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CITY CENTER GUIDEWAY AND STATIONS

Preliminary Draft Qualitative Evaluation of Potential Project Changes

February 24, 2021

CATEGORIES OF ALTERNATIVES:

1. **Baseline Approach**
2. **Change Mode or Technology**
3. **Move Guideway Alignment to Another Corridor**
4. **Shift Guideway Alignment within LPA Corridor**
5. **Stations, Joint Development, and Private Finance**
6. **Tunnel or At-Grade on LPA Alignment**
7. **Utility-Focused Changes**
8. **Move Terminus and Reduce System**

1. Baseline Approach

ALT.	POTENTIAL CHANGE	PROS	CONS
1	**Baseline: Complete Full Funding Grant Agreement (FFGA) scope for CCGS (i.e. 4 miles, 8 stations, along Locally-Preferred Alternative alignment)**	1. Consistent with public commitments. 2. Honors signed Full Funding Grant Agreement with FTA. 3. Maintains planned ridership (user benefits). 4. Not anticipated to require a Supplemental Environmental Impact Statement (Supplemental EIS). 5. Not anticipated to require any further Archaeological Inventory Survey (AIS). 6. Consistent with existing third-party agreements and utility agreements. 7. Consistent with Locally-Preferred Alternative (LPA). 8. Alignment and station locations consider locations of planned riders. 9. Property has been acquired or is in the process of being acquired. 10. All of the core systems equipment has already been designed around this corridor (requires minimal redesign). 11. All concept designs to date (including those received from priority-listed offerors) are based on this approach. 12. All previous in-depth planning studies led to this scope and layout.	1. Requires many utility relocations. 2. Likely to require utility clearance variances.

2. Change Mode or Technology

ALT.	POTENTIAL CHANGE	PROS	CONS
2A	**Separate at-grade system from Kalihi to Ala Moana with different technology**	1. Depending on technology selection, schedule, and price escalation over time, this approach could result in reduced construction costs for guideway and stations. 2. Potential to reduce visual impacts of elevated rail line in the urban core. 3. At-grade stations are often easy to access and conducive to neighborhood scale transit-oriented development.	1. Likely to require Full Funding Grant Agreement (FFGA) amendment and could result in loss of Federal Transit Administration (FTA) funding. 2. Mixes rail traffic and roadway traffic, slowing both and creating longer travel times. 3. Increased likelihood accidents between rail, pedestrians, cyclists, and autos. 4. Will require more utility relocations than an elevated guideway. 30+ feet wide for entire length vs. 8-foot diameter column every 100 to 140 feet. For Dillingham Boulevard, this concept would result in the relocation of all existing underground utilities in order to create the clear space---even if we leave the vast majority of communications and electrical aerial. 5. Potential cost increase if additional costs (ROW, trains, core systems, utilities, security, grade crossing signalization and/or viaducts) outweigh guideway savings. 6. Requires extensive ROW acquisitions and associated costs. When comparing a 12-foot median to a 30-foot wide footprint. Minimum 20 additional feet for the length of at grade construction. If extended downtown, it would result in the complete closure of parts of Halekauwila, Queen and Kona. 7. Core systems must be redesigned and operations renegotiated. 8. Likely to require new rail vehicles or retrofitting of current vehicles to accept both traction and catenary power. 9. Introduces new risks (e.g. safety, ROW, noise, access, hazards, etc.). 10. Lower ridership, due to slower travel times and less reliable service. 11. Would likely require a Supplemental EIS for at-grade system. 12. Would require City Council action to adopt a new Locally Preferred Alternative. 13. Substantial increases in cost and schedule to the program. 14. Challenges with locating 4-car (i.e. 240’ long) platforms within on-street ROW. 15. Higher operating and maintenance costs.
2B	**Terminate rail at Middle Street; build elevated automated people mover (APM) to Ala Moana**	1. Lighter guideway structure. 2. Smaller station structures. 3. More easily expandable in Downtown area.	1. Requires passengers to transfer at Middle Street (not a “one-seat ride”). 2. Would likely require a Supplemental EIS for APM system. 3. Major changes to existing contracts (e.g. core systems, elevators and escalators). 4. Requires a new maintenance and storage facility for APM vehicles. 5. Pre-purchased equipment for metro system may go to waste. 6. Likely to require Full Funding Grant Agreement (FFGA) amendment and could result in loss of Federal Transit Administration (FTA) funding.

ALT.	POTENTIAL CHANGE	PROS	CONS
2C	**Terminate rail at Middle Street; switch to bus rapid transit (BRT)**	1. Costs less. 2. Provides long-term flexibility for route changes, fleet expansion, etc. 3. May benefit from future driverless technologies.	1. Requires FFGA amendment and could result in loss of FTA funding. 2. Slower commutes. 3. Impedes other modes of traffic. 4. Increased risk of collisions at grade. 5. Conflicts with 2008 public vote, Final Environmental Impact Statement (FEIS), FFGA, etc. 6. Would likely require a Supplemental EIS. 7. Would reduce overall rail ridership.
2D	**Change technology from traction power to maglev**	1. Good ride quality. 2. Potential energy savings during operations. 3. Lower noise emission and vibration levels. 4. Reduced maintenance frequencies on some system components. 5. Quieter operations.	1. There are no proven maglev technologies in operation in North America. 2. Requires FFGA amendment and could result in loss of FTA funding. 3. Maglev is generally more expensive than traditional technologies. 4. Requires major retrofit (over $1 billion) of existing guideway, maintenance and storage facility, power supply, fleet, maintenance equipment, etc. 5. Would result in substantial delays (multiple years) to overall program. 6. Primary benefit of maglev (high speeds) would be limited by guideway alignment, passenger comfort, structural design, and frequent station stops. 7. Would likely require a Supplemental EIS. 8. Regulatory approvals could be challenging given lack of precedence in the United States.

3. Move Guideway Alignment to Another Corridor

ALT.	POTENTIAL CHANGE	PROS	CONS
3A	**Shift guideway alignment to Nimitz Hwy**	1. Avoids utilities on Dillingham. 2. Does not require significant widening (if any) of Nimitz Hwy. 3. Could support HDOT Harbors Master Plan including new cruise ship terminal at Pier 21/22.	1. Requires FFGA amendment and could result in loss of FTA funding. 2. Likely to have lower ridership, due to distance from major activity centers (Kalihi, Honolulu Community College). 3. Increases length of guideway and associated costs. 4. Requires new ROW acquisitions and associated costs. 5. Core systems must be redesigned and operations renegotiated. 6. Previous ROW acquired and buildings demolished for naught. 7. Cost per rider goes up. 8. Introduces new risks (e.g. hazmat, utilities, third parties, etc.). 9. Requires demolition and reconstruction of east end of Airport Guideway and Stations (AGS) alignment. 10. Would require a Supplemental EIS. 11. Requires new Archaeological Inventory Survey (AIS). 12. Requires City Council action to modify Locally Preferred Alternative. 13. Landowners may have anticipated TOD along Dillingham corridor. 14. New TOD zoning will need to be established. 15. New Utility relocation design required for the length of the realignment. 16. Likely to result in schedule increase due to environmental approvals. 17. Conflicts with some HDOT plans for future roadway use (e.g. Nimitz Flyover Project). 18. No plans as to how to transition guideway from Dillingham to Nimitz and how to maintain bus connectivity. 19. Would not connect UH system with Honolulu Community College (HCC). 20. Blocks harbor views and impacts businesses along Nimitz Hwy. 21. Nimitz Highway is designated as a Primary Freight Route by the FHWA. This may require FHWA approval. 22. The height of the guideway would need to consider SLR as the Honolulu Harbor, the piers, and adjacent land and roads get raised. Large container trucks would need to continue to use Nimitz Highway. 23. Requires removal of more trees transplanted by HART from Waipahu to Nimitz.

ALT.	POTENTIAL CHANGE	PROS	CONS
3B	**Shift guideway alignment to Dillingham > King Street > ?**	1. Larger residential ridership catchment area and potentially higher ridership. 2. Better integration with multimodal transit system (King/Beretania connections) 3. Potential new TOD opportunities and opportunity to integrate value-capture (see Montreal, Hong Kong, Singapore).	1. Requires FFGA amendment and could result in loss of FTA funding. 2. Requires new ROW acquisitions and associated costs. 3. Core systems must be redesigned and operations renegotiated. 4. Previous ROW acquired and buildings demolished for naught. 5. Cost per rider goes up. 6. Introduces new risks (e.g. archaeological, utilities, third parties, etc.). 7. Would require a Supplemental EIS. 8. New Archaeological Inventory Survey would need to be conducted; also need to assess impacts to historic resources and potential amendment to the Programmatic Agreement. 9. Requires City Council action to modify Locally Preferred Alternative. 10. Landowners may have anticipated TOD along Dillingham corridor. 11. New transit-oriented development (TOD) limits will need to be established. 12. New utility relocate design required for the length of the realignment. 13. Likely to result in schedule increase due to environmental approvals. 14. No plans as to how to transition guideway and how to maintain bus connectivity. 15. Alignment was studied and analyzed during Alternatives Analysis (2006); potential additional impacts to historic resources.
3C	**Tunnel the guideway along new alignment to Ala Moana (Dillingham > Beretania > Kapiolani)**	1. Larger ridership catchment areas and higher ridership (Downtown mauka). 2. Better integration with multimodal transit system (King/Beretania connections) 3. Opportunity to integrate with redevelopment sites (HECO/Blaisdell/Straub) 4. Opportunity to better integrate the Ala Moana Station with the community.	1. Requires FFGA amendment and could result in loss of FTA funding. 2. May require more utility relocations than elevated guideway due to transition from elevated to underground. 3. Requires new ROW acquisitions and associated costs. 4. Core systems must be redesigned and operations renegotiated. 5. Introduces new risks (e.g. geotechnical, adjacent buildings, etc.). 6. May require demolition and reconstruction of east end of AGS alignment. 7. Capital cost per new rider would increase. 8. Would require a Supplemental EIS. 9. New Archaeological Inventory Survey would need to be conducted; also need to assess impacts to historic resources and potential amendment to the Programmatic Agreement. 10. Substantial cost and schedule increase to the program. 11. Underground stations could impact more utilities. 12. No plans for how to transition from elevated guideway to underground tunnel. 13. Requires new scope (e.g. ventilation, fire detection, dewatering system, etc.). 14. Recent U.S. subways cost: $2.5b/mi (NY, Second Ave Subway, 2017), $930m/mi (LA Purple Line Extension), $928m/mi (SF Central Subway), $600m/mi (Seattle U-Link, 2012), $630m/mi (Vancouver Broadway Subway, 2020).

ALT.	POTENTIAL CHANGE	PROS	CONS
3D	**Tunnel the guideway directly to UH-Manoa (Dillingham > Beretania > King)**	1. Potentially higher initial ridership. 2. Potential to better integrate stations with adjacent development. 3. Addresses sustainability/resiliency directives (out of sea level rise area) 4. Potential to integrate with flood control projects (use of excess tunnel space in a large-diameter tunnel). 5. Substantial new TOD opportunities; potential to integrate value-capture (see Montreal, Hong Kong, Singapore). 6. Potential to attract private capital	1. Requires FFGA amendment and could result in loss of FTA funding. 2. Would require a Supplemental EIS. 3. Would require reopening AIS and Programmatic Agreement. 4. May require more utility relocations than elevated guideway due to transition from elevated to underground. 5. Requires new ROW acquisitions and associated costs. 6. Core systems must be redesigned and operations renegotiated. 7. Introduces new risks (e.g. geotechnical, adjacent buildings, etc.). 8. May require demolition and reconstruction of east end of AGS alignment. 9. Capital cost per new rider would increase. 10. Substantial cost and schedule increase to the program. 11. Underground stations could impact more utilities. 12. No plans for how to transition from elevated guideway to underground tunnel. 13. Requires new scope (e.g. ventilation, fire detection, dewatering system, etc.). 14. Recent U.S. subways cost: $2.5b/mi (NY, Second Ave Subway, 2017), $930m/mi (LA Purple Line Extension), $928m/mi (SF Central Subway), $600m/mi (Seattle U-Link, 2012), $630m/mi (Vancouver Broadway Subway, 2020). 15. Landowners may have anticipated TOD around existing station locations. 16. Previous ROW acquisitions and building demolitions for naught.
3E	**Shift guideway alignment to Colburn Street**	1. Fewer utility conflicts on Colburn relative to Dillingham. 2. Would shift traffic impacts from an arterial (Dillingham Boulevard) to a side street (Colburn), thereby reducing the impact on traffic capacities and commute times.	1. Requires amendment to FFGA and could result in loss of FTA funding. 2. Would likely require a Supplemental EIS. 3. Requires reopening of AIS and Programmatic Agreement. 4. Traffic impacts to Colburn would be significant and may prevent access to some properties. 5. Would not “clean up” Dillingham (e.g. would not underground aerial utilities, new roadway, etc.). 6. Requires restart of design. 7. Increases length of guideway and associated costs. 8. Requires new ROW acquisitions and associated costs. 9. Core systems must be redesigned and operations renegotiated. 10. Previous ROW acquired and buildings demolished for naught. 11. Landowners may have anticipated TOD around existing station locations. 12. New TOD limits will need to be established. 13. New utility relocate design required. 14. Likely to result in schedule increase due to environmental approvals.

4. Shift Guideway Alignment within LPA Corridor

ALT.	POTENTIAL CHANGE	PROS	CONS
4A	**Dillingham Mauka shift from Kapalama Stream to Kaaahi (qualitative assessment generally includes several variations on this concept)**	1. Substantially reduces CCUR construction risk. 2. Potential to allow HECO makai 138kV and 46kV circuits to remain aerial, if variance is granted. 3. Will also allow communication lines paralleling Dillingham to remain aerial. 4. Should significantly reduce underground utility congestion in this area relative to the current approach. 5. Substantial reduction in costs and construction schedule due to the reduction of utility relocates. 6. HECO prefers the redundancy associated with one aerial circuit and one undergrounded circuit and the separation this alternate provides between the circuits. 7. Allows one row of historic trees to remain in place. 8. Allows left turns into businesses. 9. Creates opportunity for a multi-use path under the guideway adjacent to UH HCC. 10. Less traffic disruption during guideway construction. 11. Potential to reduce traffic signal scope if DTS is amenable. 12. Moving guideway piers from median to roadside could reduce risk of vehicle collisions. 13. Reduces visual impact of elevated guideway relative to center column and straddle bent configuration; enhanced urban design.	1. Requires re-design of utility relocations, roadway, traffic signals and core systems. 2. Requires Post-ROD; risk of supplemental EIS. 3. UH HCC approval will be required. 4. Introduces noise and vibration risk to UH HCC with the guideway closer to buildings. 5. Community had been promised a full undergrounding of overhead utilities.
4B	**Dillingham Makai shift from Puuhale Rd to Kapalama Stream (qualitative assessment generally includes several variations on this concept)**	1. Substantially reduces CCUR construction risk. 2. Reduces utility relocation needs (could allow 46kV and 138kV aerial on mauka side, may require a HECO variance) and could reduce utility relocation costs. 3. Potential to integrate community multiuse path under the guideway. 4. Potential to redesign station with a smaller footprint. 5. Additional property takes could create additional opportunities for City development (e.g. housing, etc.). 6. May help reduce need for utility clearance variances. 7. Less traffic disruption during guideway construction. 8. Potential to reduce traffic signal scope if DTS is amenable. 9. Moving guideway piers from median to roadside could reduce risk of vehicle collisions. 10. Reduces visual impact of elevated guideway relative to center column and straddle bent configuration; enhanced urban design.	1. Requires re-design of utility relocations, roadway, traffic signals and core systems. 2. Previously studied and ruled out by Tiger Team due to AGS impacts. 3. Impacts utility design schedule. 4. Requires Post-ROD; risk of supplemental EIS. 5. Requires additional property acquisitions, which will like increase the project costs. 6. Requires demolition of additional buildings. 7. May require additional utility relocations. 8. Potentially significant impact to round-trip time and headway (requires simulation). 9. Potentially increases quantity of straddle bents over Dillingham.

5. Stations, Joint Development, and Private Finance

ALT.	POTENTIAL CHANGE	PROS	CONS
5A	**Shift Niuhelewai (Kapālama) Station to Ewa side of canal**	1. Addresses UH concerns with disturbing contaminated soil; reduces potential liability for investigation and remediation. 2. Adjacent to planned Kapālama Kai redevelopment. 3. Eliminates some (not all) straddle bents along Dillingham Boulevard. 4. When paired with mauka guideway shift, could allow some aerial 46kV to remain in place. 5. Simplifies emergency egress design, allows for more compact station design.. 6. Eliminates concerns about access to Kokea Center (currently impacted by current station concept). 7. Generally supported by ROW, Planning, D&C. 8. Mitigates visual impacts from proximity to historic resources.	1. Requires additional ROW acquisition(s). 2. Requires Post-ROD or potential Supplemental EIS, depending on scope of integration with other project(s). 3. Requires re-design of utilities and core-systems. 4. Previous property acquired for naught. 5. Eliminates potential, future makai station entrance. 6. Eliminates potential opportunities for future station integration with transit-oriented development at Kokea Center.
5B	**Shift Kuloloia (Downtown) Station**	1. Addresses longstanding issues with Pacific Guardian Center. 2. Could reduce visual impacts associated with proximity to historic Dillingham Transportation Building. 3. Could be integrated with Honolulu Harbors Master Plan.	1. Requires environmental re-evaluation. 2. Requires re-design of utilities and core systems. 3. Requires additional land acquisitions. 4. May require Supplemental EIS, depending on scope of integration with other project(s).
5C	**Integrate Ka'akaukukui (Civic Center) Station with joint development**	1. May enable HART to capitalize future revenues to offset project costs. 2. May be well received by public. 3. Could result in a better integrated system with more amenities.	1. May require zoning changes (e.g. building height waivers) to make potential projects profitable and attractive to developers. 2. Increases complexity and risk due to additional stakeholders (e.g. DTS for O&M-phase agreements, DPP TOD for zoning, HCDA, etc.). 3. Increases complexity and risk due to additional project interfaces (e.g. multiple interdependent design and construction projects). 5. May require Supplemental EIS depending on scope of integration with other project(s). 6. Increases schedule and risk associated with environmental approvals to incorporate new scope into project (e.g. FEIS). 7. Additional impacts from joint development (on historic resources, etc…) could require further mitigation.
5D	**Integrate other stations with joint development**	1. Could attract different sources of financing/capital (similar to typical commercial development). 2. Could increase ridership.	1. Likely to require Post-ROD(s) and could require Supplemental EIS depending on scope of integration with other project(s). 2. Additional impacts from joint development (on historic resources, etc…) could require further mitigation.

ALT.	POTENTIAL CHANGE	PROS	CONS
5E	**P3 for stations**	1. May enable HART to capitalize future revenues to offset project costs. 2. May be well received by public. 3. Could result in a better integrated system with more amenities.	1. Likely to require Post-ROD(s) and could require Supplemental EIS depending on scope of integration with other project(s). 2. May require zoning changes (e.g. building height waivers) to make potential projects profitable and attractive to developers. 3. Increases complexity and risk due to additional stakeholders (e.g. DTS for O&M-phase agreements, DPP TOD for zoning, etc.). 4. Increases complexity and risk due to additional project interfaces (e.g. multiple interdependent design and construction projects). 5. Increases schedule and risk associated with environmental approvals to incorporate new scope into project (e.g. FEIS, FFGA).
5F	**Shift Holau (Chinatown) Station**	1. Could address station constructability issues. 2. Would mitigate impacts to the Chinatown Historic District (by shifting station outside of the historic district). 3. Could be integrated with Honolulu Harbors Master Plan.	1. Likely to require Post-ROD(s) and could require Supplemental EIS depending on scope of integration with other project(s). 2. Requires re-design of utilities and core systems. 3. Adjacent to existing residential buildings.

6. Tunnel or At-Grade on LPA Alignment

ALT.	POTENTIAL CHANGE	PROS	CONS
6A	**Tunnel the guideway under Dillingham (and perhaps further) along existing LPA alignment**	1. Avoids many of the current utility conflicts on Dillingham. 2. Reduces visual impact to historic downtown if guideway is underground (i.e. addresses AIA's concerns). 3. May provide more flexibility in alignment (since tunnel could be underneath constraints on the surface) and could help get the alignment through to UH Manoa. 4. Eliminates construction-related traffic impacts in some areas (i.e. all but launching pits, receiving pits, and stations). 5. Reduced construction and operational noise impacts. 6. Reduced archaeological impacts due to reduced proportion of near-surface work. 7. Frees up above-ground space for joint development and/or TOD. 8. Construction can be more continuous due to lack of competing surface traffic and access. 9. ROW acquisitions should be less expensive below-ground than above-ground. 10. Mitigates visual impacts of straddle bents along narrow urban streets, especially near historic parks. 11. Could aid in pursuit of additional project funding if stakeholders are supportive of a subway in lieu of an elevated guideway. 12. Proves ability to tunnel to other locations on the island. 13. Could combine tunnel with utility and stormwater project(s). 14. No sun/rain canopies required for underground stations. 15. May reduce future problems with sea level rise (?). 16. Could attract different international bidders. 17. May garner community support.	1. May require amendments to FFGA and could result in loss of FTA funding. 2. May require more utility relocations than elevated guideway due to transition from elevated to underground. 3. Requires new ROW acquisitions and associated costs. 4. Core systems must be redesigned and operations renegotiated. 5. Introduces new risks (e.g. geotechnical, adjacent buildings, etc.). 6. May require demolition and reconstruction of east end of AGS alignment to accommodate transition. 7. Capital cost per new rider would increase. 8. Would require a Supplemental EIS. 9. Substantial cost and schedule increase to the program. 10. Underground stations could impact more utilities. 11. No plans for how to transition from elevated guideway to underground tunnel. 12. Requires new scope (e.g. ventilation, fire detection, dewatering system, etc.). 13. Recent U.S. subways cost: $2.5b/mi (NY, Second Ave Subway, 2017), $930m/mi (LA Purple Line Extension), $928m/mi (SF Central Subway), $600m/mi (Seattle U-Link, 2012), $630m/mi (Vancouver Broadway Subway, 2020). 14. Operation of underground station is more costly due to increased mechanical systems and ventilation requirements.

ALT.	POTENTIAL CHANGE	PROS	CONS
6B	**Build track at grade (i.e. at roadway level)**	1. Reduced construction costs for guideway and stations. 2. Addresses longstanding community concerns regarding visual impacts of elevated rail line in the urban core. 3. At-grade stations are more accessible stations and conducive to neighborhood scale transit-oriented development.	1. May require amendments to FFGA and could result in loss of FTA funding. 2. Mixes rail traffic and roadway traffic, slowing both. 3. Increased likelihood accidents between rail, pedestrians, cyclists, and autos. 4. Will require more utility relocations than an elevated guideway. 30+ feet wide for entire length vs. 10' diameter column every 100' to 140'. For Dillingham would result in the relocation of all existing underground utilities in order to create the clear space even if we leave the vast majority of comms and electrical aerial. 5. Could increase overall project costs if additional costs (e.g. additional ROW, additional trains, modifications to core systems, additional utility relocations, security measures, grade crossing signalization and/or viaducts) outweigh guideway savings. 6. Requires extensive ROW acquisitions and associated costs. When comparing a 12' median to a 30+ wide footprint. Minimum 20 additional feet for the length of at grade construction. If extended downtown would result in the complete closure of parts of Halekauwila, Queen and Kona. 7. Core systems must be redesigned and operations renegotiated. 8. May require new rail vehicles or retrofitting of current vehicles to accept both traction and catenary power. 9. Introduces new risks (e.g. ROW, noise, access, hazards, etc.). 10. Likely to result in lower ridership, due to slower travel times and less reliable service. 11. Likely to require a Supplemental EIS. 12. Would require City Council action to adopt a new Locally Preferred Alternative. 13. Substantial increases in cost and schedule to the program. 14. Challenges with integrating 4-car (i.e. 240' long) platforms into existing blocks and street ROW. 15. Higher operating and maintenance costs.

7. Utility-Focused Changes

ALT.	POTENTIAL CHANGE	PROS	CONS
7A	**Allow utilities to run through guideway foundations**	1. This could relieve some congestion where there are conflicts between utilities and C-pier pile caps. 2. Reopens essential discussion about variances.	1. Requires utility clearance variance(s). 2. Sequencing will require an additional utility relocate design to move the utilities in conflict as the shaft foundations are drilled and poured. 3. Results in two utility relocations, which will increase cost, schedule, and duration of impact to public. 4. Custom design and formwork will be required for shaft foundations with penetrations. 5. Likely to require larger foundations, which will take up more room and could trigger additional utility relocations. 6. Substantial cost and schedule increase to the program. 7. Represents a significant impact to the linear nature of elevated guideway build. A large number of the columns will be unique which will have a significant impact to the CCGS contractor's efficiencies. 8. Utility owners have rejected this approach in the past.
7B	**Obtain temporary variances for temporary utilities, then place utilities in guideway and demolish temporary utilities**	1. Reopens essential discussion about variances. 2. Could apply to traffic signal interconnect and/or AT&T.	1. Requires utility clearance variances. 2. Relocating utilities once (to temporary location) and again (into guideway) doubles the amount of work, time, and cost. 3. The most challenging congestion is adjacent to manholes, not guideway columns, so this approach is not anticipated to solve the variance issue. 4. Does not apply to most utilities.
7C	**Obtain temporary variances to leave utilities in place, then pay utility owners to move their own utilities after guideway is constructed**	1. Reopens essential discussion about variances. 2. Could apply to traffic signals and street lights.	1. For the case of utilities "within our column" this would require moving utilities three times: (1) to enable foundation construction, (2) to put the utility back in place within the foundation, and (3) moving it to a new location, someday. 2. Additional utility relocations increase cost and schedule. 3. Sleeving utilities through foundations requires larger rebar spacing than standards allow. 4. HART can only be reimbursed for work performed and paid (but cannot be paid in advance for work to be performed in the future).

ALT.	POTENTIAL CHANGE	PROS	CONS
7D	**Relocate utilities to provide a 5-foot temporary construction buffer around guideway foundations**	1. Clearing a 5-foot zone around guideway foundations has been, and continues to be, a part of the current basis of design for utility relocations. 2. There are numerous locations where HECO duct is currently designed and constructed within the buffer zone. They required their duct bank to be structurally reinforced in these areas.	1. Reduces the CCGS contractor's flexibility of design. 2. Adds risk to CCGS contractor (or HART if not disclosed prior to bid) due to proximity of the utilities to contractor's foundation excavation.
7E	**Revert CCUR designs to eliminate or minimize straddle bents in City Center**	1. Minimizes risks of delay due to increased ROW takes and impacts to historic resources and/or parks. 2. Minimizes risk of delay due to changes in ROW takes associated with guideway design changes.	1. Requires CCUR redesign. 2. Likely to require routing of 46kV ductbank "around the block" on Pohukaina.
7F	**Relocate utilities onto parallel streets**	1. Creates more space on Dillingham. 2. Could eliminate the need for utility clearance variances during design, and could reduce the need for clearance variances during construction. 3. If large mains are replaced with multiple, smaller mains, may improve redundancy and reduce consequences of a single utility outage. 4. There is precedence for this approach on Halekauwila and Pohukaina.	1. May require additional ROW (e.g. utility easements). 2. Applicable only to transmission utilities (i.e. not utilities with service connections on Dillingham). 3. May require amendment to Area of Potential Effect and Post-ROD . 4. May trigger the need for additional off-corridor utility relocations (e.g. 42" watermain clearance zone is 14' wide).
7G	**Use deeper, trenchless methods for utility relocations on Dillingham**	1. Reduces congestion of underground utilities near the ground surface. 2. Could eliminate the need for utility clearance variances during design, and could reduce the need for clearance variances during construction. 3. Depending on trenchless method selected, may reduce temporary traffic impacts relative to open-trench construction (except at launching pits, receiving pits, manholes). 4. Reduced risk of unforeseen utility conflicts at deeper depths. 5. Reduces dewatering expense associated with open-trench construction.	1. This approach would be practical only for transmission mains (e.g. 138kV, 42" water, etc.). 2. Still requires (larger) manholes, which will continue to create pinch points in congested areas. 3. Utility owners have concerns with maintainability (i.e. inability to access and repair a pipe 25 feet below grade) and therefore may require additional safeguards, increasing overall cost. 4. Launching and receiving require relatively large areas and could potentially require additional utility relocations. 5. Traffic impacts associated with launching pits, receiving pits, and adjacent equipment could be significant. 6. Depending on interpretation of horizontal clearance standards, this approach may still require clearance variances, regardless of utility depth.
7H	**Keep communication lines aerial on makai side of Dillingham**	1. Could eliminate the need for utility clearance variances during design, and could reduce the need for clearance variances during construction. 2. Aerial poles and lines are typically less expensive to construct relative to underground ductbanks so this approach should reduce project cost. 3. HART's designer is already looking at this concept.	1. Would leave some existing utilities overhead (rather than undergrounding everything) so there would still be some residual aerial utility clutter along Dillingham. 2. Requires redesign of utility relocations. 3. Could increase design complexity based on joint pole ownership and multiple stakeholders. 4. Still grappling with some technical issues (e.g. still requires service risers and underground service connections, conflicts with straddle bent pier capitals).