

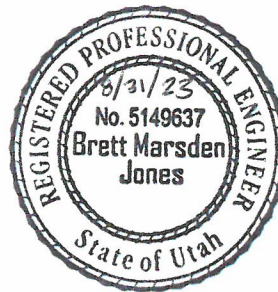
PUBLIC WORKS STANDARDS
FOR DEVELOPMENT, DESIGN,
AND CONSTRUCTION
for
BOX ELDER COUNTY



SUBMITTED & RECOMMENDED:

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8/31/23
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Aug. 16, 2023
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Attest, County Clerk

Aug. 16, 2023
Date

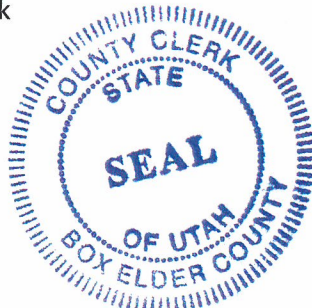


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SECTION 1 GENERAL

1.01 Ordinances Govern

Nothing in this document shall be construed to be contrary to Box Elder County Ordinances. Should a conflict exist between this document and the Ordinances, the Ordinances shall govern.

1.02 Conformance with Federal, State, and Local Laws

Nothing in this document shall relieve the Developer, Engineer, or Contractor from abiding by all Federal, State, and local laws.

1.03 Definitions

- A. Article – When “Article” is written, it shall be as if “Box Elder County Ordinance, Article” is written.
- B. Chapter – When “Chapter” is written, it shall be as if “Box Elder County Ordinance, Chapter” is written.
- C. Contractor – The individual, firm, co-partnership, or corporation, and his, their, or its heirs, executors, administrators, successors, and assigns, or the lawful agent of any such individual firm, partnership, covenantor, or corporation, or his, their, or its surety under the contract bond, constituting one of the principals to the contract and undertaking to perform the Work.
- D. Drawings – The County-approved construction drawings, the Box Elder County Public Works Standard Drawings, and/or the Manual of Standard Drawings, as applicable.
- E. Developer – The person or company sponsoring construction of the improvements.
- F. Development – The subject subdivision, minor subdivision, or building.
- G. Improvements – See “Work.”
- H. Improvement Plans – See “Drawings.”
- I. Inspector – The authorized representative of the County or County Engineer assigned to make all necessary inspections of the Work performed or being performed, or of materials furnished or being furnished by the Contractor.
- J. Standards – When “Standards” is written, it shall be as if “Box Elder County Development, Design, and Construction Standards” is written.
- K. Article 5 – When “Article 5” is written, it shall be as if “Box Elder County Land Use Management and Development Code – Article 5” is written.
- L. Article 6 – When “Article 6” is written, it shall be as if “Box Elder County Subdivision Code – Article 6” is written.
- M. Work – All types of work necessary to provide safe access and utility service to and within proposed subdivision or site, including, but not limited to, site grading, utility installation,

and street construction. Work includes all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning.¹

- N. See also “Article 5 – Land Use Management and Development Code” of the Box Elder County Ordinances. Where definition conflicts arise between County Ordinance and this document, the definitions in this document shall take precedence when in reference to this document.

1.04 Acronyms

- A. BEC – Box Elder County
- B. BMP – Best Management Practice
- C. CFP – Capital Facilities Plan
- D. DDW – Division of Drinking Water
- E. DWQ – Division of Water Quality
- F. DWRi – Division of Water Rights
- G. FEMA – Federal Emergency Management Agency
- H. HOA – Homeowners’ Association
- I. LID – Low Impact Development
- J. PVC – Polyvinylchloride Pipe
- K. RCP – Reinforced Concrete Pipe
- L. UAC – Utah Administrative Code
- M. UDEQ – Utah Department of Environmental Quality
- N. UDOT – Utah Department of Transportation
- O. UPDES – Utah Pollutant Discharge Elimination System
- P. UPRR – Union Pacific Railroad
- Q. USACE – United States Army Corps of Engineers
- R. UTA – Utah Transit Authority

¹ From EJCDC® C-700, Standard General Conditions of the Construction Contract.

1.05 Variances from the Public Works Standards

- A. When a Developer believes that meeting a specific requirement contained within the current edition of the Box Elder County Public Works Standards is technically infeasible, Developer may make application to the Roads Department Superintendent and County Engineer for a variance from the Standards. This application shall include technical reasoning for the proposed variance along with a proposed solution. The Superintendent and Engineer shall assess whether the request meets the goals and requirement of the Standards without unduly jeopardizing the public's interest. Upon review of the application, the Superintendent and Engineer may grant or deny the variance from the Standards. If the variance request is denied, the applicant may appeal to the County Hearing Officer for a final determination.

SECTION 2 DEVELOPMENT STANDARDS

2.01 Approval Procedure

See Article 6 – Subdivisions of the Box Elder County Ordinances for details.

2.02 Developer Responsibilities

- A. Required Improvements and Guarantees – see Article 6 – Subdivisions of Box Elder County Ordinances.
- B. Permits and Approvals
 - 1. Developer is responsible for obtaining all necessary permits and approvals for the construction of the Improvements. Copies of all applications and approved permits shall be submitted to the County. Agencies/permits that may be required include, but are not limited to:
 - a. Utility Providers (by other entity)
 - b. Bear River Health Department
 - c. DDW Plan Approval (pre-construction)
 - d. DDW Operating Permit (post-construction)
 - e. UPDES NOI and NOT
 - f. DWRi Stream Alteration
 - g. DWRi Dam Safety
 - h. EPA 404 Wetlands
 - i. FEMA LOMA and/or LOMR
 - j. UDOT
 - k. Others as applicable
- C. Improvements
 - 1. The required improvements shall include:
 - a. All street improvements in front of all lots along all dedicated streets to a connection with existing improvements of the same kind and to the boundary(ies) of the subdivision (excluding through remnant or remainder parcels).
 - b. All street, storm drain lines, water lines, sewer lines, and any other buried utility lines and conduits shall be installed to the boundary lines of the subdivision where reasonably expected to extend as determined by the County Engineer and based on anticipated future development and the County's Capital Facilities Plans (CFPs) and/or master plans. Design must provide for future extension to adjacent development and be compatible with the contour of the ground.

2. Upsizing based on CFPs – The Developer will be required to construct/install infrastructure sized in accordance with the County’s currently adopted CFPs. The County will be responsible for paying difference in cost between the master planned infrastructure size and the minimum infrastructure size required for the development.
3. Seal Coat Escrow – Developer shall include in the financial guarantee monies sufficient for the installation of the seal coat. These monies may be released to County at Substantial Completion for completion by the County.
4. Street Signage Escrow– Developer shall include in the financial guarantee monies sufficient for the installation of the street signage. These monies may be released to County at Substantial Completion for completion by the County.
5. Temporary Turnaround Escrow – See Section 3.05.K of this document.
6. Materials and Construction Testing – Developer shall complete all materials and construction testing as required by County Standards. Developer/Contractor is responsible for all coordination. See Section 4.03.I for more information.
7. Survey and Mapping of New Improvements – Developer shall reimburse County for time spent surveying in locations of new improvements, including but not limited to manholes, valves, and fire hydrants, and adding such improvements to the County maps, per County Ordinance.
8. Inspections of New Improvements - Developer shall reimburse County for time spent inspecting new improvements, including but not limited to manholes, valves, and fire hydrants. This shall also include an administrative fee as established by the County.

2.03 Subdivision Standards

- A. The general standards for subdivision layout and development are found in Article 6 – Land Use Management and Development Code.
- B. See also Section 3 – Design Standards and Section 4 – Construction Standards of this document.

2.04 Geotechnical Investigation

- A. A geotechnical investigation should be conducted for the following:
 1. All new subdivisions with more than three (3) lots;
 2. All commercial subdivisions and sites;
 3. Any subdivision that includes public infrastructure improvements;
 4. Any development in the Sensitive Lands zone; and
 5. Upon request of the County Engineer.

- B. The geotechnical investigation should be complete in nature, and its findings shall be summarized in a Geotechnical Report. The Geotechnical Report shall be signed and sealed by a licensed Professional Engineer with expertise in the field of geotechnical Engineering.
- C. See Appendix B for requirements regarding the Geotechnical Report, including minimum testing requirements and design parameters.

SECTION 3 DESIGN STANDARDS

3.01 Required Improvements

- A. See Article 6 for information on the required improvements.
- B. See also Section 5 – Standard Specifications and Section 6 – Standard Drawings, Plans, and Details of this document for additional information.

3.02 Improvement Plans

- A. Complete and detailed, and signed and sealed (in accordance with Utah Code 58-22-602) construction plans and drawings of improvements shall be submitted to the County for the review by the County Engineer prior to receiving final plat approval and prior to commencing construction. No construction, including dirt work, shall begin until plans have been checked and approved by the County Engineer, and final approval is granted by the County Commission. Clearing and grubbing is allowed upon approval by the Roads Department or his Designee.
- B. The following instructions are for the purpose of standardizing the preparation of drawings to obtain uniformity in appearance, clarity, size, and style. The plans and designs shall meet the standards defined in the specifications and drawings hereinafter outlined. The minimum information required on the drawings for improvements is as follows:
 - 1. All drawings and/or prints shall be clear and legible and conform to industry standard Engineering and drafting practices.
 - 2. Drawings shall be legible and to a common scale when printed on 11"x 17" paper.
 - 3. Both plan view and centerline profile must be shown. On subdivisions along steep cross slopes, profiles for each side of the street may be required to be shown.
 - 4. Plan and profiles shall indicate design and/or existing grades a minimum of 200 feet beyond the limits of the proposed project.
 - 5. All wet utilities (water, sewer, storm drain, secondary, irrigation) shall be shown in plan and profiles views.
 - 6. All dry utilities shall be shown in plan and profile views.
- C. Each set of plans shall be accompanied by a separate sheet of details for special structures which are to be constructed and are not covered by the County Standards. All structures shall be designed in accordance with the minimum Box Elder County Standards and approved by the County Engineer.
- D. Separate drawings of elements of the Box Elder County Standards shall not be required to be redrawn and submitted with the construction drawings unless specific deviations from the standards are requested for approval; however, the construction drawings shall refer to the specific items of the Standards that are to be incorporated into the Work.

- E. The plan and profile construction plans shall be submitted in portable document format ("pdf"). Upon approval, the Developer's Engineer shall provide the County Engineer with electronic files of the final plat and improvement plans in AutoCAD or another County Engineer approved format. A hard copy of the approved construction plans bearing the signature of the County Engineer shall be kept available at the construction site. Prior to final acceptance by the County, the Developer, Developer's representative, Contractor, or project Engineer shall submit to the County Engineer a set of "as built" drawings for permanent County file record.

3.03 Sanitary Sewer Design

- A. All design shall be in accordance with utility provider's Standards and Utah Administrative Code R317.
- B. Collection lines should be located underneath the roadway surface. Collection lines shall not be located on private property (easements) without the express written permission from the County.

3.04 Water Design

- A. All design shall be in accordance with utility provider's Standards and Utah Administrative Code R309.
- B. Water mains should be located underneath the roadway surface. Water mains shall not be located on private property (easements) without the express written permission from the County.
- C. Fire hydrants
 - 1. Fire hydrants are to be installed in locations as required by the fire code and approved by the Fire Marshal and County Engineer, with a minimum spacing of 500 feet.
 - 2. A three-foot (3') radius clear space shall be provided around all fire hydrants. No above ground features or driveways are permitted in the clear space.

3.05 Street/Road Design

- A. Streets shall be designed in accordance with these Standards, standard Engineering practices, and AASHTO and MUTCD guidelines.
- B. Plans should show horizontal and vertical curve information, including radii, k-values, points of curvature, intersection, inflection, and tangency, etc.
- C. Local (residential) streets shall have not less than 333' radius curves² unless specifically approved by the County Engineer.
- D. No changes of grade more than 1.5% shall be permitted without a vertical curve.
- E. Sight triangles shall be shown as per the County Code.

² AASHTO A Policy on Geometric Design of Highways and Streets (2011); Table 3-13b.

- F. Horizontal points of curvature shall not be located closer than 150' from the center of an intersection.
- G. Intersections
 - 1. Roadway centerlines shall intersect at 90 degrees. Where a 90-degree angle is not feasible, the intersection angle may be reduced to as low as 80 degrees with the County Engineer's concurrence. In no case shall the angle be less than 80 degrees.
- H. Corridor Access Management
 - 1. Road intersections shall be spaced at a minimum of 250 feet, measured centerline to centerline.
 - 2. Acceleration, deceleration and/or other auxiliary lanes may be required for developments involving trucking activities or higher traffic volumes that impair travel speeds on County roads. A traffic study may be required, as directed by the County Engineer.
 - 3. Speed limits may require reduction as housing density increases along County roadways.
- I. Cul-de-sacs
 - 1. Length of cul-de-sac shall not exceed 660 feet as shown in the Standard Drawings.
- J. Pavement/Pavement Section
 - 1. Developments
 - a. The pavement section shall be designed by the Developer's Geotechnical Engineer and included in the Geotechnical Report submitted to the County. See Appendix B of this document for Geotechnical Report Minimum Requirements, including testing requirements and design parameters.
 - 2. County Projects
 - a. Pavement section shall be included in the Project plans.
 - 3. See Drawing Sheet CS-02 for pavement notes.
- K. Temporary Turnarounds
 - 1. When turnaround cannot be constructed outside of subdivision, it shall be located on a portion of the subdivision lots (as needed) with the Developer placing in escrow an amount of money sufficient to complete the street improvements to the subdivision boundary. These funds will be used at such time the street is extended.
 - 2. The lot(s) on which the turnaround is constructed shall be restricted as follows:
 - a. Platted as an "R" (restricted) lot.
 - b. This lot cannot be sold or building permits issued until the road is extended beyond the subdivision boundary, complete with curb, gutter, and sidewalk.

3. Drainage onto adjacent property must be by written approval (easement) of adjacent property owner.
4. When a temporary turnaround is required at the end of a road where the road and the extension of the road are parts of an approved phased development, in lieu of constructing a paved temporary turnaround in accordance with the Standard Drawings:
 - a. When extension of the road is expected to begin construction within 12 months of conditional acceptance of the road and associated temporary turnaround, Developer may construct 12-inch-thick untreated base course temporary turnaround (dimensions per the Standard Plans) and place in escrow the cost of the asphalt paving. Escrow will be released to Developer upon approval of subsequent phase.
 - b. If construction of the extension of the road has not begun within 12 months of conditional acceptance of the road and associated temporary turnaround, County may, at its discretion, utilize the monies in escrow to pave the temporary turnaround.

L. UDOT

1. Roadway intersections with UDOT-controlled streets shall be in accordance with UDOT standards. A copy of the approved UDOT Access and/or Encroachment Permit(s) shall be submitted to the County.

3.06 Storm Drain and Drainage Design

See Appendix A for Storm Drain and Drainage Design Standards.

- A. Low Impact Development and 80th Percentile Storm Retention requirements for Municipal Separate Storm Sewer System (MS4) only apply to the south Willard area of the County as specified in the Willard Flood Control District's Standards.

SECTION 4 CONSTRUCTION STANDARDS

4.01 General

A. General Conditions

1. Permit/License: When the work is in progress, Contractor shall have at the work site a copy of the permit and his Contractor's license number.
2. Private Access: Temporary all-weather roadways, driveways, walks, and rights-of-way for vehicles and pedestrians shall be constructed and continuously maintained where required.
3. Street Excavation in Winter: Excavation of County streets during the winter months (herein defined as November 15 to April 1) will be allowed only if the work is a new service connection, required maintenance or emergency, or otherwise approved by the Roads Department. Permanent patching of County streets excavated in the winter may be delayed until April 1 with the following provisions: Within five (5) working days from the completion of the excavation, the Permittee provides/maintains a 1-1/2" thick temporary winter asphalt surface until such time as the permanent asphalt surface is installed; the Permittee shall provide/maintain a temporary untreated base course surface until such time as the temporary winter asphalt surface is installed. These provisions apply regardless of whether the Permittee or County crews are performing the permanent resurfacing.
4. Street Excavation in Summer: Excavation of County streets during the summer months is herein defined as April 1 to November 15. Permanent hot asphalt patching of County streets in the summer shall be within five (5) days from the completion of the excavation. The Permittee shall provide/maintain a temporary untreated base course surface until such time as the permanent hot asphalt patch surface is installed.
5. Existing Utilities: The Contractor shall use extreme caution to avoid a conflict, contact with, or damage to existing utilities, such as power lines, sewer lines, storm drains, irrigation systems, streetlights, telephone lines, cable television lines, water lines, gas lines, poles, or other appurtenances during construction of a project. Any such conflict, contact, or damage shall be immediately communicated to said utility company and the Roads Department. All projects shall be "Blue Staked" prior to construction.
6. Preconstruction Pictures: The Permittee shall secure pictures of the conditions of the existing public way improvements such as curbing, sidewalk, landscaping, asphalt surfaces, etc. If public way improvements are damaged and no pictures were taken, the Roads Department will assume the correction of the damage is the responsibility of the Permittee.

B. Licensing

1. Contractors (including all sub-Contractors) must be properly licensed with the State of Utah. The acceptable licenses shall be in accordance with UAC R156-55a-201.
2. Exceptions: A license shall not be required by the County when the Permittee is a public utility company. (Subcontractors for utility companies shall have a valid Contractor's license.)

C. Permits

Developer/Contractor is responsible for obtaining all necessary permits for the construction of the Improvements prior to commencement of said Improvements. Agencies/permits required may include, but are not limited to:

1. County Excavation

- a. The Box Elder County Roads Department issues permits to control any excavation and construction operations in the public right-of-way. All Contractors, sub-contractors, and utility companies proposing to construct, repair, or replace any facility within the public right-of-way shall contact the Roads Department and complete all permit requirements prior to commencing proposed work.
- b. Duration and Extensions – Subject to the Roads Department's approval, permits which expire may be extended by paying a permit extension fee. The length of the extension determined by the Permittee shall be subject to the approval of the Roads Department.
- c. Work by utility companies and contractors in constructing facilities in new subdivision streets shall be required to obtain a County Excavation Permit and will be subject to County inspection and compliance with all requirements.
- d. Emergency Work
 - (i) Maintenance of pipelines or facilities in the public way may proceed without a permit when emergency circumstances demand the work be done immediately provided a permit could not reasonably and practicably have been obtained beforehand.
 - (ii) If emergency work is commenced on or within any public way of the County, the Roads Department shall be notified within one-half hour when the work commences or as soon as possible from the time the work is commenced. Contact shall be made to the County's Roads Department. If emergency work is commenced during off business hours, Roads Department will be notified within one (1) hour of the start of work on the first regular business day of which County offices are open after such work commences, and, at the discretion of the Roads Department, a permit may be issued which shall be retroactive to the date when the work was begun. Before commencing the emergency work, all

necessary safety precautions for the protection of the public and the direction and control of traffic shall be taken. None of the provisions of these regulations are waived for emergency situations except for the prior permit requirement.

- e. Enforcement: Violators of these regulations of working within the public way shall be subject to the provisions of the applicable Box Elder County Ordinances.
- f. No Fee Permits: The Roads Department reserves the right to issue “no fee permits” for work in the public way when the following conditions are met:
 - (i) When utility companies are doing excavation work and such work is required in conjunction with a County Roads Department project and the work is required to be accomplished prior to the execution of the Roads Department contract.
 - (ii) When the County Roads Department is repairing or maintaining public way facilities such as curbs, gutters, cross drains, storm drains, traffic facilities, driveway, sidewalk, etc., and such work requires excavation.
- g. Permit Waivers: Working within the public way without a permit is not permissible unless the permit is waived by the Roads Department. Waivers may be granted by the Roads Department when any of the following conditions occur:
 - (i) When routine maintenance work which is being done by County, State, or utility personnel does not involve excavations in the County’s public way, i.e. crack sealing, street resurfacing and repair, snow plowing, sanding, sweeping, garbage collection, storm drain cleaning, leaves pickup, above grade work, etc.
 - (ii) When a Permittee allows their subcontractors or utility companies to perform work in the permitted trench limits.
 - (iii) When utilities shall be relocated or adjusted in conjunction with a County sponsored project provided the utility work is being accomplished within one (1) week of the time the County or its Contractor is scheduled to begin construction at that location and provided the work is coordinated and approved by the Roads Department.
- h. Revocation of No Fee Permits and Permit Waivers: “Permit Waivers” and “No Fee Permits” shall be revoked by the Roads Department if the work is found to be defective or requires action or supplemental inspection by the Roads Department. In the revocation proceedings, the Roads Department shall serve written notice which defines the problems encountered and the time (at least one day) the Permittee has to correct the problem. If the work is not satisfactorily completed within the time specified, the “Permit Waiver” or the “No Fee Permit” shall be revoked. The Permittee shall be required to secure a Fee Permit before proceeding to complete the work.
- i. Completion by County, Liability for Costs: If the work is unduly delayed by the Permittee, or if the public interests so demand, the Roads Department shall have

authority to complete the permit work. The Roads Department shall do the work only after written notice has been given to the Permittee, and the Permittee fails to respond to the Roads Department's request. The actual cost of such work incurred by the County including a fifteen percent (15%) overhead charge shall be paid by the Permittee.

2. USACE/DWRi Stream Alteration – Stream Alteration
 3. UPDES
 4. Dam Safety (DWRi)
 5. UPRR Railroad Encroachment
 6. UTA Encroachment
 7. UDOT
 8. Box Elder County Surveyor's Monument
- D. Excavation Operations
1. Blue Stakes: Before commencing excavation operations, the Permittee shall call "Blue Stakes" at 1-800-662-4111 or 811.
- E. Traffic Control Devices: Traffic control devices such as construction signs, barricades, and cones must be in place before excavation begins.
- F. Protection of Paved Surfaces: In order to avoid unnecessary damage to paved surfaces, backhoes, outriggers, tracked equipment, or any other construction equipment that may prove damaging to asphalt shall use rubber cleats or paving pads when operating on or crossing said surfaces.
- G. Open Trench Limits: Open trenches will be limited to one block at a time or 660 feet, whichever is less.
- H. Public Road Closure: No public roads shall be closed without prior written approval from Box Elder County. In the event of a planned road closure, Contractor shall notify the Roads Department, City(ies), Fire Department, emergency services dispatch, US Postal Service, Box Elder School District, and Utah Transit Authority (UTA) a minimum of 24 hours prior to the closure. In the case of an emergency, the above listed agencies will be notified at the soonest possible time.
- I. Sidewalk Closure: When it is permitted to close the sidewalk, flashing barricades and "Sidewalk Closed" signs must be placed on the sidewalk immediately adjacent to the work area. "Sidewalk Closed Ahead, Cross Here" signs must be placed at the closest adjacent sidewalks, intersections, or alternate routes to warn pedestrians of the closing so they may safely access the alternate route.

J. Environmental Controls

1. Dust and Debris: The Permittee or Contractor shall keep dust and debris always controlled at the work site. If necessary, a container shall be provided for debris and dusty areas shall be wet down. The Permittee or Contractor shall be responsible for the cleanup of mud or debris from public roads deposited by vehicles or construction equipment exiting the work site. The County reserves the right to shut down the work or issue a citation if dust is not controlled.
2. Noise: The Permittee or Contractor shall keep neighborhood free of noise nuisance in accordance with the Noise Ordinance.

K. Cleanup: The Permittee or Contractor shall remove all equipment, material, barricades, and similar items from the right-of-way. Areas used for storage of excavated material will be smoothed and returned to their original contour. Vacuum sweeping or hand sweeping shall be required when the County determines cleaning equipment is ineffective.

L. Storm Water: All Contractors working within the boundaries of Box Elder County shall conform to all current requirements and regulations in County and State Code.

M. Fencing and Signs

1. Fencing and barricade equipment shall conform to MUTCD standards. Fencing shall also conform to the following:
 - a. No advertisements shall be placed on barricades or construction signs.
 - b. Fencing and associated signs shall be removed and areas where signs are placed shall be restored to the pre-construction condition following construction.
2. Fencing (6' chain-link panels) shall be placed around all excavation pits adjoining pedestrian accesses traveled by the public. No construction activity (excavations, etc.) which may be of any risk to public safety shall remain unattended overnight.
3. All projects abutting the public rights of way shall be fenced.

4.02 Pre-Construction Conference

- A. The preconstruction conference shall not be held until the County Engineer has applied the County approval stamp to the construction plans.
- B. A preconstruction conference shall be held before any excavation or other work is begun in the subdivision or Project. The meeting will include:
 1. County Engineer
 2. Developer or Project Manager
 3. Subdivision or Project Engineer
 4. All Contractors and subcontractors involved with installing the subdivision or project improvements.

5. Representatives of affected County Departments
 6. Representatives of local utility companies as may be required by Box Elder County
- C. Items pertaining to the construction and inspection of the subdivision or Project improvements will be discussed.

4.03 Construction

A. Specifications

1. Contractor shall be responsible for constructing all improvements in accordance with the Technical Specifications, per Section 5 of this document.
2. Deviations from such shall be reviewed and authorized by the County Engineer on a case-by-case basis.

B. Plans and Details

1. Contractor shall be responsible for constructing all improvements in accordance with the Drawings, Plans, and Details, per Section 6 of this document.
2. Deviations from such shall be reviewed and authorized by the County Engineer on a case-by-case basis.
3. All construction shall be in accordance with the County stamped plan set. Any construction completed with other plan sets may be subject to tear out and replacement.

C. Sequence/Timing

1. All underground utility work shall be completed prior to placement and compaction of the roadway base course. Utilities, including service lines, not installed prior to roadway construction shall be bored as approved by the Roads Superintendent.
2. All concrete collars shall be installed within fourteen (14) days of asphalt placement.

D. Inspections

1. All construction work involving the installation of improvements in the subdivision or project shall be subject to inspection by the County. It shall be the responsibility of the person responsible for construction to ensure that inspections take place where and when required. Certain types of construction shall have continuous inspection, while others may have only periodic inspections.

E. Requests for Inspections

1. Requests for inspections shall be made to the Roads Department by the person responsible for the construction.
2. Requests for inspection on work requiring continuous inspection shall be made three (3) working days prior to the commencing of the work.

3. Notice shall also be given one (1) day in advance of the start of work requiring periodic inspection unless specific approval is given otherwise by the County.
- F. Continuous inspection
1. May be required on (but not limited to) the following types of work:
 - a. Laying of street surfacing
 - b. Placing of concrete for curb and gutter, sidewalks, and other structures
 - c. Laying of utilities and associated testing
 2. On County infrastructure construction requiring continuous inspection, no work shall be done except in the presence or by permission of the County Roads Department.
- G. Periodic inspections
1. Shall be required on (but not limited to) the following types of work:
 - a. Street grading and gravel base
 - b. Excavations for curb and gutter and sidewalks
 - c. Excavations for structures
 - d. Trenches for laying pipe
 - e. Forms for curb and gutter, sidewalks, and structures
- H. Substantial and Final Completion Inspections
1. A substantial completion inspection shall be requested by the Contractor and made by the County Engineer or authorized representative after all construction work is completed. Any faulty or defective work shall be corrected by the persons responsible for the work within a period of thirty (30) days of the date of the County Engineer's or authorized representative's Punchlist defining the faulty or defective work.
 2. A final completion inspection shall be requested by the Contractor and made by the County Engineer or authorized representative after all faulty and defective work has been corrected.
- I. Testing
1. Development Projects
 - a. Developer/Contractor shall select, hire, and pay a qualified testing firm.
 - b. Developer/Contractor shall be responsible for all testing in accordance with the Technical Specifications per Section 5 of this document.
 - c. Testing reports shall be submitted to the County for review within three (3) days of test performed. Areas with failed tests shall be corrected and retested.

- d. Failure to have improvements tested as they are constructed may be cause for work stoppage or rejection by the County.
- e. County has the option to conduct independent testing at their discretion.

2. County Projects

- a. Contractor shall select and hire a qualified testing firm as approved by the County.
- b. Contractor shall be responsible for all coordination of testing in accordance with the Technical Specifications per Section 5 of this document.
- c. Testing reports shall be submitted to the County for review within three (3) days of test performed. Areas with failed tests shall be corrected and retested at the Contractor's expense.
- d. Failure to have improvements tested as they are constructed may be cause for work stoppage or rejection by County.
- e. County has the option to conduct independent testing at their discretion.

J. Safety

- 1. Contractor is solely responsible for jobsite safety.
- 2. Contractor shall comply with all local, state, and federal rules and regulations regarding jobsite safety.
- 3. County and/or its authorized representatives shall have the authority to shut down a job when unsafe working conditions are found.

4.04 Miscellaneous

A. Enforcement

- 1. Violators of the regulations as set forth in the County Standards for work in the Public Way shall be subject to the provisions as set forth in the current County Code.

B. Guarantees

- 1. County's Protective Liability Insurance: The Permittee shall indemnify and hold the County harmless from and against any and all liability, damages, claims, demands, costs and expenses of whatsoever nature, including court costs and counsel fees, arising from or growing out of any injury to or death of any person or persons, whomsoever, or for loss of or damage to any property whatsoever, (including loss or damage to the tools, plant, or equipment of the Permittee) resulting directly or indirectly from the carrying on of the work herein specified, and to that end shall purchase on the County's behalf, County's Protective Liability Insurance with current limits specified in the excavation permit.
- 2. Bonding: Bonding as required by Box Elder County Code, Ordinance, and current rate structure.

SECTION 5 TECHNICAL SPECIFICATIONS

5.01 Technical Specifications for Box Elder County

- A. Adoption of Divisions 01 through 34 of the Manual of Standard Specifications, as published by Utah LTAP Center, Utah State University, Logan, Utah, current edition, with all published amendments. (Commonly known as the *APWA Specifications*)
- B. Modifications and Additions to Manual of Standard Specifications (see Appendix C)

5.02 Order of Precedence

- A. Approved project-specific specifications (when applicable)
- B. Modifications and Additions to Manual of Standard Specifications
- C. Manual of Standard Specifications, current edition, with all published amendments

SECTION 6 STANDARD DRAWINGS, PLANS, AND DETAILS

6.01 Standard Drawings, Plans, and Details for Box Elder County

- A. Box Elder County Standard Drawings, current edition (See Appendix D)
- B. Adoption of Manual of Standard Plans, published by Utah LTAP Center, Utah State University, Logan, Utah, current edition, with all published amendments. (Commonly known as the *APWA Plans*)

6.02 Order of Precedence

- A. Approved project-specific drawings and details (when applicable)
- B. Box Elder County Standard Drawings, current edition
- C. Manual of Standard Plans, current edition, with all published amendments, when not covered by one of the aforementioned items.

APPENDIX A – STORM DRAIN AND DRAINAGE DESIGN GUIDELINES

APPENDIX A
STORM DRAIN AND DRAINAGE DESIGN STANDARDS

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A1. General Provisions

- A. This document represents the reporting, design, and construction standards for private and public design and construction as it relates to storm drainage within the County.
- B. A Storm Water Report is required for all new development and redevelopment projects.

A2. Definitions and Acronyms

The following terms shall be defined as follows in this document relating to storm water:

- A. Best Management Practices (BMPs) – Construction practices and control measures necessary to protect against pollution generated by construction sites.
- B. Detention Basin – A water storage pond designed to store a volume of water that reduces the post-development peak runoff of a storm to the pre-development runoff rate or other rate as defined by the governing body. This is accomplished by the use of an outlet which controls the rate of flow out of the pond into the receiving storm drain or water body. Detention ponds contain an inlet, outlet, and spillway; the inlet and outlet may be one and the same. The detention basin is intended to drain the storm water within a period of time to make the volume available for the next storm event.
- C. Development – Any man-made change to unimproved land, including but not limited to site preparation, excavation, filling, grading, paving, and construction of buildings or other structures.
- D. Disturb – To alter the physical condition, natural terrain or vegetation of land by clearing, grubbing, grading, excavating, filling, building or other construction activity.
- E. Drain Inlet – A point of entry into a sump, storm water basin, or storm drain system.
- F. Drinking Water Source Protection Zone – Zones determined by geo-hydrology designed to protect groundwater aquifers of a well in a culinary water system.
- G. DWQ – Acronym for Division of Water Quality, a division of the UDEQ.
- H. Freeboard – The vertical distance between the emergency spillway and the top of the basin embankment.
- I. Hardscape – Generally impervious areas, typically streets, sidewalks, driveways, parking areas, and roofs.
- J. Infiltration – The movement of water through the soil surface and into the soil;¹ the movement of water downward from the ground surface through the upper soil.²
- K. Infiltration Rate – The rate at which water actually enters the soils during a storm.²
- L. Infiltration System (storm water) – A system which is designed to return storm water runoff

¹ Linsley/Franzini/Freyberg/Tchobanglous. (1992). *Water Resources Engineering and Environmental Engineering*. New York: McGraw-Hill Inc.

² Lindeburg. (2003). *Civil Engineering Reference Manual*. Belmont, CA: Professional Publications, Inc.

- into an underground aquifer.
1. The discharge of storm water piping below grade for the purpose of infiltration is considered a Class V injection well facility.
- M. Injection Well, Class V – As defined in Utah Administrative Code R317-7-2:
1. A bored, drilled, or driven shaft whose depth is greater than its largest surface dimension, OR
 2. A dug hole whose depth is greater than its largest surface dimension, OR
 3. An improved sinkhole, OR
 4. A subsurface fluid distribution system.
- N. Municipal Separate Storm Sewer System (MS4) – The storm water conveyance system owned by the County which includes streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains. For a full definition, see UAC 317-8.
- O. Outlet – The discharge mechanism of a detention basin, typically a pipe containing a head gate or orifice to control the release of water out of the basin.
- P. Percolation – The movement of water through the subsurface soil layers, usually continuing downward to the groundwater table,³ measured by a Standard Percolation Test in units of minutes per inch.
- Q. Pollutant – Chemicals, sediment, trash, disease-carrying organisms, and other contaminants picked up by storm water which is conveyed into rivers, streams, and other water bodies.
- R. Redevelopment – Alteration of a property that change the footprint of a site or building.
- S. Retention Basin – A water storage pond designed to store the runoff volume of a storm and dispose of water through percolation, infiltration, and evaporation within a period of time to make the volume available for the next storm event. A retention basin contains an inlet and spillway, but no structural outlet.
- T. Softscape – Generally pervious areas, such as native vegetation and landscaped areas.
- U. Spillway, Emergency – A storm drain basin feature that controls and guides storm water as it spills over the basin's embankment.
- V. Spillway, Internal – A storm drain basin feature that allows excess water to leave the basin through discharge piping which is set at an elevation below the emergency spillway.
- W. Storm Drain System – The system of conveyances (including but not limited to catch basins, detention basins, retention basins, infiltration galleries, curbs, gutters, ditches, cross drains, roads, man-made channels, sumps, pipes, etc.) owned and operated by the County, which is designed and used for collecting and/or conveying storm water.
- X. Storm Water Pollution Prevention Plan (SWPPP) – A written plan that evaluates and minimizes the impact of pollutants on storm water through the use of control measures and

activities that target pollution sources. A SWPPP template can be found on the UDEQ Water Quality website.

- Y. Storm Water Report – A written analysis of a development or redevelopment site that estimates the volume and rate of storm water runoff generated by the proposed improvements. The report details rationale and calculations for establishing the sizes of storm water piping and storage facilities in compliance with this document.
- Z. Storm Water Runoff – Precipitation that is not intercepted or otherwise captured at a site which eventually enters into natural water bodies such as rivers, streams, and lakes.
- AA. Subsurface Fluid Distribution System – An assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids below the surface of the ground. (i.e. infiltration galleries, underground retention)
- BB. UAC – Acronym for Utah Administrative Code.
- CC. UDEQ – Acronym for Utah Department of Environmental Quality.

A3. Rainfall Hydrology

- A. All storm drain system components shall be designed to accommodate the 100-year storm event, unless otherwise stated.
- B. Storm Specifications
 - 1. Local storm drain piping shall be designed for the 10-year storm, where the street or other aboveground conveyance will carry the difference to the 100-year storm.
 - 2. Storm drain piping connecting two (2) streets through private property shall be designed for the 100-yr storm.
 - 3. Local detention basins, including all piping into the basin from the nearest point of entry, shall be designed to accommodate the 10-year storm event with a maximum discharge of 0.1 cubic feet per second (cfs).
 - 4. Local retention basins, including all piping into the basin from the nearest point of entry, shall be designed to accommodate the 100-year, 3-hour storm.
 - 5. Regional detention basins, including all piping into the basin from the nearest point of entry, shall be designed to accommodate the 100-year storm event.
 - 6. The storm duration used for the sizing of basins shall be based upon the worst-case scenario.
 - 7. NOAA reports shall be used for the most recent rainfall data using the rain gauge stations and localities nearest the development.
- C. Hydrologic Methodology
 - 1. Parameters

- a. Hardscape – Proposed streets and sidewalk areas plus the estimated hardscape areas (roofs, driveways, patios, walkways etc.) determined by using a recent subdivision with similarly sized lots, or calculated area as measured from approved site plan.
 - b. Softscape – The remaining area of the subdivision not hardscape.
2. Developments less than 20 acres
 - a. The Rational Method may be used. A computer model may also be used.
 - b. Rainfall Intensity – When using the Rational Method, use the rainfall intensity table from NOAA reports reflecting the most recent rainfall data and rain gauge stations for localities nearest the development.
 - c. Runoff Coefficients – The following C-values shall be used when using the Rational Method:
 - i. Hardscape – 0.90
 - ii. Softscape (open space, landscaping) – 0.25
 - iii. Values from published sources may be used when pre-approved by the County Engineer.
3. Developments larger than 20 acres
 - a. A County Engineer-approved computer model shall be used.
 - b. Rainfall Pattern and Depth – The following rainfall pattern shall be used. This pattern is based on the Farmer-Fletcher Distribution. This pattern is for a 1-inch unit storm and must be multiplied by rainfall depth for storms of other magnitudes, as provided in NOAA reports reflecting the most recent rainfall data and rain gauge stations for localities nearest the development.

Farmer-Fletcher Distribution

Unit Storm

Time (Min.)	Depth (inches)	Time (Min.)	Depth (inches)	Time (Min.)	Depth (inches)	Time (Min.)	Depth (inches)	Time (Min.)	Depth (inches)	Time (Min.)	Depth (inches)
1	0	11	0.004	21	0.033	31	0.052	41	0.012	51	0.005
2	0	12	0.005	22	0.034	32	0.045	42	0.011	52	0.005
3	0.002	13	0.008	23	0.035	33	0.04	43	0.01	53	0.004
4	0.002	14	0.009	24	0.038	34	0.035	44	0.009	54	0.004
5	0.002	15	0.009	25	0.039	35	0.03	45	0.009	55	0.004
6	0.002	16	0.013	26	0.045	36	0.022	46	0.008	56	0.003

7	0.002	17	0.017	27	0.052	37	0.02	47	0.006	57	0.003
8	0.002	18	0.02	28	0.054	38	0.018	48	0.006	58	0.002
9	0.003	19	0.024	29	0.054	39	0.016	49	0.005	59	0.002
10	0.003	20	0.029	30	0.054	40	0.014	50	0.005	60	0.001

A4. Storm Drain System

A. Independent System (applicable to all new construction)

1. Storm waters shall not be conveyed in irrigation ditches.
2. Irrigation waters shall not be conveyed in storm drain systems.

B. Groundwater

1. Where adverse groundwater conditions exist, the County may allow the installation of a subsurface land drain system. Laterals may be installed to each lot for clear groundwater only (surface water may be permitted only upon approval from the County Engineer). Subsurface lines shall be installed with a slope adequate for proper drainage. A backflow control device may be required at the confluence of the land drain system and storm drain system, as determined by the County Engineer. All land drain systems shall connect downstream to a storm drain system.

C. Piping

1. Storm Drain Lines

- a. All storm drain lines considered part of the County's storm drain system shall be reinforced concrete pipe (RCP), of appropriate class when installed in the public right-of-way. Other materials shall be as approved by the County Engineer and County Road Department.
- b. Minimum size for storm drain mains shall be 15-inch diameter.
- c. Public storm drainpipes shall not be curved.
- d. See section A3 for sizing requirements.

2. Land Drain Lines

- a. All land drains shall be PVC.
- b. Minimum size for land drain mains shall be 8-inch diameter.
- c. Minimum size for land drain laterals shall be 4-inch diameter.

3. Reimbursement / Pioneering Agreements – Where determined by the County Engineer and/or the Storm Drain Capital Facilities Plan, larger drain lines shall be installed to accommodate future development. The cost to provide adequate storm drainage for a

development shall be paid for by the Developer. Upsizing will be coordinated at the time of development. The cost of upsizing will be the responsibility of the County or as defined in the agreement.

- D. Access – Storm drain lines shall have cleanout boxes, inlets, or manholes installed at all changes in grade or alignment, with a maximum distance of 400 feet between accesses. Structures shall be installed in accordance with the Technical Specifications and Standard Drawings.
- E. Sumps
 - 1. Sumps are not allowed in the County’s storm drain system, except as approved by the County Engineer on a case-by-case basis.
 - 2. Sumps shall not be permitted within zones 1, 2, or 3 of any Drinking Water Source Protection Zone of any drinking water source.
 - 3. Class V Injection Well permitting is required.
- F. Grates
 - 1. Grates shall be provided at all entrances/exits of the storm drain system, and on the upstream end of all culverts greater than 70-ft in length.
 - 2. Grates shall be provided on catch basins, junction boxes, control structures, etc.
 - 3. Bar spacing shall be designed for location, function, and safety. (Generally, bar spacing should not exceed three (3) inches.)

A5. Detention and Retention Basins

- A. When Required
 - 1. Storm drainage basins are required for all development; however, residential developments less than one (1) acre are not required to have detention or retention, except when determined by the County Engineer.
 - 2. In an effort to increase the County’s ability to more easily manage storm events, Regional Detention Basins shall be constructed wherever possible.
 - 3. Developer may be required to participate in the construction of a new regional detention basin or the upgrading of an existing detention basin that is designated as a regional detention basin in lieu of onsite detention within the proposed development, if the development is located within a regional detention basin’s drainage subbasin.
- B. Basin Property, Easement, and Access
 - 1. Public Basins – Public basins shall be located on a separate parcel dedicated to the County with frontage along a public roadway. The developer shall provide the County permanent access to any public basin.

2. Private Basin – Private basins serving multiple lots shall be located on a separate parcel, owned by the home-or land-owners association. Private basins serving a single lot shall be located within the lot. The County shall be provided an easement to, around, and across the basin for emergency access, operation, and/or repair for a private basin.
3. Access – Each basin shall be constructed with sufficient, all-weather, drivable access to all structures from a public street. A turnaround area shall be provided at the termination of the access road.

C. Maintenance and Ownership

Actual ownership and responsibility shall be specifically defined in the Owner's Dedication, Certificates, Development Agreements, or by Deed.

1. Local Basins – Local basins shall be constructed by the developer. Following conditional acceptance of the construction, the operation and maintenance shall be conveyed to the County when applicable.
2. Regional Basins – Regional basins shall be owned and maintained by the County, constructed according to the criteria herein, and approved of the County Engineer.
3. Private Basins
 - a. Single Lots (Non-residential only) – When approved, private basins shall be owned and maintained by the property owner.
 - b. Multiple Lots – When approved, private basins shall be owned and maintained by the Homeowners' Association.
 - c. Access may be provided from a private street provided an access easement is granted to the County providing access to/from the basin from a public street.
 - d. For all private basins, Developer is required to enter into a Long-Term Storm Water Maintenance Agreement with the County.

D. Basin Volume

1. All basin designs and calculations shall be included in the Storm Water Report and submitted to and reviewed by the County Engineer for approval.
2. Volume shall be measured to the internal spillway (overflow) elevation.
3. Volume in pipes, ditches, or roadside swales shall not be considered in the volume calculation for detention and retention basins.
4. Storage of water shall not be allowed in parking lots.

E. Allowable Discharge Design

1. See Section A3.B for storm specifications.
2. Discharge shall not exceed the lesser of:

- a. Pre-development runoff with pre-development, meaning the condition of the land prior to settlement, or
- b. The discharge rate determined by using the standard rate of 0.1 cubic feet per second per total acre.

Show all calculations or provide spreadsheet or program file.

3. Calculations shall be based on the total acreage of the development draining to the basin.
4. Pass-through of offsite drainage through the development must be considered and will be allowed.

F. Detention and Retention Basin Elements

1. Depth – Basins should not exceed three (3) feet in depth as determined from its lowest point to the overflow or spillway, unless it is completely fenced and secured from trespassing, or as otherwise approved by the County.
2. Side slopes – Side slopes shall not be steeper than 4:1 (horizontal to vertical).
3. Bottom Slope – The basin floor shall be designed to prevent the permanent ponding of water. The slope of the floor of the basin shall not be less than 1% to provide drainage of water to the outlet grate and prevent prolonged wet, soggy, or unstable soil conditions.
4. Freeboard – At least one (1) foot of freeboard is required (berm above the high-water mark).
5. Spillways
 - a. The spillway shall be designed to carry the 200-year storm flow minus the 100-year storm flow which is handled by the outlet control structure.
 - b. Spillways shall introduce flows back into the pipe or stream downstream of the outlet control.
 - c. Spillways shall include a maintained swale and drainage easement to a safe location.
 - d. The spillway shall be designed to prevent erosion.
 - e. All spillways shall be designed to protect adjacent embankments, nearby structures, and surrounding properties.
6. Ground Covers – The surface area of the basin shall be hydro-seeded, hydro-mulched, or sodded. Use seed mixture found in the Technical Specifications. A minimum of four (4) inches of topsoil must be installed prior to sod or hydro-seed placement. A sprinkler irrigation system is also required for all grassed basins. Developer/contractor is responsible for establishing vegetation.

7. Embankment (Fill) Construction – If a raised embankment is constructed for a basin (constructed with granular materials), it shall be provided with a minimum of 6-inches of clay or bentonite cover on the inside of the berm to prevent water passage through the soil.
 8. Excavation (Cut) Construction – If the basin is constructed primarily by excavation, then it may be necessary to provide an impermeable liner (for detention basins) and land drain system when constructed in the proximity of basements or other below grade structures as determined by the geotechnical investigation.
 9. Multi-Use Basins – Basins may be designed as multi-use facilities when appropriate precautions are incorporated into the design. If amenities such as pavilions, playground equipment, volleyball courts, etc. are to be constructed within the water detention area of a basin, they shall be designed appropriately. Structures shall be designed for saturated soil conditions and bearing capacities are to be reduced accordingly. Restrooms shall not be located in areas of inundation. Inlet and outlet structures should be located as far as possible from all facilities. No wood chips or floatable objects may be used in the area that will be inundated.
 10. Fencing – A conveniently-located access gate, appropriately sized for entrance by maintenance vehicles and equipment, shall be provided for fenced basins. Fencing should not be located at the top of the basin embankment where maintenance equipment, vehicles, and personnel need access. Fencing shall be 6-ft tall chain link in accordance with these Standards and shall conform to County Zoning Requirements.
- G. Detention Basins
1. Percolation – No reduction due to percolation for detention basins volumes shall be permitted.
 2. Outlet Control
 - a. Private detention basins may have a calculated fixed orifice plate mounted on the outlet of the basin.
 - b. Regional detention basins shall have movable, screw-type head gates set at the calculated opening height with a stop block required to carry the maximum allowable discharge.
 3. Low Flow Piping – The inlet and outlet structures may be located in different areas of the basin, requiring a buried pipe to convey any base flows that enter and exit the basin. (Cross gutters and surface flows are prohibited.) The minimum pipe size and material for the low flow pipe shall be 15-inch RCP or as otherwise specified by the County Engineer.

4. Oil/Sediment Separators
 - a. Sizing and design of oil/sediment separators shall be reviewed by the County Engineer and County Personnel prior to installation.
 - i. Manufacturer's recommendations for sizing must be followed with calculations submitted to the County.
 - ii. Consideration must be given to frequency and ease of maintenance of the structure
 - iii. Separator may either be installed upstream or downstream of detention basin, appropriately sized for such location.
 - b. Any site dealing with large parking lots or particularly dirty parking lots such as auto repair and maintenance will be required to have an oil separator
 - c. Private basins shall have contracts in place to periodically clean the Separator (at least annually).
- H. Retention Basins
 1. Retention basins must be specifically approved by the County Engineer.
 2. Retention basins shall not be permitted within zones 1, 2, or 3 of any Drinking Water Source Protection Zone of any drinking water source.
 3. An approved oil/sediment separator shall be installed upstream of retention basin when required by the County Engineer.
 4. Retention Basin Criteria – Retention basins may be permitted if the following conditions apply:
 - a. The distance between the nearest County storm drain and the boundary of the development is greater than:
 - i. For residential development: 500 feet or 50 feet times the number of lots in the entire development (whichever is greater);
 - ii. For commercial development: 20 feet times the number of parking stalls on the site.
 - b. The basin is not located within a Hazardous Area (such as a steep slope) or some other sensitive area (such as a Drinking Water Source Protection Zone).
 - c. Site is topographically incapable of draining to the County system.
 - d. Recommendation by the County Engineer.
 5. Percolation Rate for Retention Basins

- a. A percolation test shall be performed by a licensed tester. The percolation test shall be performed at the elevation of the proposed grade of the bottom of the retention basin.
 - b. Due to degradation of soils ability to percolate over time, only 80% of the percolation rate shall be used in the calculations for the retention basins.
6. Retention basins shall be designed to completely drain within 48 hours of the primary storm event.
- I. Subsurface Fluid Distribution Systems
 1. Subsurface Fluid Distribution Systems are allowed for private basins only.
 2. See Paragraph H for requirements related to Percolation Rate for Retention Basins.
 3. A Class V injection well permit is required.
 4. An approved oil/sediment separator shall be installed upstream of subsurface fluid distribution system.
 5. Subsurface Fluid Distribution Systems are not allowed for storm water disposal if located in Zone 1 or 2 of a drinking water source. They may be allowed in Zone 3 or 4 of a drinking water source if they are equipped with appropriate pretreatment and approved by the County Engineer.
 6. Examples of Subsurface Fluid Distribution Systems include but are not limited to: ADS StormTech® systems, ACF Environmental R-Tanks® and similar; perforated pipe infiltration galleries, etc.

A6. Water Quality

- A. Long-term Best Management Practices (BMPs) shall be used to maintain, to the maximum extent practical, the quality of the water to the pre-developed condition.
- B. Construction BMPs shall be implemented per a Storm Water Management Plan.

APPENDIX B – GEOTECHNICAL INVESTIGATION REPORT MINIMUM REQUIREMENTS

APPENDIX B

GEOTECHNICAL INVESTIGATION REPORT MINIMUM REQUIREMENTS

B1. General Provisions

- A. All reports shall include the Minimum Testing Requirements and use the Design Parameters as detailed below.
- B. All reports shall be signed and sealed by a registered Professional Engineer licensed in Utah.

B2. Report Contents

- A. Geotechnical Investigation Report submitted to Box Elder County shall generally include the following contents, as applicable.

CONTENTS

- 1.0 *Project Description/Overview*
 - 1.1 *Existing Conditions*
 - 1.2 *Proposed Improvements*
- 2.0 *Site Conditions*
 - 2.1 *Surface Conditions*
 - 2.2 *Subsurface Conditions*
 - 2.3 *Groundwater*
- 3.0 *Subsurface Investigation*
 - 3.1 *Percolation Test*
 - 3.2 *Infiltration Test*
- 4.0 *Laboratory Testing*
- 5.0 *Geologic Hazards*
 - 5.1 *Rock Fall*
 - 5.2 *Faulting*
 - 5.3 *Seismic/Ground Motions*
 - 5.4 *Lateral Spread*
 - 5.5 *Liquefaction Potential*
 - 5.6 *Landslide and Scarps*
 - 5.7 *Debris Flow/Alluvial Fan*
 - 5.8 *Expansive/Collapsible Soils*
 - 5.9 *Avalanche*
- 6.0 *Earthwork*
 - 6.1 *Site Preparation and Grading*
 - 6.2 *Temporary Excavations*
 - 6.3 *Permanent Cut and Fill Slopes*
 - 6.4 *Fill Material Composition, Placement, and Compaction*
 - 6.5 *Roadway and Embankments Fill*
 - 6.6 *Structural Fill*

- 6.7 *Utility Trenches*
- 6.8 *Re-use of Excavated Soil Materials*
- 7.0 *Foundations*
 - 7.1 *Foundation Recommendations*
 - 7.2 *Installation Requirements*
 - 7.3 *Estimated Settlement*
 - 7.4 *Lateral Resistance*
- 8.0 *Static and Seismic Lateral Earth Pressures (Active, Moderately Yielding, At-Rest, and Passive Conditions)*
- 9.0 *Floor Slabs*
- 10.0 *Drainage Recommendations*
 - 10.1 *Surface*
 - 10.2 *Subsurface*
 - 10.3 *Foundation Drains/Subdrains*
- 11.0 *Pavement Section*
 - 11.1 *(See Section B4)*
 - 11.2 *Exterior Concrete Flatwork*
- 12.0 *Retaining Walls (Required for all retaining walls taller than 4 feet, when used)*
 - 12.1 *Surface and Subsurface Drainage*
 - 12.2 *Internal and Global Stability (Static and Seismic Loading)*
 - 12.3 *Dimensions and Elevations*
 - 12.4 *Settlements*
 - 12.5 *Construction Inspection*
- 13.0 *Slope Stability (Required for slopes greater than 25%)*
- 14.0 *References*
- Tables*
- Figures*
 - A. *Project Location/Site Map*
 - B. *Boring/Test Pit Locations*
 - C. *Boring/Test Pit Logs*
 - D. *Key to Symbols for Boring/Test Pit Logs*
- Appendices, as needed*

B3. Minimum Testing Requirements

- A. Borings (B) and Test Pits (TP), either known as a “hole”
 - 1. Total: Minimum 1 hole per 2 acres, rounded up
 - a. Example: 5.5 acre site: $5.5 \div 2 = 2.75$, round up to 3 holes
 - 2. Roadway: 1 hole + 1 hole per 500 lf of roadway (rounded up, along centerline alignment) (counts towards Total)
 - a. Example: 10.5 acre subdivision with 1,850 lf of roadway centerline
 - i. Roadway: $1 + (1,850 \div 500) = 4.7$, round up to 5 holes
 - ii. Total, minimum: $10.5 \div 2 = 5.25$, round up to 6 holes

- iii. Therefore, 6 total holes are required for subdivision, with 5 of the holes being along the roadway alignment.
- 3. Commercial sites: 1 hole + 1 hole per 5,000 square feet (rounded up) for buildings
 - a. Example: 13,500 sf building: $1 + (13,500 \div 5,000) = 3.7$, round up to 4 holes
- 4. Additional borings or test pits as may be required for a representative sampling of the site, as determined by the geotechnical engineer.

B4. Minimum Design Parameters for Pavement

- A. Local/Residential
 - 1. 75,000 ESALS
 - 2. 20-yr design life
 - 3. 3% growth factor
- B. Cul-de-Sac
 - 1. 50,000 ESALS
 - 2. 20-yr design life
 - 3. 3% growth factor
- C. Minor Collector (as shown on the County's Master Street Map)
 - 1. 300,000 ESALS
 - 2. 20-yr design life
 - 3. 3% growth factor
- D. Major Collector / Minor Arterial
 - 1. Contact County for traffic requirements

APPENDIX C – MODIFICATIONS AND ADDITIONS TO MANUAL OF STANDARD SPECIFICATIONS

APPENDIX C
MODIFICATIONS AND ADDITIONS TO THE
2017 MANUAL OF STANDARD SPECIFICATIONS

as published by:
Utah LTAP Center
Utah State University
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SECTION 03 20 00 M
CONCRETE REINFORCING (MODIFIED)

PART 3	EXECUTION
---------------	------------------

3.1 PLACING

Add paragraphs F and G as follows:

- F. No steel shall extend from or be visible on any finished surface.
- G. For sidewalks and curb only - all steel shall have a minimum of 1.5-inches of concrete cover.
All other reinforced concrete shall have a minimum of 3-inches of concrete cover.

**SECTION 03 30 04 M
CONCRETE (Modified)****PART 2 PRODUCTS****2.4 ADDITIVES**

Add paragraph F as follows:

- F. Fiber Reinforcement: A minimum of 1 pound per cubic yard of polyolefin fiber reinforcement shall be evenly distributed into the mix. Mixing shall be as recommended by the manufacturer/supplier such that the fibers do not ball up. Polyolefin fibers shall meet the requirements of ASTM C1116 and ASTM D7508.

2.5 MIX DESIGN

Replace paragraph A with the following:

- A. **Class:** When not specified in the plans or project specification, use the following table to select the class of concrete required for the application:

Class	Application
5,000	Reinforced structural concrete
4,000	Sidewalks, curb, gutter, cross gutters, waterways, pavements, and unreinforced footings and foundations
3,000	Thrust blocks
2,000	Anchors, mass concrete

SECTION 03 30 10 M
CONCRETE PLACEMENT (Modified)

PART 3	EXECUTION
---------------	------------------

3.2 PREPARATION

Add paragraph F as follows:

- F. No concrete shall be placed until the surfaces have been inspected and approved by the County Roads Department.

SECTION 31 23 16 M
EXCAVATION (Modified)

PART 3	EXECUTION
---------------	------------------

3.3 GENERAL EXCAVATION REQUIREMENT

Add paragraph I as follows:

- I. Excavation for pipelines under existing curb and gutter, concrete slabs, or sidewalks shall be open cut. In no case shall tunneling be allowed. At the option of the County Engineer, jacking under permanent facilities may be allowed based on his/her direction.

Add Section 31 23 20 Fill

**SECTION 31 23 20
FILL**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-structural fill materials.
- B. Non-structural placement and compaction.

1.2 REFERENCES

A. ASTM Standards

- D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

- A. When requested by OWNER, submit laboratory dry density and optimum laboratory moisture content for each type of fill to be used.

1.4 QUALITY ASSURANCE

- A. Do not change material sources without OWNER's knowledge.
- B. Reject material that does not comply with the requirements specified in this Section.

1.5 STORAGE

- A. Safely stockpile materials.
- B. Separate differing fill materials, prevent mixing, and maintain optimum moisture content of materials.

1.6 SITE CONDITIONS

- A. Do not place, spread, or roll any fill material over material that is damaged by water. Remove and replace damaged material at no additional cost to OWNER.
- B. Control erosion. Keep area free of trash and debris. Repair settled, eroded, and rutted areas.
- C. Reshape and compact damaged structural section to required density.

1.7 ACCEPTANCE

- A. General: Native material may be wasted if there is no additional cost to substitute material acceptable to OWNER.
- B. Lift thickness: One test per Lot.

- C. Compaction: One test per Lot. Verify density using nuclear tests, ASTM D 2922. Compaction and Lot sizes as follows:
 - 1. Compact to 92% Standard Proctor
 - 2. One Lot = 1500 square feet per lift

1.8 **WARRANTY**

- A. Repair settlement damage at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 **FILL MATERIALS**

- A. Material shall be free from sod, grass, trash, rocks larger than four (4) inches in diameter, and all other material unsuitable for construction of compacted fills.

2.2 **WATER**

- A. Make arrangements for sources of water during construction and make arrangements for delivery of water to site.
- B. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

PART 3 EXECUTION

3.1 **PREPARATION**

- A. Implement the traffic control plan requirements, Section 01 55 26.
- B. Verify material meets maximum size requirements.
- C. If ground water is in the intended fill zone, dewater.

3.2 **PROTECTION**

- A. Protect existing trees, shrubs, lawns, structures, fences, roads, sidewalks, paving, curb and gutter and other features.
- B. Protect above or below grade utilities. Contact utility companies to repair utility damage. Pay all cost of repairs.
- C. Avoid displacement of and damage to existing installations while compacting or operating equipment.
- D. Do not use compaction equipment adjacent to walls or retaining walls that may cause wall to become over-stressed or moved from alignment.
- E. Restore any damaged structure to its original strength and condition.

3.3 **LAYOUT**

- A. Identify required line, levels, contours, and datum.
- B. Stake and flag locations of underground utilities.

- C. Upon discovery of unknown utility or concealed conditions, notify OWNER.
- D. Maintain all benchmarks, control monuments and stakes, whether newly established by surveyor or previously existing. Protect from damage and dislocation.
- E. If discrepancy is found between Contract Documents and site, OWNER shall make such minor adjustments in the Work as necessary to accomplish the intent of Contract Documents without increasing the Cost of the Work to CONTRACTOR or OWNER.

3.4 **SUBGRADE**

- A. Protect Subgrade from desiccation, flooding, and freezing.
- B. Before placing fill over Subgrade, get OWNER's inspection of subgrade surface preparations.
- C. If Subgrade is not readily compactable get OWNER's permission to stabilize the subgrade.

3.5 **TOLERANCES**

- A. Compaction: Ninety-two (92) percent minimum relative to a standard proctor density, Section 31 23 26.
- B. Lift Thickness (before compaction):
 - 1. Twelve (12) inches when using riding compaction equipment.
 - 2. Eight (8) inches when using handheld compaction equipment.

3.6 **CLEANING**

- A. Remove stockpiles from site. Grade site surface to prevent free standing surface water.
- B. Leave borrow areas clean and neat.

END OF SECTION

**SECTION 31 41 00 M
SHORING (Modified)**

PART 1 GENERAL

1.2 PRICE – MEASUREMENT AND PAYMENT

A. In Trenching, Shoring:

Revise subparagraph 1 to read as follows:

1. A two (2) part Protective System is required if each Side of the Trench is to be shored. The use of a Trench Box shall be classified as one Protective System.

1.4 DESIGN OF PROTECTIVE SYSTEMS

Add paragraphs C and D as follows:

- C. Trenches five (5) feet deep or greater require a protective system unless the excavation is made entirely in stable rock. If less than five (5) feet deep, a competent person may determine that a protective system is not required.
- D. Trenches 20 feet deep or greater require that the protective system be designed by a registered professional engineer or be based on tabulated data prepared and/or approved by a registered professional engineer in accordance with 1926.652(b) and (c).

1.5 SUBMITTALS

Revise paragraph A to read as follows:

- A. Submit a Protective System plan:
 1. When excavation is over twenty (20) feet deep, or
 2. When requested by ENGINEER.

Add Article 1.6 as follows:

1.6 REFERENCES

- A. 29 CFR Part 1910 – Occupational Safety and Health Standards
- B. 29 CFR Part 1926 Subpart P – Excavations

PART 3 EXECUTION

3.4 INSPECTIONS

Add paragraph C as follows:

- C. OWNER and/or ENGINEER may order an immediate work stoppage if working conditions are thought to be unsafe. Work may resume only after proper safety precautions are implemented.

SECTION 32 01 06 M
STREET NAME SIGNS (Modified)

PART 1	GENERAL
---------------	----------------

1.2 REFERENCES

Add paragraph C as follows:

- C. Box Elder County Public Works Standard Drawings

**SECTION 32 01 13.64 M
CHIP SEAL (Modified)**

PART 1 GENERAL

1.2 REFERENCES**A. ASTM Standards:**

Add the following to paragraph A:

- | | |
|-------|--|
| C 29 | Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate |
| C 330 | Standard Specification for Lightweight Aggregates for Structural Concrete |

Rename Article 1.5 as follows:

1.5 WEATHER AND CONDITIONS**A. Temperature**

Add subparagraph 4 as follows:

4. Do not place if forecasted temperature is expected to drop below 40 deg F within 72 hours of placement.

B. Moisture and Wind:

Add subparagraph 1 as follows:

1. Do not place chip seal coat if surface moisture is present.

PART 2 PRODUCTS

2.1 ASPHALT BINDER

Add paragraph B to read as follows:

- B. Emulsified Asphalt: CRS-2P or LMCRS-2, Section 32 12 03. Use any of the following additives to match aggregate particle charge, weather conditions, and mix design:
(Subparagraphs 1-5 remain unchanged.)

Replace Article 2.2 with the following:

2.2 COVER AGGREGATE**A. Material**

1. Standard Chip: Use 100% crusher processed virgin aggregate consisting of natural stone gravel meeting the requirements of Table 1 for Standard Chip Seal Coat.

2. Lightweight Chip: Use 100% crusher-processed rotary-kiln lightweight expanded shale chips meeting the requirements of Table 1 for Lightweight Chip Seal Coat. (Utelite or approved equal).

Table 1 – Physical Properties of Cover Materials					
	Standard	Standard Chip		Lightweight Chip	
	ASTM	Min	Max	Min	Max
Dry-unit weight (rodded), lb/ft ³	C 29	--	100	--	60
Wear (hardness or toughness), percent	C 131	--	30	--	30
Angularity (2 fractured or angular faces), percent	D 5821	60	--	--	--
Soundness (weight loss), percent	C 88	--	12	--	10
Polishing, BPN	D 3319	30	--	31	--
Flats or elongates (1:3 ratio), percent	D 4791	--	10	--	--
Friable particles, percent	C 142	--	3	--	2
NOTES a) Wear of aggregate retained on No. 8 sieve. b) Soundness for combined coarse and fine aggregate measured using five (5) cycles Na ₂ SO ₄ .					

- B. Gradation: Analyzed on a dry weight and percent passing basis. Meet the gradation limits in Table 2.

Table 2 – Master Grading Bands for Cover Materials					
		Percent Passing			
	Test Method	Standard Chip		Lightweight Chip	
Sieve	ASTM	Grade A (UDOT Type I)	Grade C (UDOT Type II)	Type A	Type C (UDOT Lightweight)
1/2"	C 136	100	98-100	100	90-100
3/8"		85-100	69-91	80-100	55-80
No. 4		0-20	0-11	5-40	0-5
No. 8		0-5	0-6	0-20	0-3
No. 16		-	-	0-10	-
No. 200	C 117	0-1	0-1.5	-	0-1

Replace Article 2.3 with the following:

2.3 FOG SEAL/FLUSH COAT

- A. Material: Use cationic emulsified asphalt grade CSS-1H, Section 32 12 03.

Add Article 2.4 as follows:

2.4 MIX DESIGN

- A. Select type and grade of emulsified asphalt, ASTM D 3628.
- B. Determine application rates based on evaluation of road conditions and per manufacturer's recommendation. Submit mix design for approval by Engineer.
- C. Application rates should be in the following ranges, unless otherwise approved by Engineer.
 1. Emulsion: Use Table 3.

Table 3 – Emulsion Application Rate		
	Application Rate (gal/sy)	
Emulsion	Standard Chip	Lightweight Chip
CRS-2P	0.37-0.44	0.32 – 0.35
LMCRS-2	0.37-0.44	0.32 – 0.35

2. Cover Material: Use Table 4.

Table 4 – Cover Material Application Rate			
	Unit Weight (lbs/ft ³)	Application Rate (lbs/sy)	
Lightweight Chip		Type A	Type C
	45 – 50	9.6	11.8
	50 – 55	10.6	13.1
	55 – 60	11.6	14.3
Standard Chip		Grades A & C	
	60-65	17.0	
	65-70	18.4	
	70-75	19.8	
	75-80	20.7	
	80-85	22.1	
	85-90	23.5	
	90-95	24.9	
	95-100	25.8	

3. Fog Seal/Flush Coat: Use 0.10 – 0.12 gal/sy at a 2:1 dilution rate.

PART 3 EXECUTION

3.2 PREPARATION

Add paragraph F as follows:

- F. Cover manholes, valves boxes, storm drain inlets, and other service utility features before placing any chip seal coat.

3.4 APPLICATION

Revise paragraph A to read as follows:

- A. Asphalt Emulsion: Keep viscosity between 50 and 100 centistokes during application, ASTM D 2170. Keep temperature to a minimum of 145 deg F.

Revise Article 3.6 to read as follows:

3.6 FOG SEAL/FLUSH COAT

- A. Sweep surface and remove loose debris prior to applying.
- B. Apply within 24 hours of placing chips.
- C. Keep viscosity between 50 and 100 centistokes, during application, ASTM D 2170.
- D. See also Section 32 01 13.50.

SECTION 32 01 90 M
MAINTENANCE OF PLANTING (Modified)

PART 1	GENERAL
---------------	----------------

1.2 GRASS MAINTENANCE

Add the following sentence immediately following the end of paragraph A:

Contractor shall mow the lawn until the end of the date of Substantial Completion. The number of mowing to be provided by the Contractor shall be determined by the growth pattern of the lawn. There shall be no minimum number of mowing set forth, only that the health and vitality of the lawn shall be maintained. At no time shall the height of the lawn exceed 4½".

SECTION 32 12 05 M
BITUMINOUS CONCRETE (MODIFIED)
(Amendment 2 of the 2017 Edition APWA Specifications)

PART 1	GENERAL
---------------	----------------

1.4 SUBMITTALS

Revise paragraph C as follows:

Replace item 11 with the following:

11. Tensile Strength Ratio or Hamburg Rut Test results.

Add the following item:

14. Unless otherwise specified, Road Class II shall be used for the selection of Mix Design parameters.

**SECTION 32 12 13.13 M
TACK COAT (Modified)**

PART 3 EXECUTION

3.3 APPLICATION

B. Application Rate: Typically as follows:

1. Emulsions, 0.05 to 0.15 gallons per square yard.

Add subparagraph a as follows:

- a. For Thin Overlays, 0.12 to 0.15 gallons per square yard.

SECTION 32 12 16.13 M
PLANT-MIX BITUMINOUS PAVING (Modified)

PART 3	EXECUTION
---------------	------------------

3.8 TOLERANCES

- A. Compaction: Target is 94 percent of ASTM D2041 (Rice density) plus or minus two (2) percent.

Add subparagraph 1 as follows:

1. Thin Overlay – Target is 92.5 percent of ASTM D2041 (Rice density) plus or minus two (2) percent.

SECTION 32 16 13 M
DRIVEWAY, SIDEWALK, CURB, GUTTER (Modified)

PART 3	EXECUTION
---------------	------------------

3.9 CONTRACTION JOINTS

B. Curb, Gutter, Waterway:

Revise subparagraph 1 to read as follows:

1. Place joints at intervals not exceeding 10 feet.

3.5 EXPANSION JOINTS

B. Sidewalks:

Add subparagraph 5 as follows:

5. Place expansion joints wherever new sidewalk adjoins existing sidewalks, driveways, or aprons.

C. Curb, Gutter, Waterway:

Add subparagraph 4 as follows:

1. Place expansion joint where new curb and gutter adjoins existing curb and gutter.

SECTION 32 31 13 M
CHAIN LINK FENCES AND GATES (Modified)

PART 2 PRODUCTS

2.6 POSTS, CAPS, RAILS, COUPLINGS

- A. Posts, Frames, Stiffeners, Rails: ASTM F 1043:

Revise applicable rows of Table 1 to read as follows:

Top Rail	1-5/8" pipe
----------	-------------

PART 3 EXECUTION

3.6 INSTALLATION OF FENCE FABRIC

Revise paragraph A to read as follows:

- A. Place fence fabric on roadway side of posts unless otherwise specified. Place fabric approximately 1 inch above the grounds. Maintain a straight grade between posts by excavating ground high points and filling depressions with soil.

SECTION 32 31 16 M
WELDED WIRE FENCES AND GATES (Modified)

PART 1 GENERAL

1.2 REFERENCES

Add paragraph D as follows:

D. UDOT Standard Drawing

FG 2A Right of Way Fence and Gates (Metal Post)

FG 2B Right of Way Fence and Gates (Metal Post)

PART 3 EXECUTION

3.2 INSTALLATION

Add paragraph N as follows:

N. Install per UDOT Standard Drawings FG 2A and FG 2B.

Add Section 32 31 23 Polyvinyl Chloride (PVC) Fences and Gates

**SECTION 32 31 23
POLYVINYL CHLORIDE (PVC) FENCES AND GATES**

PART 3 GENERAL

1.1 SECTION INCLUDES

- A. PVC fencing, posts, gates, and appurtenances.

1.2 REFERENCES

A. **ASTM Standards:**

- | | |
|--------|--|
| D 1784 | Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds |
| F 626 | Fence Fittings |
| F 964 | Rigid Polyvinyl Chloride (PVC) Exterior Profiles Used for Fencing and Railing |
| F 1999 | Installation of Rigid Polyvinyl Chloride (PVC) Fence Systems |

1.3 SUBMITTALS

- A. Drawings: Indicate plan layout, grid, size and spacing of components, accessories, fittings, anchorage, and post section.
- B. Data: Submit manufacturer's installation instructions and procedures, including details of fence and gate installation.
- C. Submit sample of fence fabric and typical accessories.

PART 2 PRODUCTS

2.1 GENERAL

- A. Products from other qualified manufacturers having a minimum of 5 years' experience manufacturing PVC fencing will be acceptable by the architect as equal, if approved in writing, ten days prior to bidding, and if they meet the following specifications for design, size, and fabrication. PVC Profiles, lineals, and extrusions used as components must "meet or exceed" the minimum performance guidelines laid out in ASTM 964.

2.2 PVC FENCE

- A. Pickets, rails, and posts fabricated from PVC extrusion. The PVC extrusions shall comply with ASTM D 1784, Class 14344B and have the following characteristics:

Specific Gravity (+/- 0.02)	1.4
Using 0.125 specimen Izod impact ft. lbs./in. notch	23.0
Tensile strength, psi	6,910
Tensile modulus, psi	336,000
Flexural yield strength, psi	10,104
Flexural modulus, psi	385,000
DTUL at 264 psi	67°C

- B. All fence parts made from PVC shall have a minimum thickness of 0.17 in except where specified otherwise.

2.3 POST CAPS

- A. Molded, one piece.
- B. Cross Section: Match post or gate upright cross section.
- C. Thickness: 0.095" minimum.
- D. Configuration: Flat or four-sided as required for installation to top of posts and gate.

2.4 ACCESSORIES

- A. Standard gate brace, screw caps, rail end reinforcers, and other accessories as required.

2.5 MISCELLANEOUS MATERIALS

- A. Stiffener Chemicals: Galvanized steel structural channel. Configure channels for concealed installation within PVC rails with pre-drilled holes for drainage. Aluminum extruded channel available upon request.
 - 1. Cross Section: 3.00" x 3.00" x 1.500" hourglass shape to grip picket.
 - 2. Thickness: 0.040 Gauge (minimum)
- B. Fasteners and Anchorage: Stainless Steel. All fasteners to be concealed or colored heads to match. Provide sizes as recommended by fence manufacturer.
- C. PVC Cement: As recommended by fence manufacturer.

2.6 GATE HARDWARE AND ACCESSORIES

- A. General: Provide hardware and accessories for each gate according to the following requirements.
- B. Hinges: Size and material to suit gate size, non-lift-off type, self-closing, glass filled nylon with stainless steel adjuster plate, offset to permit 120 degree gate opening. Provide one pair of hinges for each gate.
 - 1. Stainless Steel, painted with carbo zinc base.
 - 2. Finish: Pre-painted, 2 coats "Polane."
 - 3. Color: Black Gravity Latch or dual access gravity latch.

C. Latch: Manufacturers' standard self-latching, thumb latch, pre-finished steel, or stainless steel gravity latch. Provide one latch per gate.

1. Finish: Match gate hinge finish.

D. Hardware: Stainless Steel. Provide sizes as recommended by fence manufacturer.

1. Finish: Match gate hinge finish.

2.7 CONCRETE

A. Use Class 2000 concrete. Section 03 30 04.

2.8 REINFORCING FOR FILLED POSTS

A. Steel Reinforcing:

1. Steel Reinforcing Bars: ASTM A 615. Grade 60. Deformed (#4 or ½").

2. Install 2 bars for each corner or gate post as specified in the drawings.

PART 3 EXECUTION

3.1 PREPARATION

A. Locate and preserve utilities, Section 31 23 16.

B. Excavation, Section 31 23 16.

C. Review to ASTM F 567 and CLFMI products manual for chain link fence installation.

D. Protect roots and branches of trees and plants to remain.

E. Limit amount of clearing and grading along fence line to permit proper installation.

3.2 LAYOUT OF WORK

A. Accurately locate and stake locations and points necessary for installation of fence and gates.

B. General arrangements and location of fence and gates are indicated. Install except for minor changes required by unforeseen conflicts with work of other trades.

3.3 INSTALLATION – GENERAL

A. Install fence in compliance with manufacturer's written instructions.

B. PVC components shall be carefully handled and stored to avoid contact with abrasive surfaces.

C. Install components in sequence as recommended by fence manufacturer.

D. Install fencing as indicated on the drawings provided.

E. Variations from the installation indicated must be approved.

F. Variations from the fence and gate installation indicated and all costs for removal and replacement will be the responsibility of the CONTRACTOR.

3.4 **INSTALLATION OF POSTS**

A. Excavation

1. Drill or hand-excavate (using post hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.
2. If not indicated on drawings, excavate holes for each post to a minimum diameter of 12 inches.
3. Unless otherwise indicated, excavate hole depths not less than 30 inches or to frost line.

B. Posts

1. Install posts in one piece, plumb and in line. Space as noted in the drawings. Enlarge excavation as required to provide clearance indicated between post and side of excavation.
2. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.
 - a. Unless otherwise indicated, terminate top of concrete footings 3 inches below adjacent grade and trowel to a crown to shed water.
 - b. Secure posts in position for manufacturer's recommendations until concrete sets.
 - c. After installation of rails and unless otherwise indicated, install reinforcing in posts in opposing corners of post as shown and fill end and gate posts with concrete to level as indicated. Concrete fill shall completely cover the reinforcing steel and gate hardware fasteners. Consolidate the concrete by striking the post face with a rubber mallet, carefully tamping around the exposed post bottom.
 - d. Install post caps. Use #8 screws, nylon washers and snap caps.
 - e. Remove concrete splatters from PVC fence materials with care to avoid scratching.

3.5 **INSTALLATION OF RAILS**

A. Top and Bottom Rails

1. Install rails in one piece into routed hole fabricated into posts to receive top and bottom rails, and middle where necessary. Except at sloping terrain, install rails level.
 - a. Prior to installation of rails into posts, insert concealed steel channel stiffeners in top rail, where necessary. Bottom rails shall include minimum 2- $\frac{1}{4}$ " drainage holes.
 - b. At posts to receive concrete fill, tape rail ends to prevent seepage when filling post with concrete.

B. Middle Rails:

1. Where necessary, install middle rails in one piece into routed hole in posts with larger holes facing down. Except at sloping terrain, install middle rails level. Secure mid rail to pickets with 2-#8 x 1- $\frac{1}{2}$ " screws evenly spaced.
 - a. At posts to receive concrete fill, tape rail ends to prevent seepage when filling post with concrete.

3.6 INSTALLATION OF FENCE FABRIC/PICKETS

- A. Pickets: Install pickets in one piece as per manufacturer recommendations. Install pickets plumb.

3.7 INSTALLATION ON SLOPING TERRAIN

- A. At sloping terrain rails may be racked (sloped) or stepped to comply with manufacturer's recommendations.

3.8 INSTALLATION OF GATES

- A. Prior to installation of rails into posts, apply PVC cement into sockets per manufacturer's recommendations. Bottom rail shall include minimum 2-¼" drainage holes.
- B. Assemble gate prior to fence installation to accurately locate hinge and latch post. Align gate horizontal rails with fence horizontal rails.
- C. Install gates plumb, level, and secure for full opening without interference according to manufacturer's instructions.
- D. Gate Latch Installation. Install gate latch according to manufacturer's instructions.
- E. Allow minimum 72 hours to let concrete set-up before opening gates.

END OF SECTION

SECTION 32 84 23 M
UNDERGROUND IRRIGATION SYSTEMS (Modified)

PART 1	GENERAL
---------------	----------------

1.1 SECTION INCLUDES

Add paragraphs B and C as follows:

- B. Underground irrigation system for private systems only.
- C. This section shall not be used for irrigation or secondary water distribution systems.

SECTION 32 92 00 M
TURF AND GRASS (Modified)

PART 2 GENERAL

1.3 SUBMITTALS

Add paragraph C as follows:

- C. Submit seed mix if proposing alternate to seed mix shown in paragraph 2.1.D below.

PART 2 PRODUCTS

2.1 SEED

Add paragraphs D and E as follows:

- D. Seed Mix: For improved areas with irrigation, use Table 1. For non-improved areas requiring a native seed mix and all other areas, use Table 2. If unclear, check with County Engineer.

Table 1 – Seed Mix for Improved Areas			
Seed No.	Botanical Name	Common Name	% by Weight
1	Poa pratensis	Adlephi	10
2	Poa pratensis	Columbia	30
3	Poa pratensis	Midnight	20
4	Poa pratensis	Ram I	10
5	Poa pratensis	Sydsport	20
6	Perennial Rye	Citation	10

Table 2 – Seed Mix for Other Areas			
Seed No.	Botanical Name	Common Name	% by Weight
1	Agropyron cristatum 'Fairway'	Fairway Crested Wheatgrass	15
2	Agropyron riparium 'Sodar'	Streambank Wheatgrass	20
3	Bromus inermis 'Manchar'	Smooth Brome	32
4	Fescue rubra 'Fortress'	Red Fescue	25
5	Poa compressa 'Reuben's'	Reuben's Canadian Bluegrass	6
6	Trifolium repens	White Dutch Cover	2

- E. The seed mixture shall meet the minimum tested requirements of A.N.A. The seed shall be the current year's crop, guaranteed by the supplier as follows:
1. 80% Germination Rate, 28 pounds per bushel or equivalent.
 2. 72% Purity and 80% pure live seed.

3. No more than 2% inert matter.
4. No noxious weeds and no more than 0.1% weed seed.

2.4 ACCESSORIES

Replace paragraph A with the following:

- A. Commercial fertilizer shall be a mixed commercial fertilizer, O-F-241C, type 1, grade 16-16-8, level B with guaranteed chemical analysis of contents marked on the containers.

PART 3 EXECUTION

3.3 FERTILIZING

Revise paragraph A to read as follows:

- A. Apply fertilizer at a rate of 6 pounds per 1,000 square feet or as required by soil analysis.

3.4 SEEDING

Revise paragraph A to read as follows:

- B. Apply seed at a rate of eight (8) pounds per 1,000 square feet evenly in two (2) intersecting directions. Rake in lightly.

SECTION 33 05 25 M
PAVEMENT RESTORATION (Modified)

PART 1 GENERAL

1.2 REFERENCES

Replace paragraph A with the following:

- A. Box Elder County Public Works Standard Drawings

PART 2 PRODUCTS

2.2 ASPHALT PAVEMENT

Revise paragraph A to read as follows:

- A. Permanent Warm Weather Asphalt Concrete: Section 32 12 05 M unless indicated otherwise.

Revise paragraph C to read as follows:

- C. Pavement Sealing:
 - 1. Crack Seal: Section 32 01 17.
 - 2. Chip Seal: Section 32 01 13.64 and 32 01 13.64 M.
 - 3. Fog Seal: Section 32 01 13.50.

PART 3 EXECUTION

3.5 ASPHALT PAVEMENT RESTORATION

Revise paragraphs A and B to read as follows:

- A. Follow Box Elder County Public Works Standard Drawings.
- B. Match existing pavement thickness or 4-inches minimum, whichever is greater.