	2.81	0.46%	15.9 %	0.1 %	0.0 @ 20 cycles	Heavier Than 700lb. Heavier Than 200lb. Less than 20lb.	20 Inches 14 Inches 6 Inches	0 50 10 max
Class III	2.81	0.46%	15.9 %	0.1 %	0.0 @ 20 cycles	Heavier Than 2000lb. Heavier Than 600lb. Less than 40lb.	28 Inches 20 Inches 8 Inches	0 50 10 max

Note: Optimum gradation is 50 percent of the stone being above and 50 percent below the midsize. Reasonable visual tolerance will apply.

12. PRECAST INLETS

A. Inlets shall be precast concrete.
B. Contractor to provide detailed drawings of each inlet to City for approval prior to shipment and installation.
C. Lifting holes shall be provided to assure a "safe" lift without slippage. Fill lifting hole with approved non-shrink grout.
D. Steps shall be vibrated in place when casting into walls and shall be set vertically per OSHA requirements.

E. Flow channels shall be constructed of SHA concrete mix #2.

F. Field cutting/altering of precast inlets is not permitted.

G. Joints shall be provided with an approved gasket and shall be watertight when installed.

H. Annular space between pipe and pipe openings, including future stubs, shall

1. Be provided with a flexible rubber pipe to manhole seal that:
    a. Shall be watertight.
    b. Meets the requirements of ASTM C923.
2. Have no mortar placed between the pipe and the wall of the concrete structure, except as necessary to create a smooth transition from the pipe to the flow channel.

ROAD CONSTRUCTION METHODS

Latest revision 01-02-18

ROAD CONSTRUCTION METHODS

Latest revision 01-02-18

1. GENERAL

   A. This specification encompasses street construction within the City of Salisbury Corporate Limits. Any conflict between these construction methods, and specification or plans from sources outside the Infrastructure and Development Department shall be brought to the attention of the City Engineer and will be considered not acceptable unless approved by the Engineer before construction. All construction methods are considered minimum standard.

2. RIGHTS OF VARIOUS INTERESTS

   A. Wherever work being done by the Owner's forces, Utility Companies or by other Contractor's forces is contiguous to work covered by this contract, the respective rights of the various interests involved shall be established by the Engineer to secure the completion of the various portions of the work in general harmony.

3. ENGINEER

   A. The term "Engineer" as used in these specifications refers to the designated representative(s) of the City Infrastructure and Development Department. During normal working hours, call Department of Infrastructure and Development at (410) 548-3170 or visit the Department in Room 202, Government Office Building, 125 North Division Street, Salisbury, Maryland 21801.

4. CONCRETE CONSTRUCTION

   A. Curb, gutter and sidewalk shall be constructed by a City approved curb gutter and sidewalk contractor, approved before construction.
   B. The Contractor will be responsible for damage to existing curb, gutter and sidewalk during construction. All disturbed or damaged areas shall be replaced in-kind to equal or better condition at no additional cost to the City.

5. STORM DRAIN AND INLETS

   A. All storm drain piping and inlets will be installed by contractors approved by City before construction.

6. MANHOLES AND VALVE BOXES

   A. Exposed Utilities in the streets, and other areas are set to a rough grade, by the Utility Contractor, using grades on the utility construction plan or as directed by the

Engineer. Manholes, valves, etc. must be adjusted to final grade by roadway Contractor. Unless otherwise specified, the Contractor will raise existing manholes, valve boxes, etc. to the proper grade before blacktopping.

1. Streets
   The Contractor shall construct streets using applicable City Standard details. The Contractor must adjust manholes and water valve boxes to grade, cross slope and minus ¼" of proper elevation. Elevations will be supplied (on a cut sheet) by the Developer's layout personnel. Use of a string line and the top of curbing is the recommended procedure for final adjustment.
2. Parking lots, grass areas, etc.
   Adjust manholes, valves, etc. to the finish grade in all areas, unless otherwise instructed by Engineer.

B. When instructed by the Engineer, the manholes and water valve boxes will be ringed with 8" wide by 8" deep City approved concrete.

C. The Contractor will be responsible for any damage to manholes and water valve boxes during construction.

7. EXISTING UTILITIES STRUCTURES

A. The Contractor will be responsible for damage to existing structures during construction. All disturbed or damaged areas shall be replaced in-kind to equal or better condition at no additional cost to the City.

8. TRAFFIC CONTROL

A. Unless otherwise specified all signs, arrow boards, barricades, lights, flagmen, etc. needed for maintenance of traffic shall be furnished by the Contractor. All traffic control devices shall be properly maintained to insure that the general public's safety is never jeopardized. All traffic control devices are to conform and adhere to those specified and set forth in the Maryland Manual on Uniform Traffic Control Devices.

B. A traffic control plan must be approved by the City when working on a City of Salisbury street is required and a traffic control plan must be approved by the State of Maryland when detouring or signing for construction, on or adjacent to State Highway roads.

9. COMPACTION TESTS

A. The Engineer may at his discretion require compaction and or proctor test results from an approved agency hired by the Contractor or developer when soil conditions are considered to be marginal for roadway construction. Testing procedures, as

outlined in "General Conditions" - Testing Procedure shall be adhered to by the testing agency.

10. ROADWAY PROOF ROLL

A. The Contractor will be required to proof roll materials to determine if roadway is acceptable for stabilization and paving. The roadway shall be proof rolled as described in "Testing Procedures", unless otherwise directed or approved by Engineer.

11. MANHOLE WORKMANSHIP AND SAFETY

A. All work shall be done by qualified workers using proper equipment. The Contractor shall be responsible for maintaining a safe working condition in and around the manhole area. This shall include but not be limited in testing of the atmosphere in the manholes prior to entering and also continuously during the workday. The atmosphere is to be checked for flammable gas, toxic gas (including hydrogen sulfide) and oxygen deficiency. Provision for proper ventilation of the atmosphere in the manhole in order to insure a safe working environment shall be the responsibility of the contractor. All electrical equipment must be explosion-proof (also lighting). Specific attention must be paid to the possible presence of flammable gas, toxic gas, and oxygen deficiency in manholes.

B. The Contractor shall stop work, except ventilation efforts, and clear the area if the atmosphere does not meet Maryland Occupational Safety Administration and OSHA requirements for confined space entry. All other MOSHA and OSHA requirements are to be met. This is the responsibility of the Contractor.

12. PAVEMENT MILLING

A. The Contractor shall furnish a pavement-milling machine with operator for the milling of existing bituminous concrete. Milling machine shall be equipped with automatic sensor for grade control and be capable of removing, in one pass, a layer of asphalt pavement at the specified depth and at least half the lane width. At the time of bidding, the Contractor shall submit information and the type of machine he intends to use. The cold milling process shall be utilized. Unless otherwise specified the Contractor shall supply all manpower and equipment for milling and delivery of milled materials.

B. The Contractor will be responsible to check the pavement ahead of the milling operation for any buried metal objects such as manholes and valves. Unless otherwise specified milling materials from City streets shall belong to the City and shall be delivered by the Contractor to an agreed upon location for usage by the

City. Maryland State Highway Standards Specification for Construction and Materials Section 508 will also be applicable unless otherwise directed or approved by the Engineer.

C. For areas that are less than 2000 square feet, a skid steer mounted with a 30" wide milling attachment may be utilized as long as the proper grade and profile of the road surface can be maintained.

13. INSPECTION SCHEDULE

A. An inspection shall be made by the Engineer, of the rough graded subbase before continuing construction to assure material is suitable for construction without additional undercutting.

B. An inspection shall be made by the Engineer, of the graded select borrow or existing material before placement of stone. The Engineer shall determine satisfactory compaction and proper cross section grade according to the template.

C. An inspection shall be made by the Engineer, of the placed and fine graded stone stabilization before placement of Bituminous Asphalt. The Engineer shall determine proper cross section grade according to the template and proper adjustment of manholes, water valve boxes, and other structures.

D. A pre-final inspection of all areas of construction will be made by the Engineer at which time a punch list of unfinished or unsatisfactory construction items will be submitted to the Contractor.

E. After completion of punch list items, a final inspection of all construction areas shall be made by the Engineer, before total acceptance of work by the City and before the beginning of warranty period by the Contractor.

F. If the Engineer deems it necessary, the Engineer may require at his/her discretion additional inspections or eliminate inspection steps throughout the construction period.

14. UNSUITABLE MATERIAL

A. Where existing or placed base soil is of unsuitable material, the Engineer at his discretion may require removal and replacement with approved select borrow. Existing material, which would normally be acceptable but was removed due to excessive moisture, may be used after adequate removal of moisture at the Engineers discretion.

15. MOISTURE CONTENT OF MATERIAL

A. Where material is determined, by Engineer, to be too dry for proper compaction, paving, or dust control, the Engineer may require the Contractor to incorporate a

wetting technique, such as placement of water on the material, or an application of calcium chloride. The wetting technique must be approved by the City before application.

B. Where material is determined by the Engineer to be too wet for proper compaction or paving, the Engineer will require the Contractor to remove material or suspend construction operations until a proper drying technique can be performed or suitable backfill is brought to the site. The method utilized by the contractor must be approved by the Engineer.

16. DRAINAGE

A. Where ground water or runoff due to construction or other factors is encountered the Engineer may require suitable under drainage of roadbed or other drainage relief as deemed necessary. Contractor shall not leave roadway in a condition so as to impede drainage or pocket water when storms are expected and when leaving construction area for extended time periods such as over the weekend.

17. SEDIMENT CONTROL

A. Sediment control requirements, per Soil Conservation "Standards and Specifications for Soil Erosion and Sediment Control in Developing Areas" latest revision, shall be adhered to when soil is disturbed.

18. TYPICAL STREET SECTIONS

A. Unless otherwise specified, all streets shall be constructed to City of Salisbury typical sections and templates for the street as designated by the Engineer. All streets shall be constructed as shown on template drawings.

19. CONSTRUCTION SEQUENCE

A. Shall be as specified or shown on plan or as directed by the Engineer.

20. ROADWAY PATCHING

A. See Construction Methods Utilities

ROAD CONSTRUCTION
MATERIALS

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ROAD CONSTRUCTION
MATERIALS

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1. MATERIALS, EQUIPMENT AND CONSTRUCTION PROCEDURE

   A. Bituminous concrete and wearing course shall be constructed in accordance with – Section 500 Paving, of the Maryland State Highway Administration Standard Specifications for Construction and Materials.

2. BITUMINOUS SURFACE COURSE & BASE COURSE

   A. Bituminous concrete material to be used on this project will be placed in depths as shown on plan and/ or as directed by the Engineer. The Contractor will submit an approved Maryland State Highway Administration Mix Design to the Engineer at least one (1) week prior to actual construction and receive approval before starting.

3. BITUMINOUS CONCRETE TESTING

   A. Testing shall conform to Maryland State Highway Administration Specifications, latest edition, with errata and addenda.
   B. The City of Salisbury reserves the right to require the Contractor to provide testing to insure proper asphalt content of the mix, and specified compaction requirements of the in place mat.

4. MINERAL AGGREGATE

   A. Shall be 100% commercially graded aggregate and shall conform to Maryland State Highway Administration Specifications, latest edition, with errata and addenda. It shall be dried and brought to the mixer at a temperature between 250F and 350F. It is the intent that when combined with asphalt cement, the resultant bituminous concrete mixture shall be at a temperature of between 250F and 300F.
   B. The principle aggregate shall be crushed stone of gradation and specific gravity suitable to the Engineer.
   C. A controlled amount of commercially graded washed sand and special gradations of crushed stone will be permitted not exceed 50% of the batch.
   D. The Engineer reserves the right to disapprove any source of aggregate which, in his opinion, is unsuitable for use on this contract. Approval of source of aggregate shall be secured before submittal of bid.

5. BORROW EXCAVATION

   A. Borrow material shall meet the requirements of Maryland State Highway Administration Classification A-2 or better, with maximum P.I. of 10.0 and a dry weight not less than one hundred and ten (110) pounds per cubic foot as

determined by "Standard Laboratory Method for Test for Compaction and Density of Soil", A.A.S.H.O. Designation T-180.

B. The Engineer reserves the right to disapprove any source of aggregate which, in his opinion, is unsuitable for use on this contract. Approval of source of borrow may be secured before submittal of bid.

6. STONE

A. Material shall meet the requirements of Maryland State Highway Administration CR-6, GAB Crushed Stone or Recycled Concrete. All stone or Recycled Concrete shall be composed of clean, hard crushed stone and shall be free from excess of thin or elongated pieces, frozen lumps, vegetable or other deleterious matter, organic matter, metal, wood Etc. and not become slippery under conditions of wetting. In all other aspects, the stone or Recycled Concrete shall meet the requirements of the Maryland State Highway Administration's Specifications for Materials, Highways, Bridges and Incidental Structures except as may be otherwise noted in this specification.

B. The Engineer reserves the right to disapprove any source of aggregate which, in his opinion, is unsuitable for construction. Approval of source of stone shall be secured before submittal of bid

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7. RC6 (RECYCLED CONCRETE)

A. **RC6 Recycled Concrete to be used as roadway stabilization only, not to be used as pipe bedding, not to be in contact with metals i.e. manhole frames, water valve boxes, utility mains, etc. A minimum 3' separation shall be provided.**

B. Material must meet the requirements of Maryland State Highway Administration CR6 Crushed Stone in addition to Salisbury Infrastructure and Development requirements for Stone M-3 #7 and requirements listed herein. The following supplemental items and testing requirements are required for acceptance of recycled concrete (RC6) as stabilization on City of Salisbury Roadways:

1. For every 500 tons or fraction thereof.
2. Upon receipt of passing test reports performed by a licensed professional engineering consulting firm Salisbury Infrastructure and Development will approve RC6 stock piles for use within City of Salisbury Right of Ways or Easements. Stockpiles at the time the test samples are taken shall be designated as captive, meaning no new material may be added.
3. Salisbury Infrastructure and Development representative shall meet the approved engineering consulting firm on site and determine sampling locations for all testing.
4. Base paving shall be placed within reasonable time after placement of RC6

due to possible leaching.

5. Questionable loads delivered to any site may at the inspector's discretion require retesting.
6. Per the Maryland State Highway Administration Standard Specifications for Construction and Materials:
   a. One sieve analysis for aggregate grading requirements per table 901A.
   b. One Sodium Sulfate test will be required per 5,000 ton captive stockpile or portion thereof. Additional tests may be required at the Engineer's discretion per SHA table 901B.
   c. One Flatness & elongation test will be required per 5,000 ton captive stockpile or portion thereof. Additional tests may be required at the Engineer's discretion per SHA table 901B.
   d. One Los Angeles Abrasion test will be required per 5,000 ton captive stockpile or portion thereof. Additional tests may be required at the Engineer's discretion per SHA table 901B.
   e. Material sources may be rejected where it is evident that the material tends to be of marginal quality when compared to the Specification limits of its specified properties per SHA 900.01.
   f. Materials represented by samples taken and tested in accordance with the specified tests and failing to meet required values shall be considered to be defective regardless of prior tests or approvals per SHA GP-6.03.
   g. The cost of replacing, correcting and or removal of defective material will be the responsibility of the contractor, developer, owner, or material vendor per SHA GP-6.03 d.
   h. One Analysis of aggregate physical property requirements test will be required per 5,000 ton captive stockpile or portion thereof. Additional tests may be required at the Engineer's discretion per SHA table 901B

C. Per EPA method 9045C Soil and Waste PH.
   1. One PH test with results greater than 2 and less than 12.5 (EPA Corrosivity Limits)
   2. EPA Toxicity Characterizing Leaching Procedure (TCLP) test will be required per 5,000 ton captive stockpile or portion thereof. Additional tests will be performed at the Engineer's discretion where any material is suspected to be hazardous or toxic per SHA TC-6.09 and SHA TC-6.10.

8. TESTING

A. The City of Salisbury reserves the right to require the Contractor to provide any testing to insure that the placement of material and the material itself conforms to

City of Salisbury specifications.

9. ROADWAY SUBGRADE CONSTRUCTION

A. Subgrade preparation

1. Prior to any work being performed on roadways, a determination shall be made by an licensed engineering or geotechnical firm and submitted to the City of Salisbury Department of Infrastructure and Development and developer as to type of stabilization to be utilized and the type and thickness of paving to be used.
2. The type of stabilization used with this specification is Crushed Stone GAB. For stabilization types other than Crushed Stone GAB advance approval is required in writing from the Infrastructure and Development Department prior to any work being performed.
3. Before grading is started, the entire right-of-way area shall be first cleared of all stumps, roots, brush and other objectionable materials and all trees not intended for preservation. All tree stumps, boulders and other obstructions shall be removed to a depth of two (2) feet below the subgrade.
4. At the discretion of Infrastructure and Development Department, material from roadway cuts conforming to the standard for select fill may be used on-site as needed.
5. When unsuitable material is encountered, the unsuitable material shall be removed as directed by the Infrastructure and Development Department. The unsuitable material shall be replaced with acceptable cut material from the project or of borrow excavation in accordance with the City of Salisbury Infrastructure and Development Construction and material Specifications and section 203-"borrow excavation" (select borrow) of Maryland S.H.A. latest edition specifications including all errata and addenda. Compaction and moisture control for the materials finally used shall be accomplished in accordance with section 204-"embankment and subgrade" of Maryland S.H.A. specifications including errata and addenda.
6. The roadways and their appurtenances shall be graded to the proper cross-section as shown in the City of Salisbury Book of "Construction Standards" and to the lines and profile grades shown on approved plans. The acceptability of the final subgrade shall be determined by the Infrastructure and Development Department before any stabilizing aggregate is applied.

B. Roadway subgrade stabilization for good, medium, and poor soils

1. Subgrade preparation roadway subgrade stabilization for good, medium and poor soils % of dry density modified proctor to establish California bearing ratio values. The subgrade must be tested at 95 subgrade with CBR above 20 will be classified as good class subgrade, CBR between 5 and 20 will be

classified as medium class subgrade and CBR less than 5 as poor class subgrade. Compaction of the aggregate subbase % modified proctor density.

a. good class subgrade- CBR above 20 = use 6 inches of Crushed Stone GAB (ASTM d2940(h)).
b. medium class subgrade- CBR 5 to 20 = use 10 inches of Crushed Stone GAB (ASTM d2940(h)).
c. poor class subgrade - CBR 2 to 5 = use 14 inches of Crushed Stone GAB (ASTM d2940(h)). Tensar bx1200 or equal with 10-inches of stone.
d. very poor class subgrade - CBR less than 2 = design must be approved by the Infrastructure and Development Department and unsuitable material shall be removed and replaced with select borrow as directed by the Infrastructure and Development Department.

2. Crushed Stone GAB stabilization shall be applied by an approved mechanical spreader or approved alternate at the rate designated. After the stabilizing aggregate has been applied at the designated rate, the aggregate shall be carefully shaped so as to avoid segregation, brought to the proper grade and cross-section and thoroughly compacted. Water shall be added by sprinkling in sufficient quantity to attain proper compaction. Compaction and moisture control shall be accomplished in accordance with section 501-"aggregate base courses" of Maryland S.H.A. latest edition specifications including all errata and addenda.
3. The Infrastructure and Development Department or their representative must be present as the stabilizing aggregate is being applied. Proof of aggregate weights shall be determined by certified weigh slips, which must be presented to the City of Salisbury representative prior to the stabilizing aggregate being applied.
4. High ground water and field conditions significantly different than 95% dry density will require design review at the time of subbase placement.

C. CBR testing

1. Soil sampling locations shall be determined by Infrastructure and Development Department prior to testing for new subdivision streets. Tests shall be at roadway entrances, intersections, cul-de-sacs, and 500 feet on center of roadway. Failure to get Infrastructure and Development Department approval of locations may result in the need for additional testing.
2. Provide soil classifications at each location to a depth of 6 feet and note groundwater if encountered.
3. Test and report shall conform to ASTM d-1883
4. Road design will be based on CBR testing.

CONCRETE CONSTRUCTION
METHODS & MATERIALS

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CONCRETE CONSTRUCTION
METHODS & MATERIALS

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1. STANDARD DETAILS

   A. The Contract or project as described shall be built in accordance with the "Construction Standards" Manual of the City of Salisbury, latest revision. Pertinent standard drawings are included in this contract. All others are available at the City of Salisbury Infrastructure and Development Department.

2. VERTICAL ELEVATIONS & HORIZONTAL ALIGNMENT (Grades and layout)

   A. Concrete construction which will be located inside of City R/W, Easements, Alleys, Street Beds, or is City maintained, or located on private property which connects to City maintained concrete; shall not be placed at any time without City approved horizontal alignment and/or vertical elevations.

   B. Layout and/or cut sheets shall be submitted to City Engineer or representative in advance of construction (three (3) days minimum). Approval shall be in writing from the Engineer. (Cutsheet stamped and signed by City Engineer or representative will be acceptable).

   C. Contractor will be responsible for the removal and re-alignment of any unapproved concrete placed on private property which does not tie-in to City profile grades when approaching City maintained concrete. The amount of concrete to be removed and re-aligned shall be the City Engineer or representative's decision.

   D. The City shall not be held responsible for any concrete construction on private property which does not provide proper drainage, due to prior design which insufficiently incorporates City profiled streets etc., into the site-work design.

3. METHODS, MATERIALS, WORKMANSHIP

   A. Shall be as described in the Maryland State Highway Administration's "Specifications for Construction and Materials for Maryland State Highway Projects", latest revisions except as herein specified. The City of Salisbury reserves the right to reject all concrete construction which is not placed and finished as specified in City of Salisbury Specification and Details to a quality, which is consistent, with other concrete construction, accepted by the City, within the City Limits. The Contractor shall familiarize himself with existing concrete finishing standards and techniques considered acceptable in the City. The Engineer will, upon request, arrange a field tour of different concrete construction sites to help the Contractor establish the finished construction quality, which is expected from the Contractor when working in the City limits.

4. MINIMUM SAFETY PRECAUTIONS

   A. "CAUTION" Freshly mixed cement, mortar, concrete or grout may cause skin injury. Avoid contact with skin whenever possible and wash exposed skin areas promptly with water. If any cement or cement mixtures get into the eyes, rinse immediately and repeatedly with water and get prompt medical attention. Keep children away from cement powder and all freshly mixed cement products.

   B. Follow these safety precautions at a minimum to avoid skin contact with cement powder, freshly mixed concrete, grout or mortar.
      1. Wear rubber boots high enough to keep out cement products. Tops of boots should be tight to protect feet.
      2. Wear rubber gloves to protect hands.
      3. Wear long pants tucked inside boots to protect knees.
      4. Wear knee pads when finishing concrete to protect knees.
      5. Wear long-sleeved shirts buttoned on the sleeves and neck to protect upper body and arms.
      6. Wear tight-fitting goggles when handling cement powder to protect eyes.

5. FORMING

   A. All form work shall be completed with City of Salisbury Standard Curb, Gutter and Sidewalk steel forms, except short radii curves with a radius of 500' or less, and where approved by the Engineer. All steel forms will be straight and free of defects and debris.

6. JOINT FILLER

   A. Shall be of a non-extruding bituminous fiber type conforming to A.S.T.M. Specifications (latest revision) for pre-formed expansion joint filler for concrete (non-extruding and resilient), latest revision.

   B. Felt roofing paper, polyethylene, or other approved substitute joint material shall be placed around utility poles, anchors, signs, hydrants and other stationary objects in the sidewalk area. The material shall be placed flush with the finished grade of the sidewalk and extend the complete depth of the concrete.

7. CONCRETE BATCH DESIGN

   A. The concrete mix used in performing this work shall be Maryland S.H.A. No. 3 (See S.H.A. Specifications Section 902, latest revision) and shall meet the approval of the Engineer.

   B. Fly ash shall meet the requirements of A.S.T.M. C-618 pozzolan Class F and may be

used as a partial substitute for cement when approved by the Engineer.

C. The concrete temperature shall not exceed 90F. when delivered to the job-site or at any time prior to placement in the forms.

D. Type I - Portland Cement: Shall be used from October 1st thru May 1st and when the air temperature in the shade and away from artificial heat is 70□F or less, or as directed by the Engineer.

E. Type II Portland - Cement: Shall be used from May 1st thru October 1st and when the air temperature in the shade and away from artificial heat is above 70□F, or as directed by Engineer.

F. When required by the Engineer, Hi-Early strength concrete (S.H.A. Mix No. 6 having no less than 7.5 bags of Portland cement per Cubic yard, will be used. When Hi-Early strength concrete is used, the Engineer shall determine the period of time required for curing and the time necessary prior to opening construction to traffic. This shall normally be no less than 24 hours after placing.

G. Concrete must be supplied by a Maryland State Highway Administration approved batch plant.

8. PLACING AND FINISHING

A. Concrete not in excess of 3" slump shall be placed in a single layer and shall be scored as directed by Engineer, and finished by steel trowel, cork float, roller, broom, or by a combination of the above, as directed by the Engineer.

9. REINFORCING WIRE MESH

A. 6" x 6" - #10 gauge to meet A.S.T.M. Designation A-185 (latest revision).

10. REINFORCEMENT FOR CONCRETE STRUCTURES

A. Shall meet all the requirements of Maryland State Highway Administration "Standard Specifications for Construction and Materials" (latest edition) Sections 420 and 902. Reinforcement shall be deformed and must conform to A.S.T.M. A-615 GRADE 60. Size, location, and spacing shall be as shown on details.

11. CURING

A. A sample of the curing compound shall be submitted to the Engineer for approval, before use by the Contractor.

B. The temperature of freshly placed concrete shall be at least 50 degrees F and shall be maintained at a temperature in excess of 50 degrees F for a period of three (3) days after pouring and placement.

C. After the forms have been stripped and all necessary finishing completed, the Contractor shall apply two (2) applications of approved colorless curing compound. The second coat shall be applied in a direction perpendicular to the first coat. The compound shall form a uniform, continuous, coherent, film that shall not check, crack, or peel and be free from pin holes and other imperfections. If pin holes or other discontinuities exist, additional coat shall be applied within 30 minutes to the affected areas.

D. Concrete surfaces which are subjected to heavy rainfall within three hours after the compound has been applied shall be re-sprayed, by the Contractor, at no additional cost to the City. Concrete surfaces which in the opinion of the Engineer have insufficient coverage shall be re-sprayed, by the Contractor, at no additional cost to the City.

12. COLD WEATHER CONCRETE PLACEMENT

A. After November 15th of each calendar year, no concrete is to be placed without special permission from the City Engineer.

B. The Contractor shall be governed by Maryland State Highway Administration Specifications, Section 501.0302 Cold Weather Concreting. Principal among these is the following:

1. Do not pour concrete on frozen sub grade (suggest excavating for concrete on the morning of the day concrete is to be poured or place adequate insulation on prepared sub grade to prevent freezing).
2. Pour no concrete when the air temperature in the shade and away from artificial heat is 40 degrees F. or less, without specific permission from the Engineer.
3. Have available all times, to the job-site, adequate insulating cover material such as large burlap bags filled with straw or straw in between two layers of burlap or plastic sheeting. Under conditions where it might be expected that the air temperature will fall below freezing, these cover materials should be applied to all concrete and remain in place for five (5) days. In the event High-Early strength is poured, this may be reduced to three (3) days.
4. If the Contractor desires to use any other effective way of protecting against damage by cold weather, the Contractor shall have approval of the Engineer before placement at job-site.
5. Any materials which meet Maryland State Highway Administration cold weather concrete procedures will be satisfactory.

13. EXCAVATION AND BACKFILL FOR CONCRETE PLACEMENT

A. All excavation for concrete placement shall be incidental to the various items of this Contract. Backfilling with earth to the typical section shall be incidental to the various items of this Contract and will not be a pay item.

14. ACCEPTANCE OF COMPLETED WORK

A. The Contractor will be required to bring each curb, gutter and sidewalk improvement to a finished condition without undue delay.
B. The Contractor shall be entirely responsible for the safety of the public, until final acceptance of each job-site by the City.
C. The Contractor shall remove all forms, scrap lumber, excess earth, materials, and tools incidental to construction, and shall shape the earth in the vicinity of the improvement and leave it in a neat and presentable condition.
D. Upon completion of work at each job-site, the Contractor may submit a final completion report to the Engineer. The Engineer will cause final inspection to be made, in a reasonable amount of time, and formally accept each job-site for City maintenance.
E. Contractor payments will not be made on any areas, which have not been formally accepted by the Engineer.

STREET LIGHTS
CONSTRUCTION METHODS & MATERIALS

Latest revision 01-02-18

STREET LIGHTS
CONSTRUCTION METHODS & MATERIALS

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1. STANDARD DETAILS

   A. The Contract or project as described shall be built in accordance with the "Construction Standards" Manual of the City of Salisbury, latest revision. Pertinent standard drawings are included in this contract. All others are available at the City of Salisbury Infrastructure and Development Department.

2. METHODS, MATERIALS AND WORKMANSHIP

   A. Shall be as described in the Specifications for the project or as directed by the Engineer, or City of Salisbury, Traffic Department representative. Shall meet all local and national electrical codes. Handicap accessibility shall be maintained for sidewalks when placing poles and base.
   B. Contact the City of Salisbury Traffic Manager in the Field Operations Department prior to commencing street light construction.

3. MATERIAL APPROVALS

   A. A materials list showing all materials to be used for street lighting purposes shall be submitted to the City of Salisbury, prior to ordering or shipping of materials and/or delivery of materials to jobsite. The City reserves the right to standardize on specific brands or models, of products, when the Engineer or representative of the City feels it is in the best interest of the City to do so. It shall be the Contractors responsibility to use only materials previously approved, in writing, by the City for the project. See Approved Substitutes section.

4. POLE SPACING (Unless otherwise specified)

   A. Shall be 250' maximum distance from center of poles except when decorative lighting is installed. If decorative lighting is installed, then pole spacing shall be determined by wattage of lamp and manufacturer's recommended fixture spacing. Poles should be a minimum of 5' from any utility laterals.

5. POLE SIZE (Unless otherwise specified)

   A. Aluminum: (see construction standards detail Std. 600.01)
      a. Height = 28'0"
      b. Base diameter = 8"
      c. Top diameter = 4.5"
      d. Base bolt circle template = 10"
      e. Base bolt circle range = 10"-11"

f. Base bolt spacing = 7-1/2" square.
g. Base flange casting = 10 ½" x 10 ½" outside.
h. Base flange casting = 13 5/8" diagonal.

B. If decorative lighting is used, pole height shall be determined by wattage of lamp and manufacturer's recommendations.

6. POLE MATERIAL (Unless otherwise specified)

A. Aluminum
   a. Manufactured by Hapco # 21-647
   b. Removable aluminum pole top.
   c. Cast aluminum base flange w/bolt covers.
   d. two (2) 1/16" base shims per pole.
   e. Arm bracket to be factory drilled for 4(four) 3/8" bolts.

B. Decorative poles shall be Hadco, SP 6855-14A, and approved by City.

7. POLE ARM

A. Aluminum
B. Spread = 8' (excluding luminaire)
C. Rise = 2'6" from center of bracket
D. Aluminum tube tapered & flattened.
E. Luminaire end of arm sized for 2" slip-fit luminaire.
F. Center of arm support bracket to be 6" below top of pole, before pole top placement.
G. Arm hardware to include four (4) 3/8" bolts, flat washers, and 1" I.D. Grommet.
H. Luminaire to be installed with 30' minimum height, from centerline of luminaire to ground level.

8. POLE ACCESS HANDHOLE

A. Opening = 8"H x 4"W (when pole is vertical)
B. Reinforced frame and cover
C. 1/2'-13 NCR tap for electrical ground connection to cover.
D. Cover shall be mounted to pole and all hardware included.

9. LUMINAIRE

A. All Luminaire shall be LED. See Standard Details.
B. Cobra head: 48, 4000K Philips Lumileds Luxeon T LED with photo control.
C. Ornamental Street Light, Residential: 80, 4000K Philips Lumileds Luxeon R LEDs.

D. Ornamental Street Light, Collector: 80, 4000K Philips Lumileds Luxeon T LEDs.
E. All fixtures shall be equipped with photoelectric receptacles.
F. All Luminaires or decorative fixtures to operate at 240v. (unless otherwise specified).
G. Decorative lighting shall be Hadco, 56855-2B5NNG250SG, and approved by City.
H. Decorative lighting circuits shall be controlled by approved lighting contactor controlled by photocontrol.

10. POLE BASE (for Aluminum poles)

A. Concrete
   a. Top must be set level
   b. Bottom Diameter = 24" square
      Top Diameter = minimum 13" square.
   c. Depth = 42" minimum. Actual depth of concrete varies, according to soil conditions and possible under-ground conditions.
   d. Top of base to be set 2"-4" above proposed ground level or set to proposed top of curb grade, per City.
   e. Unless otherwise specified two (2) 1-1/2" PVC electrical conduit elbows shall be installed in each base and extended above the base and outside the base on each side. The conduits shall be stubbed out at a depth of 18" below proposed ground level and placed to, couple to, main line conduits connecting pole to other poles or service.
   f. Galvanized Anchor bolts = four (4)- 1" diameter x 40" long anchor bolts placed on 10" bolt circle size and 7-1/2" square. Two (2) anchor bolts must be placed, parallel with, and on the curbside of base. Top 12" of bolt is threaded and projects 4" above top of base.
   g. Mounting of pole-to-pole base: Install two (2) galvanized adjusting hex nuts to each anchor bolt (8 (eight) total). Install two (2) galvanized flat washers to each anchor bolt (8 (eight) total)
B. Galvanized metal (Screw-In)
   a. AB Chance Co. # C1124NG4VP or approved substitute.
   b. Dixie # N 1202-0053
C. Decorative base shall be Hadco, D1202-0231 Dixie Base, and approved by the City.

11. ALUMINUM POLE ADJUSTMENT

A. Pole shall be plumbed vertical, by Contractor, using two (2) 1/16" galvanized shims below aluminum pole base flange. Four (4) hex nuts to be tightened securely after adjustment and covers secured in place over bolt ends.

12. CONDUIT AT/BETWEEN POLES OR TO SERVICE

A. Unless otherwise specified, it shall be 1-1/2" PVC Schedule 40 Electrical conduit.
B. Shall be 18" minimum depth at all locations, may be deeper where required by City or specification.
C. Shall be enclosed at all locations
D. Shall terminate in City approved box or fixture
E. Conduit installed under street will be IMC or approved substitute
F. Conduit shall be installed per approved site plan prior to lot driveway construction, lot sodding or roadway surface application.
G. Contact the City's Traffic Manager to inspect conduit prior to backfill.

13. ELECTRICAL SERVICE/METER PANEL MOUNTS (Unless Otherwise Specified by City)

A. Metered Service - Pedestal
    a. Milbank 200A Pedestal Series, 12 Circuit Interior, 20A Receptacle, with lever bypass, U6221-O-200-10GR.
    b. Or Equal approved by Delmarva Power or appropriate power company.
B. Metered Service - Wood Mount
    a. Panel mount shall be constructed using 2" x 8" or 2" x 10" salt treated boards, which shall be fastened securely to 4" x 6" salt treated post(s). Top of post(s) shall be beveled to shed water. Boards shall be placed perpendicular to the post and boards shall be added to post(s) in a sufficient quantity, to allow for installation of the meter and panel on the same mount. Upright Post(s) shall be buried in the ground to a minimum depth of 4' below the finished ground elevation. Top of meter shall be mounted to height of 3' to 6' above finished ground elevation. Bottom of panel shall be mounted to a minimum height of 12" above finished ground level. Posts shall be plumbed vertically when placed in the ground. Top of mount shall be plumbed horizontally when placed in the ground.
    b. Service panel shall be Square "D" brand panel, approved by City before beginning construction.
C. Service to be located next to power source (ie: transformer pad).

14. ELECTRICAL WIRING (Must comply with the National Electrical Code)

A. Inside pole/Conduit (No direct burial accepted).
    a. Copper
    b. T.H.H.N. Insulation
B. In line fuses, 10 Amp 250 Volt, maximum size, required at handhole opening at each pole

C. Circuits shall be 240 volt.
D. Breakers shall be double pole and sized to accommodate load.

15. ACCEPTANCE OF COMPLETED WORK

A. The Contractor will be required to bring light poles, wiring, services, and other appurtenances to a finished operational condition without undue delay.
B. The Contractor shall be entirely responsible for the safety of the public, until final acceptance of each jobsite by the City.
C. The Contractor shall remove all materials, forms, scrap lumber, excess earth, materials, and tools incidental to construction, and shall shape the earth, and seed disturbed areas in the vicinity of the improvement and leave it in a neat and presentable condition.
D. Disturbed roadways and driveways shall be restored by an approved contractor for the particular repair, using materials, standards, and workmanship previously approved by the City. See City "Construction Standards" pertaining to each type of repair.
E. Upon completion of work at each jobsite, the Contractor may submit a completion report and any necessary Electrical Inspection Certificates to the proper Power Company representative. The City's Traffic Manager will also conduct a final inspection and formally accept each jobsite for City maintenance if all City specifications have been met.
F. Contractor payments will not be made on any areas, which have not been formally accepted by the Engineer.
G. Contractor shall submit as-built drawings.
H. The City will apply for Customer service and establish an account with the local Power Company, after receipt of certification from Contractor.
I. Contractor will maintain streetlights for a period of one (1) year from date of acceptance of completed work.

TESTING PROCEDURES

Latest revision 01-02-18

TESTING PROCEDURES

Latest revision 01-02-18

1. RESPONSIBILITY

   A. Unless otherwise specified, testing shall be the responsibility of the Contractor. The City shall approve the Testing Agency before beginning of testing. Prior to roadway construction/re-construction, including but not limited to, paving and concrete, the required and acceptable test reports for all water, sewer, storm drain and roadway subgrade must be approved by the City of Salisbury, Department of Infrastructure and Development, technical support branch

   B. All test reports must be submitted directly to Salisbury Infrastructure and Development by the Testing Agency via fax, e-mail, hand-delivery or the U.S. Postal Service.

   C. Test reports must be delivered within 1 week of testing and prior to the placement of CR6, Crushed Stone GAB, paving, sidewalks, etc.

   D. Testing Agencies must provide access to all documentation regarding tests performed within City of Salisbury Right of Ways and or Utility Easements to Salisbury Infrastructure and Development upon request by the City.

   E. All test reports must reflect:
      1. Type of material tested, including but not limited to CR6, Crushed Stone GAB, RC6, sand, select borrow, etc.
      2. The depth of the test from finished grade.
      3. Stationing of tests to correspond with pipe and or roadway stationing depending on test required.
      4. A written description of test performed i.e. a copy of technician's field report.
      5. The number of tests performed and the test results.
      6. A sketch or orientation map for tests taken.

   F. Only items B, C, and D apply to Bacteria Testing.

   G. All Public underground infrastructure must be completely installed and backfilled, in accordance with City standards, within the phase of the project, prior to any testing requiring observation and approval by City inspector.

2. SUB-GRADE COMPACTION

   A. See Standard Detail Drawing in "Construction Standards" Manual.

   B. Approved mechanical compactors required.

   C. 95% of maximum soil density required below top 12" of the street subgrade.

   D. 97% of maximum soil density required on top 12" of the street subgrade.
      1. Density by Modified Proctor Method (AASHTO T-180, AASHTO T-191)
      2. Contractor to conduct density tests. The cost of tests not meeting the density requirements shall be deducted from the Contractor's invoice.

   E. Backfill or sub-grade found not meeting above requirements shall be removed and recompacted by the contractor in a manner determined by the City Inspector.

F. The moisture content of the select borrow base course material at the time of compaction shall be within 2% of the optimum.

G. The material shall either be moistened or dried, as needed, and thoroughly mixed before compaction. Field compaction shall comply with the requirements of the following AASHTO test methods as modified by the Department:
   1. AASHTO T 180 Method A, Moisture-Density Relationship; Modified Proctor Test.
   2. AASHTO T 191 Density By Sand Cone.
   3. AASHTO T 224 Coarse Particle Correction.
   4. AASHTO T 238 Density By Nuclear Methods.
   5. AASHTO T 239 Moisture Content by Nuclear Methods.
   6. AASHTO T 272 Method C, Moisture-Density Family of Curves.

3. WATER UTILITY PRESSURE TESTING

A. All piping, valves, fire hydrants, services, and related appurtenances for the entire approved phase or sub-phase shall be installed prior to testing.

B. Pressure tests on exposed and aboveground piping shall be conducted only after the entire piping system has been installed and attached to pipe supports, hangers or anchors as shown on the Approved Plans.

C. City Inspector must be present to observe/approve the pressurizing process for Water Mains and appurtenances.

D. No testing shall be observed/approved prior to City Inspector possessing approved Red Lined Drawings and passing compaction test results.

E. Contractor shall not operate any valves without a City Inspector present.

F. Pressurize Main to 150 P.S.I. at the high point of the Main.

G. Maintain for 150 P.S.I for one hour on all mains, services, and appurtenances.

H. Repeat test after replacing section(s) of Main and/or appurtenance if previous tests have failed to hold required pressure. Sleeves or repair couplings will not be permitted in the replacement of failed Mains and/or appurtenances.

I. The Contractor is required to furnish all labor, tools, and equipment for pressure test(s).

J. All Fire Service lines shall be tested per applicable code requirements. Refer to City Fire Safety Inspector.

K. Test polyethylene tubing water extension (pigtail) on the backside or property line side of the water meter to the customer service coupling. The tubing shall be temporarily capped with a jumper placed in the water meter yoke and pressurized by air or water to 75 psi for acceptance. Contractor to furnish all labor, tools, gauges, meters and jumpers necessary to complete the test. The test must be observed by a City Inspector for acceptance.

L. All concrete anchor blocks shall be allowed to cure a sufficient time to develop a minimum strength of 2,000 psi before testing.

4. WATER UTILITY DISINFECTION

   A. Contractor shall not operate any valves without a City Inspector present.
   B. Provide minimum residual chlorine content of 5 ppm after (12) twelve hours.
   C. Flush utility to an approved discharge site, until a maximum of 1.5 PPM residual chlorine content remains in the water pipe.
   D. The utility must meet local Health Department requirements for bacteria levels for potable water before placing into service.
   E. Utility piping for horizontal and vertical realignment shall be disinfected per City's requirement.
   F. All test reports must be submitted directly to Salisbury Infrastructure and Development by the Testing Agency via fax, e-mail, hand-delivery or the U.S. Postal Service.
   G. Passing test reports must be delivered within 1 week of testing and prior to the placement of aggregate base, paving, sidewalks, etc.
   H. Testing Agencies must provide access to all documentation regarding tests performed within City of Salisbury Right of Ways and or Utility Easements to Salisbury Infrastructure and Development upon request by the City.

5. TRACER WIRE TEST

   A. Tracer wire test will be required for all non-metallic Water Mains and appurtenances.
   B. Tracer wire Tests for Water Mains and/or appurtenances will be performed by City Utilities Branch. Contractor shall contact City Inspector 3 days prior to required testing, for scheduling. Failed sections shall be repaired by Contractor in a manner approved by City inspector. The test will be repeated after repairs are made by Contractor.

6. SANITARY SEWER

   A. City Inspector must be present to observe the pressurizing of Sewer Mains and appurtenances.
   B. No testing shall be observed or approved prior to City Inspector possessing approved Red Lined Drawings and passing compaction test results.
   C. Air testing under the conditions approved by the City Inspector will be required. Air testing of Gravity Sewer Mains and appurtenances shall be accomplished by applying 5 PSI of for 5 minutes. Air Testing of Sewer Force Mains and appurtenances shall be accomplished by applying 100 PSI of air for 1 hour.
   D. Repeat test after replacing section(s) of main and/or appurtenance if previous tests have failed to hold required pressure. Sleeves or repair couplings will not be

permitted in the replacement of failing mains and/or appurtenances.

E. Mandrel test (deflection test) shall be performed by the Contractor in order to verify the roundness and proper installation of the pipeline. Mandrel shall be approved by the City Inspector prior to use and shall meet the following requirements:
   1. See Standard Detail in "Construction Standards" manual.
   2. Mandrel shall have a diameter equal to 95% of the inside diameter of the pipe.
   3. Mandrel shall have an odd number of gauging plates. The minimum number of plates shall be nine (9) with a contact surface length equal to the inside pipe diameter plus two inches (2") for pipeline ten inches (10") in diameter and smaller. On larger diameters, the contact surface length shall equal the inside pipe diameter.
   4. Mandrel shall be pulled through the pipeline from manhole to manhole by hand. If the mandrel is unable to pass the pipe without applying excessive force, as determined by the City Inspector it will be construed as evidence that pipe has deflected more than five percent (5%) of the inside pipe diameter.
   5. A permanent record of all testing with locations where excessive pipeline deflections occur shall be kept by the Contractor and forwarded to the Engineer after completion of testing on each line.
   6. Repeat test after replacing section(s) of main and/or appurtenance if previous tests have failed Mandrel Tests. Sleeves or repair couplings will not be permitted in the replacement of failing mains and/or appurtenances.

F. Mirror Testing shall be required for Gravity Sewer Mains and/or appurtenances. Mirror Testing shall be performed by City Inspector. The contractor must replace all failed sections of Mains and/or appurtenances. Sleeves and/or repair couplings will not be permitted in the replacement of failed mains and/or appurtenances.
   1. Repeat test after replacing section(s) of main and/or appurtenance if previous tests have failed Mirror Tests. Sleeves or repair couplings will not be permitted in the replacement of failing mains and/or appurtenances.

G. Tracer wire Tests for Force Mains and/or appurtenances will be performed by City Utilities Branch. Contractor shall contact City Inspector 3 days prior to required testing for scheduling. Failing sections shall be repaired by Contractor in a manner approved by City inspector. The test will be repeated after repairs are made by Contractor.

7. ROADWAY PROOF ROLL

A. A proof roll shall be performed with a fully loaded, ten-wheel dump truck to reveal any soft, yielding, or spongy areas. The equipment shall be run longitudinally with less than 18" (500 mm) of the unrolled area between tire strips.

B. If the test rolling shows the subgrade to be unstable, the Contractor shall

remove/replace, scarify, disc, aerate, or add moisture, and re-compact the subgrade to the extent necessary to achieve stability. Acceptance of the proof roll by the Engineer will be a requirement prior to placement of subsequent lifts.

C. Compaction and/or modified proctor tests are to be used in areas where proof rolling is not sufficient to determine if existing materials are acceptable for road construction or as determined by the Engineer.