## Tropic Gardens Condominium Phase 1 Thru 4 Drainage Improvements Design Rationale

- 1) Per C&C of Honolulu Storm Drainage Design Standard 2017 Edition, Section 1-4.2, the Stormwater Runoff Volume from the design shall be limited to predevelopment values unless it can be shown that the runoff can be safely conveyed through existing or planned conveyances and that the increased stormwater volume would not have adverse impacts to downstream properties. For this project including all phases, this would require implementing on-site stormwater retention systems and devices for filtering of stormwater prior to connecting to the C&C's storm drainage system. This would also require a drain connection license.
- 2) Based on the City Storm Drainage Design Standards and the existing conditions at the site, an underground Drainage System to collect the site's Stormwater runoff and incorporating on-site stormwater retainage systems located prior to discharge into the City's Right-of-way would have been difficult to design and costly to construct due to the following:
  - a) Configuration of the existing buildings, location of existing underground utilities, such as existing sewer, waterlines, electrical ducts and the alignment for new sewer lines would interfere with the routing of new underground drain lines.
  - b) There is limited space on site to construct stormwater retention systems.
  - c) Relocation of unforeseen utilities within the City and County Right of Way would have added significant costs to the project.
  - d) Each proposed Drainage Connection from the property to the City's Drainage System requires a Drainage Connection License with no guarantees that the applications would be approved.
  - e) Due to existing site elevations, there are some locations where, the stormwater from the site would need to be collected at sump manholes which would require installation of a sump pump in order to discharge back to the City's Drainage System. This was deemed to be economically unfeasible and maintenance prohibitive as opposed to installing drywells at these locations.
  - f) For Buildings 4212, 4210, 4206, and 4205 located at the makai side of the site above the commercial development, the runoff from this area is not allowed to surface flow onto the adjacent property. During initial study, we tried to approach the

adjacent owner to see if they could accommodate a drainage easement, but their construction had progressed to a stage where it was not possible. Therefore, Drywells were deemed to be the most viable solution.

3) In general, the proposed use of Drywells appeared to be the most economical method to capture the Stormwater runoff within the property, including from the existing roofs and to divert stormwater away from the existing structures.