- Cross drain pipes used throughout Abu Dhabi shall be circular pipes and shall meet the material selection limitations.
- Concrete box culverts shall be structurally designed to withstand all live and dead loads for both the construction and permanent conditions in accordance to the requirements within the DoT Road Structures Design Manual [30].

III. Concrete box culverts shall also meet the pipe durability, service life, corrosion protection, and abrasion resistance for concrete pipe as per manufacturers requirement.

IV. Size:

- Minimum culvert sizes shall meet the requirements of Table A5-5.

Table A5-5: Minimum culvert sizes

Culvert type	Minimum size (mm diameter)
Cross drain**	600
Median drain	500*
Side drain	500*
Box culvert	900 by 900 precast 1,200 by 1,200 cast-in situ
Drains from inlets on high fills (e.g., gutter drain)	300*

*When debris control is provided by grates and sand trap facilities use a 300-mm-dia. minimum.
**Size of cross drains shall also be agreed with the O&M department, according to site conditions.

V. End treatment:

Selection of end treatment facilities must be consistent with hydraulic requirements, maintenance concerns, and provide vehicle collision safety where culvert ends terminate within the roadway clear zone.

A5.2.1.2. Culvert Fundamentals

1. Flow control:

Culverts can operate either under inlet control, where the barrel has a greater hydraulic capacity than the inlet; or, under outlet control, where the inlet has a greater hydraulic capacity than the barrel.

When a culvert is operating under inlet control, the barrel will flow partially full (i.e., the culvert is capable of carrying more flow than the inlet will accept). Culverts flowing in inlet control have a shallow, high-velocity flow categorized as supercritical. For supercritical flow, the control section is at the upstream end of the barrel, or the inlet. When an outlet is submerged under inlet control, a hydraulic jump will occur inside the barrel.

When a culvert is operating under outlet control, the barrel is intended to flow full for design conditions (i.e., the culvert barrel is not capable of conveying as much flow as the inlet will accept). Culverts flowing in outlet control will have relatively deep, lower velocity flow — termed subcritical flow.