# Beneath the Surface

## Podium Membrane Replacements and Sustainable Design Considerations for New Construction

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BCBEC Luncheon

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# Topics for today!

- Background – why me, why this, why now
- Legal – Professional responsibilities
- Technical – Membrane replacement process, high level
- Management – Client FAQ/Support, Involved Parties, Scope
- Sustainability – embodied carbon & waste considerations

Some slides are heavy text. That’s for future use and reference.

# About me

Technologist, Engineer
P.Eng – Building Science
Consulted for ~20 years. Specialties: building science, façade access & fall protection

*I'm not a legal, finance or real estate professional. I do not take responsibility for content in this presentation of these subject matters. Verify this information.*

# Why this, why now

- Podium membrane replacements – end of service life 80s/90s
- My condo experience
  - Scope errors and omissions, insufficient detail, budget vs cost variance
- Registered Professional Engineer (P.Eng.) – code of ethics
  - Uphold the value of the engineering profession (previous version)
- Share experience with peers and newcomers to the industry
  - Foster learning and development
  - Support the construction industry, collaboration
  - Help to provide better / consistent service to the public (clients)

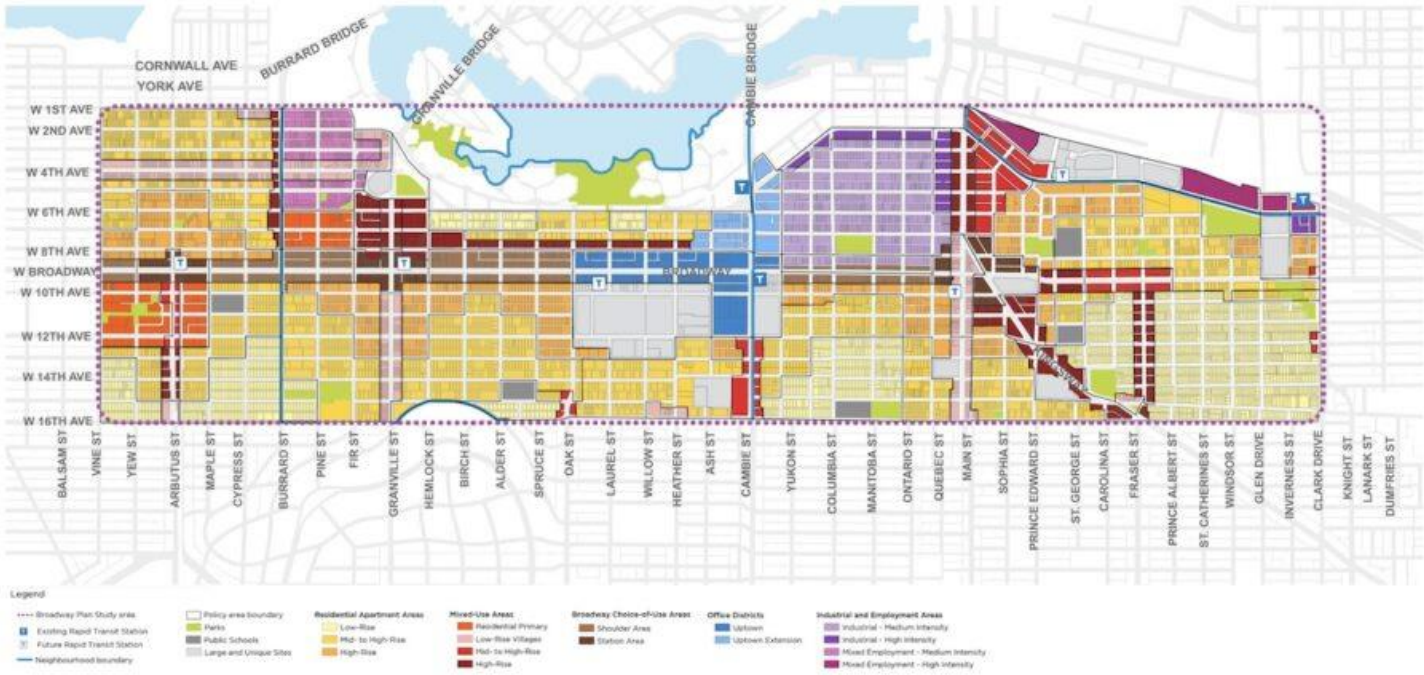
# Renewal or Redevelopment?

Land values & development are costly

Higher density still doesn't pencil for many existing properties

Existing buildings are "greener" than demo / new

**Renewal will be common**

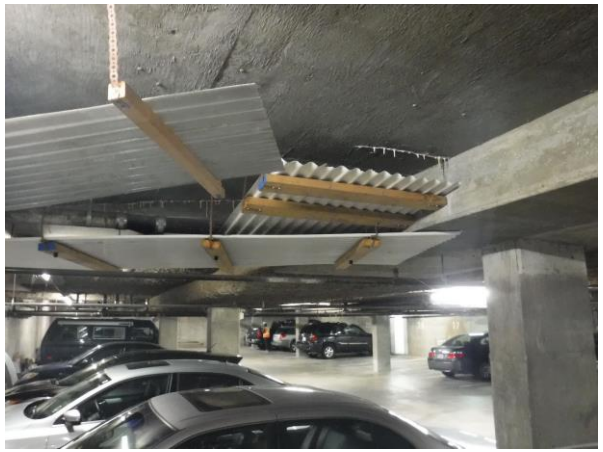



Broadway Plan

# Podium Renewals – what drives the need?

- Depreciation Report – end of service life
- Reported leaks
- Visible concrete spalling and corroded rebar
- Crack injection program advancing & costly
- Other planned work – proper sequencing

Any of these trigger a Condition Assessment

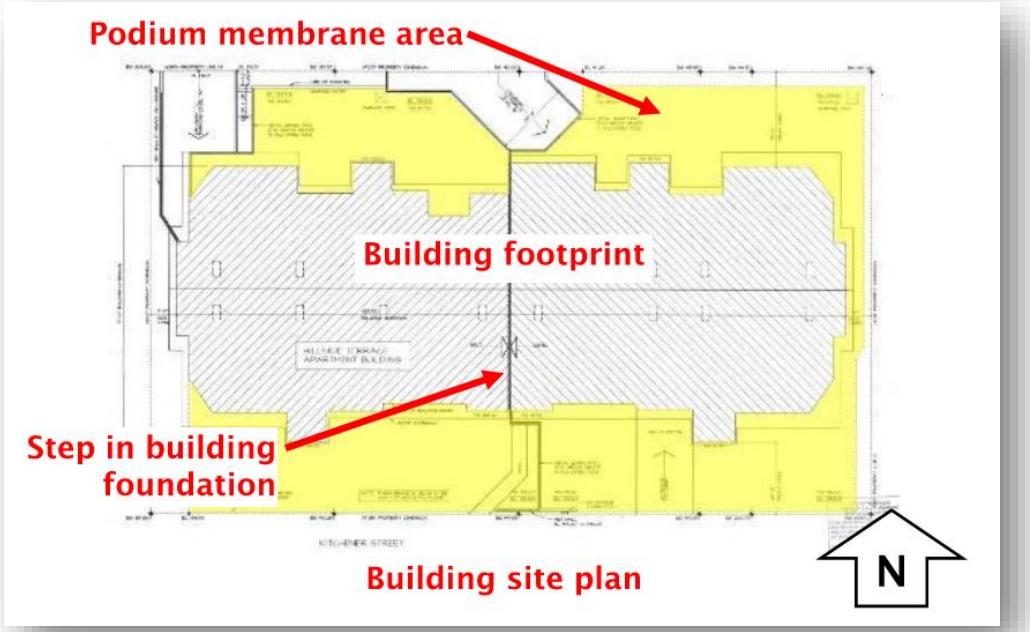


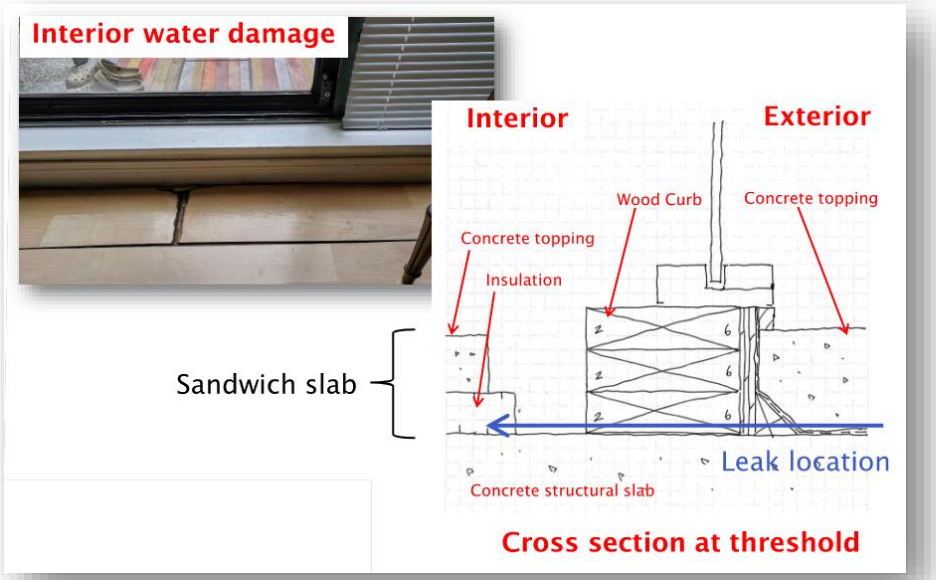
# Condition Assessments

## Answer these questions

- Is there a problem? What is the nature?
- Localized or systemic problems, and severity of conditions
- Risks if left unaddressed – health & safety, property damage, aesthetic, maintenance increases. **Be realistic not catastrophic.**
- Recommendations to address – short term, long term
- How long before work needs to be done?



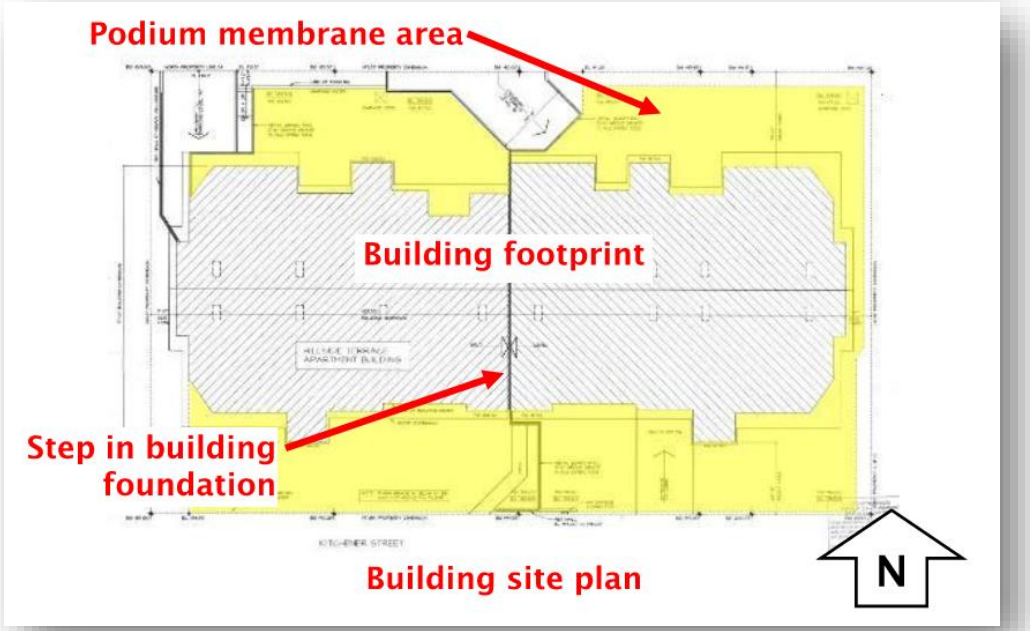



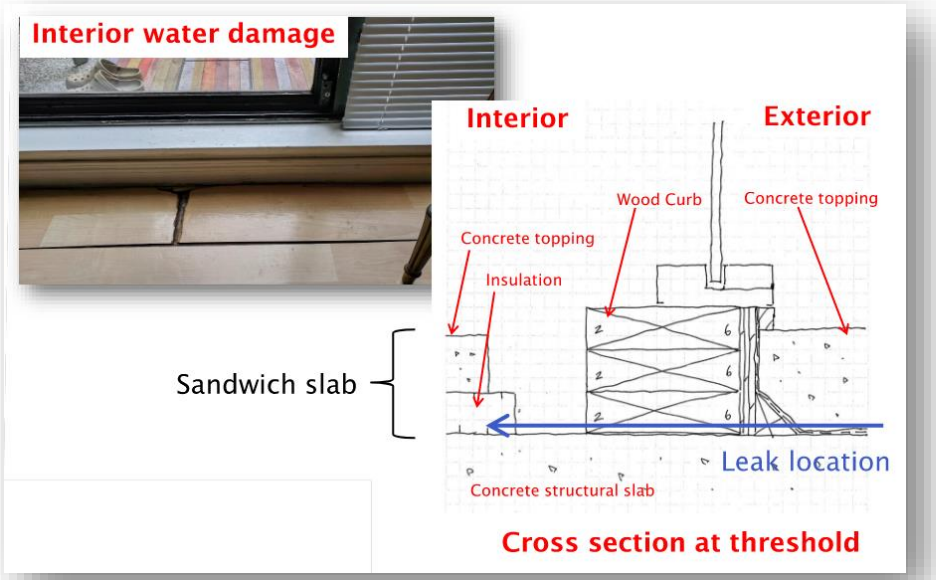




# Condition Assessments

- Provide context
- Understand conditions – sandwich slab?
- Make the case: H&S, property damage
- Make strategic openings
- Ask the owner group specific questions
- Focus investigation on key issues

This damage is at the base of structural bearing walls
The conditions are causing interior damage to property




# Condition Assessments

## Ask yourself

- Was the review extensive enough to assess the issues?
  - Openings, resident survey, leak test, etc.
  - Do a few test pits provide enough info?
- Anything beyond your expertise?
  - Structural, mechanical, etc.
- Is there an urgency to deal with issues?
- Is more extensive review required?

Consider the value of a report that is inconclusive…

# Engineer/Architect reports & impacts

- Engineering reports have *serious and permanent implications* to owners and properties.
- Be reasonable, prudent, practical given the conditions.
- Strata Owners are Everyday People. This is Real Money.
- **Readers should understand conditions and have enough info to <u>make informed decisions</u>**

# EGBC Code of ethics (paraphrased)

1. Hold paramount safety, health, welfare of public…

2. Practice only in fields where competent in training & ability

10. Present clearly the possible consequences if professional judgements are disregarded

12. Undertake work & documentation in accordance with applicable standards

ENGINEERS & GEOSCIENTISTS BRITISH COLUMBIA

CODE OF ETHICS

The Code of Ethics required under the *Professional Governance Act*, S.B.C. 2018, c. 47 and created in the Bylaws of Engineers and Geoscientists BC provides a set of principles that all registrants are required to follow.

A registrant must adhere to the following Code of Ethics:

Registrants must act at all times with fairness, courtesy and good faith toward all persons with whom the registrant has professional dealings, and in accordance with the public interest. Registrants must uphold the values of truth, honesty, and trustworthiness and safeguard human life and welfare and the environment. In keeping with these basic tenets, registrants must:

1. hold paramount the safety, health, and welfare of the public, including the protection of the environment and the promotion of health and safety in the workplace;
2. practice only in those fields where training and ability make the registrant professionally competent;
3. have regard for the common law and any applicable enactments, federal enactments, or enactments of another province;
4. have regard for applicable standards, policies, plans, and practices established by the government or Engineers and Geoscientists BC;
5. maintain competence in relevant specializations, including advances in the regulated practice and relevant science;
6. provide accurate information in respect of qualifications and experience;
7. provide professional opinions that distinguish between facts, assumptions, and opinions;
8. avoid situations and circumstances in which there is a real or perceived conflict of interest and ensure conflicts of interest, including perceived conflicts of interest, are properly disclosed and necessary measures are taken so a conflict of interest does not bias decisions or recommendations;
9. report to Engineers and Geoscientists BC and, if applicable, any other appropriate authority, if the registrant, on reasonable and probable grounds, believes that:
   a. the continued practice of a regulated practice by another registrant or other person, including firms and employers, might pose a risk of significant harm to the environment or to the health or safety of the public or a group of people; or
   b. a registrant or another individual has made decisions or engaged in practices which may be illegal or unethical;
10. present clearly to employers and clients the possible consequences if professional decisions or judgments are overruled or disregarded;
11. clearly identify each registrant who has contributed professional work, including recommendations, reports, statements, or opinions;
12. undertake work and documentation with due diligence and in accordance with any guidance developed to standardize professional documentation for the applicable profession; and
13. conduct themselves with fairness, courtesy, and good faith towards clients, colleagues, and others, give credit where it is due and accept, as well as give, honest and fair professional comment.

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https://www.egbc.ca/complaints-discipline/code-of-ethics/code-of-ethics

# Ok… so Podium Renewal is required…

# Membrane replacement is simple!



Not quite…
There's a lot more to it. Who's responsible and what are clients expecting?
And once it's covered up, it's expensive to diagnose and correct deficiencies…

## Membrane replacement is ~~simple~~ not simple!

- The membrane replacement is often the “easy part”
- The “hard parts”
  - Pre-construction coordination & sequencing, multiple professionals
  - Demolition – access, equipment, planter walls, base of walls & tie-ins
  - Delineation of scope/professional responsibility
  - Patio, fence, landscape design
  - Trees and plants, and soil depth thickness and drainage
  - Code requirements for egress paths, etc.
  - Drains & piping
  - Tie-ins to existing components and materials

The ***Design intent*** for all these aspects and more need to be in the ***contract documents.***

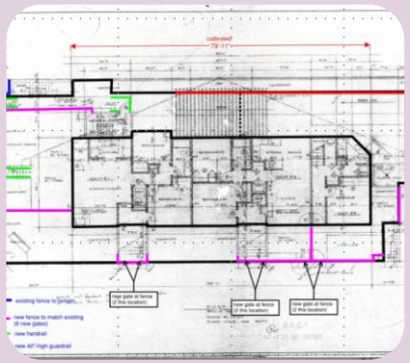
…The role of the ***Coordinating Registered Professional***…

BE professional (engineer, architect, etc.)

CRP, Supporting professionals, estimator, manufacturers

GC, CM, trades

AHJ




## Assess

- Is there a problem
- How bad is it
- What's the extent
- What are some solutions
- When to do them
- Expected outcomes
- Risks of not doing

## Design/Budget

- Scope of work
- Owner decisions
- Unknowns/allowances
- Supporting professionals
- Warranty expectations
- Permit expectations
- Schedule
- Expected outcome
- Maintenance & renewal

## Tender/Permit

- All disciplines are included & coordinated
- Scope creep/gaps identified and mitigated
- QA/QC expectations are clear
- Review & qualify bids
- Post-tender meetings
- Scope revisions
- Sep/Alt prices

## Contract admin

- Certificates of Payment
- Field review
- Shop drawing review
- Substitution requests
- Mock-ups
- Mfr reviews
- Changes – RFI, SI, CO
- Review and certify timesheets for contingency or T&E work
- Supporting details
- Regular site meetings
- Budget updates to client

## Close out

- Schedules received
- Permit closed
- Warranty docs to client

# Professionals that are *typically required*

- Building Envelope specialist – Typ. engineer or architect
- Coordinating Registered Professional (CRP) – architect/engineer*

  ***Bulletin-34 status. Confirm expectations with AHJ prior to design.**
- Arborist – what trees stay/go; tree protection plan
- Landscape architect – what replaces the trees, soil, plants
- Hazardous materials – abatement?
- General Contractor or Construction Manager
- Manufacturers' Representatives – warranties, guidance

Required for building permit

# Professionals that *may also be required*

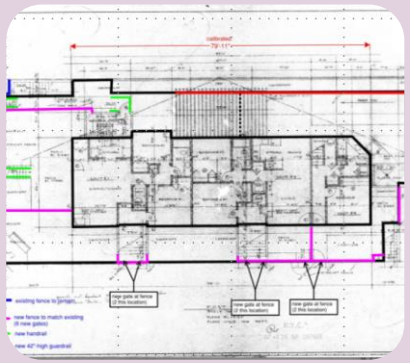
- Mechanical or civil engineer – drainage, mech systems in areas of work (hydronic systems at base of walls)
- Structural engineer
  - Impact of current conditions on structural integrity (assessment)
  - Design of temporary shoring
  - Confirm adequacy of existing conditions to support proposed work
  - Etc.
- Plumbing design/build contractor – drainage, piping
- Supporting professionals – Schedule S
  - E.g. guardrails, doors/windows, fencing
- CP (Certified Professional) – Vancouver only/VBBL

BE professional (engineer, architect, etc.)

CRP, Supporting professionals, estimator, manufacturers

GC, CM, trades

AHJ



## Design/Budget

- Scope of work
- Owner decisions
- Unknowns/allowances
- Supporting professionals
- Warranty expectations
- Permit expectations
- Schedule
- Expected outcome
- Maintenance & renewal

**Design is a key step**

Outline the scope
Ensures an accurate budget
Make sure Owners understand what they're paying for

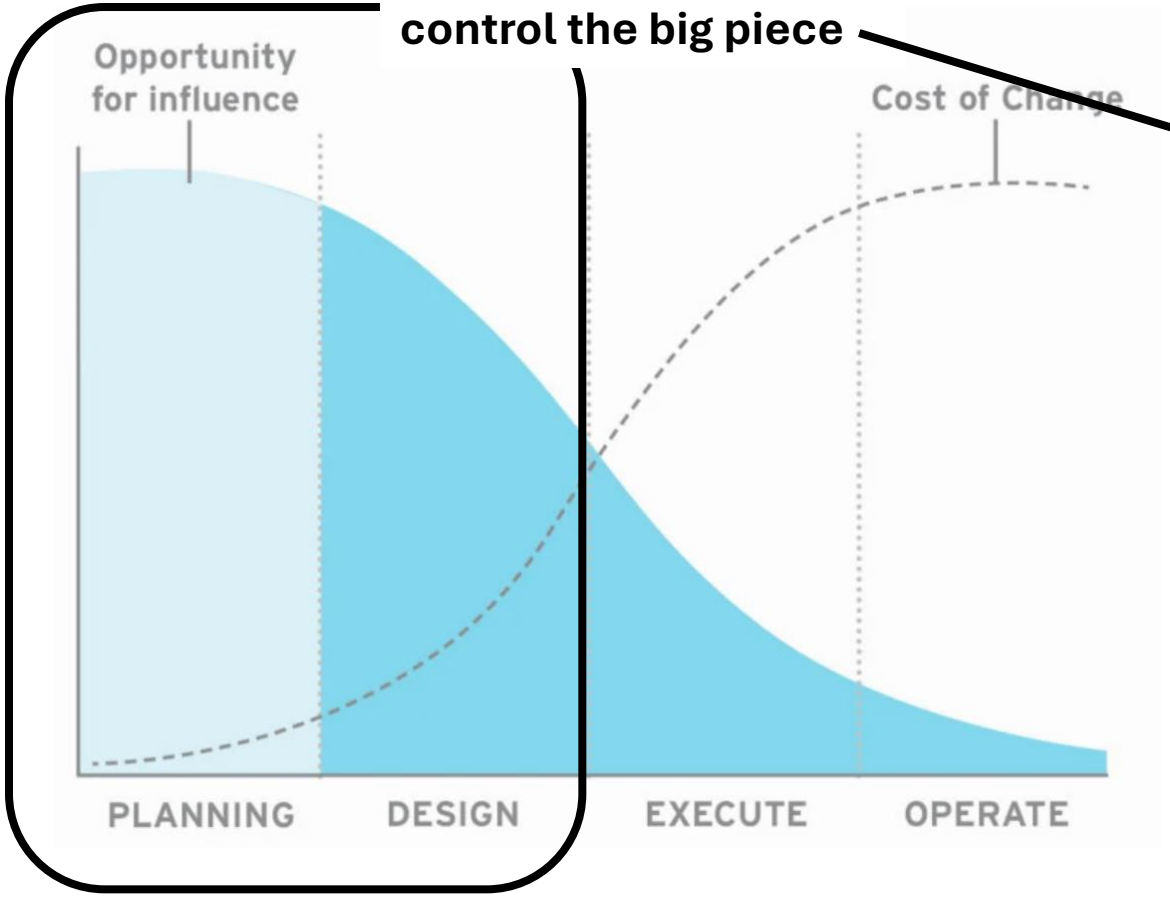
**A lot of work is required, and supporting professionals**

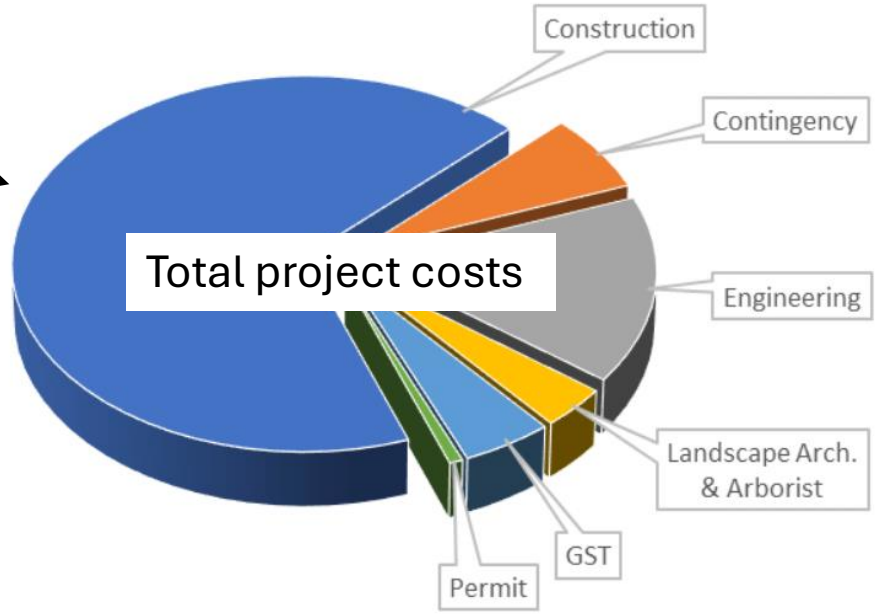
# Design for Cost Control

**Charge the fees to prepare the right scope of work**
**Code of ethics, values peers & profession**

COE #12 - Undertake work & documentation in accordance with applicable standards

**Focus effort here to control the big piece**




- Cost of changes are much higher later in the process
- Get the scope “tight” for tender
- Good design controls the biggest piece – construction
- Poor design = risk of delays, difficulties, deficiencies, contention, increased costs

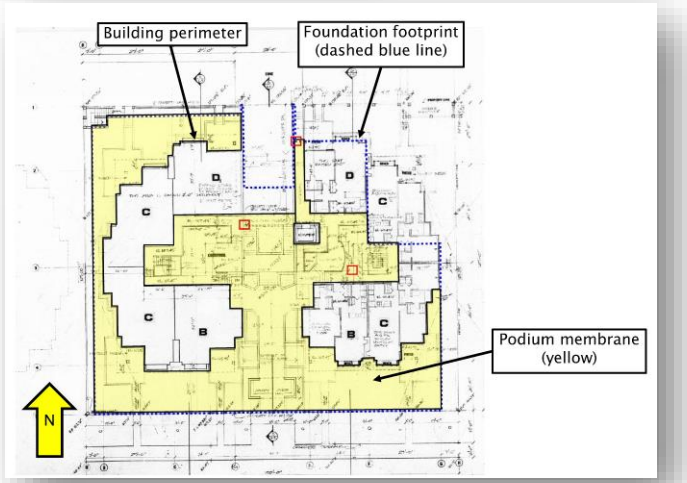
This is all built up

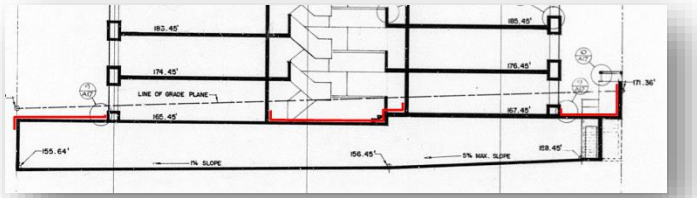
# Design / Budget

- What's the extent of the work?
- What are all the considerations?

Access for demo/work
Different slab levels
Egress paths - widths
Railings, attachments
Stairs – dimensions, nosings
Planters
Rainwater leaders
Topping slabs
Etc…

Need to include in scope
Need to quantify
Need to detail accurately
Design intent must be clear and viable to price & execute

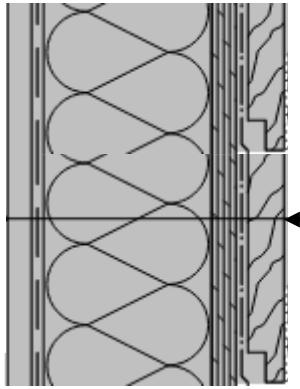



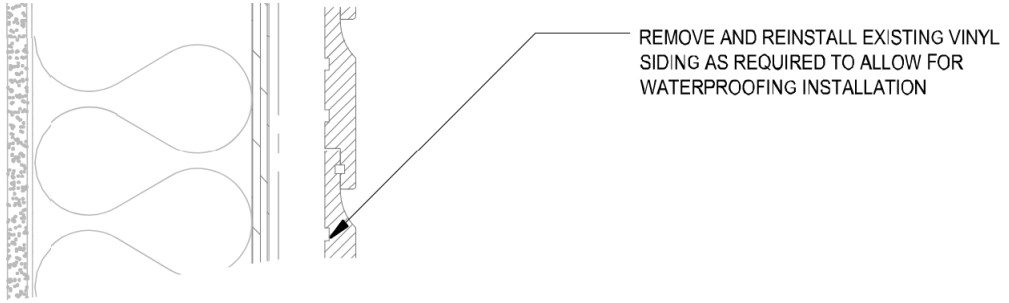
# Design / Budget

- You know the typical details. That’s easy.
- What about…
  - Substrate conditions
  - Substrate construction

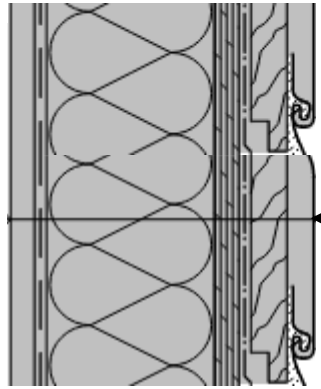
# Design / Budget



Cedar siding on 2x wall
(original construction)




Current project doesn't show cedar.
This will be an extra when work starts.
Details will need to be redrawn during construction.



Vinyl siding on cedar
siding on 2x wall
(overclad since original)

Discovered during balcony renewal and detailed as such

# Design / Budget

- You know the typical details. That's easy.
- What about…
  - Substrate conditions
  - Substrate construction
  - Adequacy of structure for demo equipment
  - Condition of tie-in materials
  - Egress paths, fire safety
  - Door attachment/conditions & wall tie-ins
  - Drainage
  - Etc.
- Identify as many things as possible that could be included in scope
- Determine what is your expertise and what's not

**WHAT ABOUT OWNER DECISIONS?**

More assessment is generally required to confirm details and construction

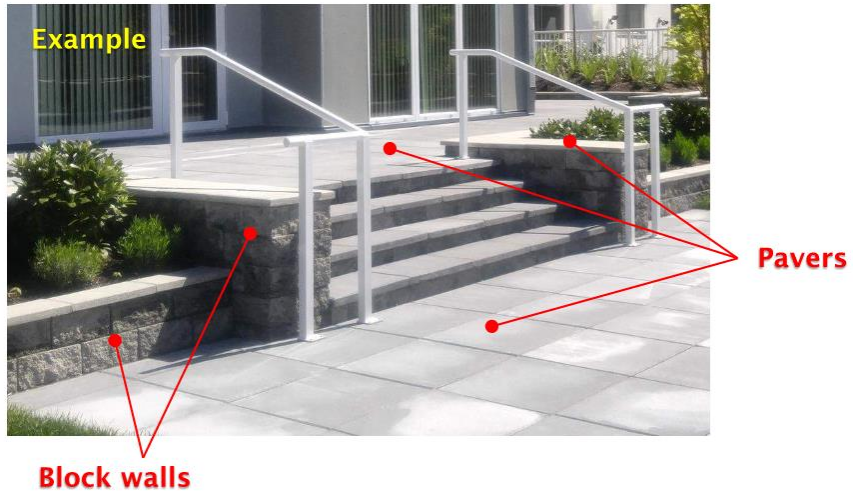
Don't rely on original drawings (if you have them)

Are there newer drawings available from a recent rehab that include more info?

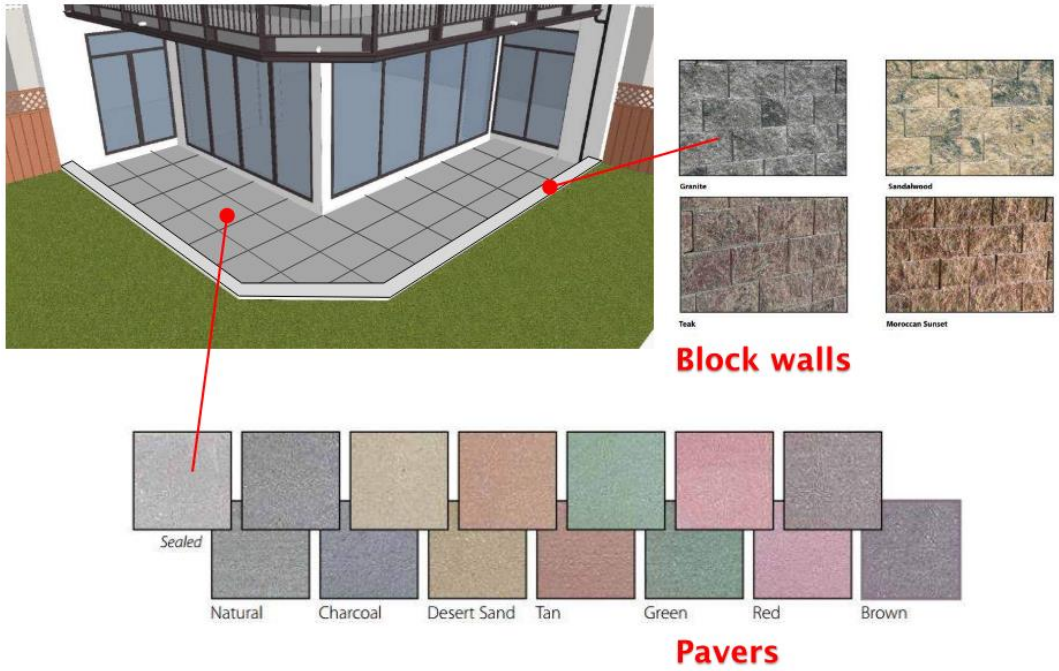
…Due diligence…

# Design / Budget – Owner Decisions

Level of finish and extent dictates price
Owners should have control over some decisions
Need to know this info for construction documents




## Finish options for patios

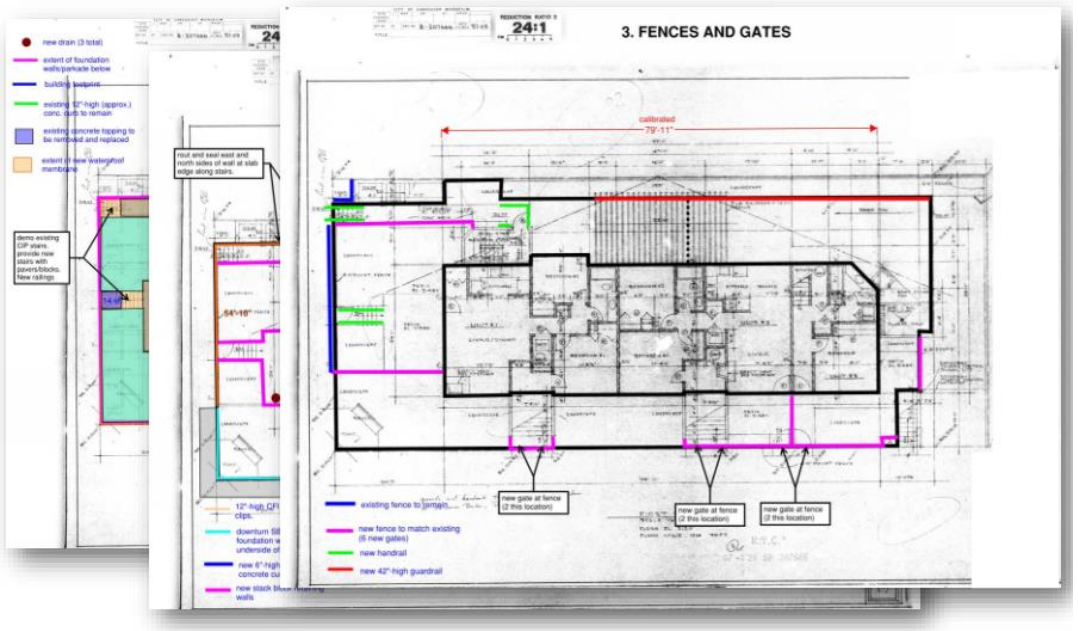



## Fence options for patios

# Design / Budget – Pricing Assistance from QS, GC

Outline scope of work

- Make it clear & easy for a contractor to bid/price.
- Contractors are busy and they look to you for extent of design.
- Demonstrates to owners/contractors that you've done your due diligence.
- Confidence on all levels.




| | | QTY | Unit rate | Unit | Cost |
|---|---|---|---|---|---|
| **Hard costs** | | | | | |
| | general conditions ($/mo construction) - fencing, safety, parking, hoarding, egress, etc. | | | monthly | $ - |
| | demo & excavation | | | SF | |
| | conc repair, surface prep @ podium field area & upstand walls | | | SF | |
| | membrane (field), incl drain bodies | | | SF | |
| | membrane, perimeter - turn down incl. excavation & backfill. Assume term bar/mech attach | | | LF | |
| | membrane, perimeter - assume PMMA termination in saw cut | | | LF | |
| | membrane, base of wall incl. flashings & 12"W gravel strip - excl. door re/re & tie-in | | | LF | |
| | plumbing connections in parkade, allow for 50 LF | | | allowance | $ - |
| | overburden (drainage layers) drain mat, 2" gravel, filter fabric | | | SF | |
| | overburden (soil above filter fabric), excl plants - avg depth 12" | | | CF | |
| | hardscape - patios (pedestal pavers), incl. edging @ softscape interface, assume 100 SF/ste | | | SF | |
| | hardscape - property perimeter & beyond patios (stack block ret. Walls x 3H blocks) | | | LF | |
| | hardscape - stairs, ramps, etc., primarily along lane. Some at entrance. | | | allowance | $ - |
| | fencing - 6'H x 8'L Home Depot panels or equiv., incl. connections to found'n & pedestals | | | LF | |
| | gates x 12 | | | each | |
| | sealant @ exposed cold joints ext. side of perimeter upstand walls | | | LF | |
| | misc details - vent shaft, stairs, entrance | | | allowance | $ - |
| | perimeter upstand walls (int/ext/top), surf prep (light grind) & crack repair, urethane cap | | | LF | |
| | **Subtotal, hard costs (excl. plants)** | | | | |
| | Contingency (% hard costs) | | 10% | | $ - |
| | OH&P (% hard costs incl contingency) | | 10% | | $ - |
| | Management (% hard costs incl contingency) | | 10% | | $ - |
| | **Total, hard costs (rounded)** | | | | |
| **Total project costs** | | | | | |
| | Total soft costs, rounded | | | | $ - |
| | Total hard costs, rounded | | | | |
| | **Total project costs, rounded (soft + hard)** | | | | |
| | approx. cost/suite | | | | |
| | approx. cost/SF podium area | | | | |
| **Alt prices** | | | | | |
| | alt price - door re/re & wall/podium tie ins | | | | |
| | alt price - patio finish upgrades, specific units | | | | |
| | alt price - new doors | | | | |
| | alt price - plants | | | | |

# Design / Budget – Pricing Assistance from QS, GC

Outline scope of work

- Make it clear & easy for a contractor to bid/price.
- Contractors are busy and they look to you for extent of design.
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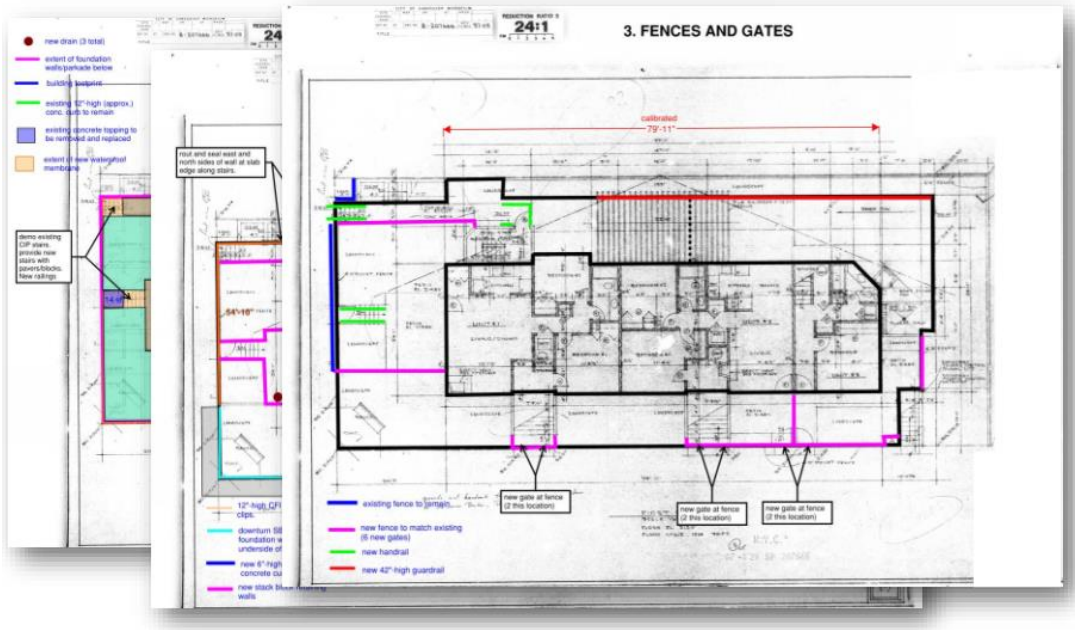



| Take-offs & assumptions | | | | | |
|---|---|---|---|---|---|
| | | | Qty | Units | |
| Construction duration, projected/approx. | | | 6 | months | |
| approx SF podium area | | | 5500 | SF | |
| approx LF podium perimeter @ foundation walls | | | 500 | LF | |
| approx LF podium perimeter excavation (for downturn) | | | 250 | LF | |
| approx LF podium perimeter w upstand wall (for turn-up/gumlip & ext sealant) | | | 250 | LF | |
| approx LF building base of wall | | | 510 | LF | |
| approx SF patio areas (hardscape), approx 100 SF per patio x 12 patio | | | 1200 | SF | |
| approx LF patio perimeter (3 sides, excl building), approx 30 LF x 12 patio | | | 360 | LF | |
| approx SF softscape | | | 3800 | SF | |
| approx vol. gravel strip (12" wide x 4" deep) - 0.25 CF/LF base of wall (30% base wall length) | | | 40 | CF | |
| approx depth of overburden througout podium where occurs (avg) - 2 stack blocks | | | 12 | Inches | |
| approx LF fencing @ 6' high | | | 700 | LF | |
| | | | | | |
| **Soft costs** | | | | | |
| | | | **Unit rate** | **Unit** | **Fees** |
| construction documents - RFI sketches by GC to clarify work and correlate pricing | | | 1 | fixed fee | |
| arborist | | | 1 | fixed fee | |
| landscape architect | | | 1 | fixed fee | |
| surveyor | | | 1 | fixed fee | |
| permit | | | | calc. | |
| PM/CM - schedule, tender, planning | | | 1 | fixed fee | |
| contract admin, incl. field review ($/month construction). Note: | = 10% contract | | | month | $ - |
| | | **Total, soft costs** | | | |
| | | | | | |
| **Hard costs** | | | | | |

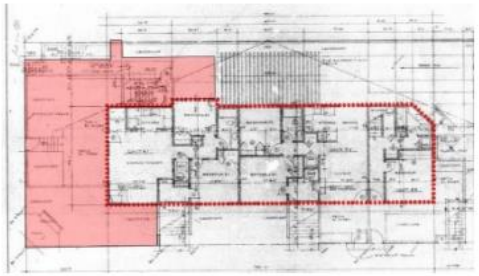
You can approximate quantities, but include caveats!

- Values are approximate based on visual review, non-destructive testing, drawing review, etc.
- Contractor to field verify
- Subject to further review…

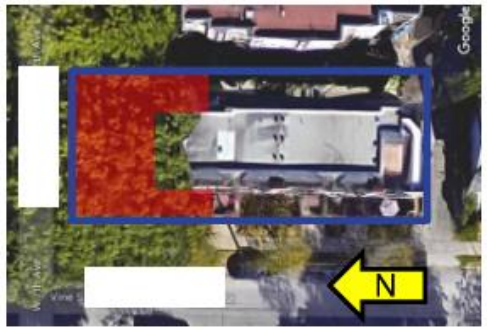
# Options – Extent of work

$400k

**Targeted renewal**



*Area with issues*



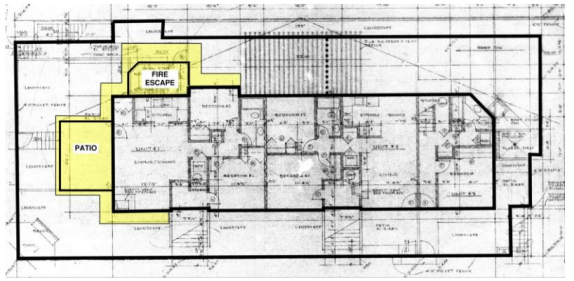

$800k

**Full renewal**

*Entire podium area*

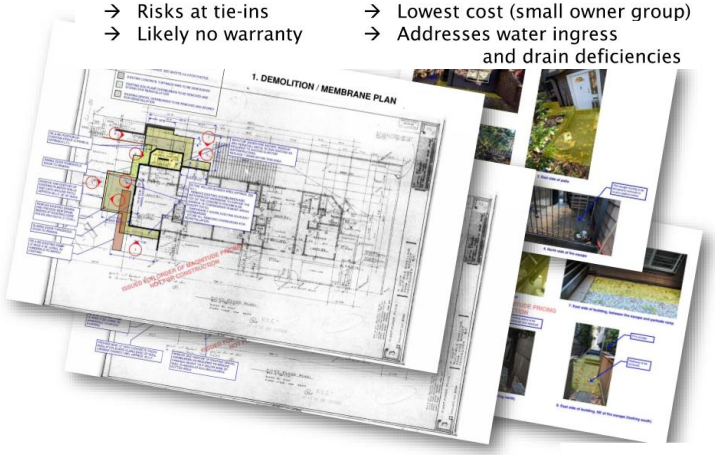

$200k

**Targeted repair**




→ Risks at tie-ins
→ Likely no warranty

→ Lowest cost (small owner group)
→ Addresses water ingress and drain deficiencies




Provide options if practical and feasible. Targeted repairs may be a viable solution.
Even if a reduced scope is not the *best* option, clients may still want to know and assess their risk tolerance.
Ultimately, it's the client's decision as to what work is done.
It's the job of professionals to provide the necessary information for clients to make *informed decisions*.
Understand clients' needs & limitations, and your areas of expertise and professional liability.

New conc. curb

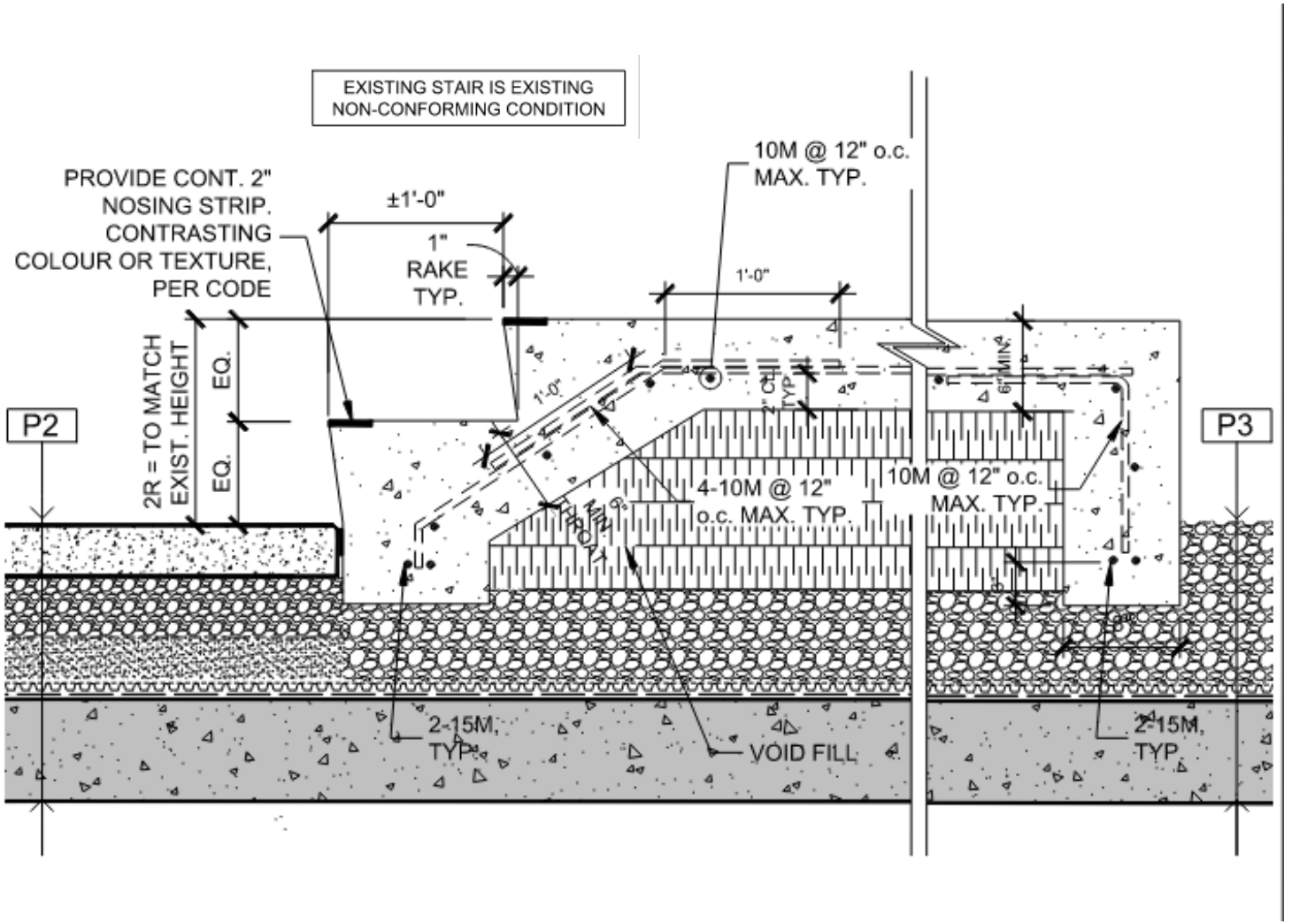
Temp shoring req'd

# Design/budget – other disciplines

- Sill plate, column replacement = structural
- Temporary shoring required = structural
- New concrete curb = structural
- Include in contract before tender

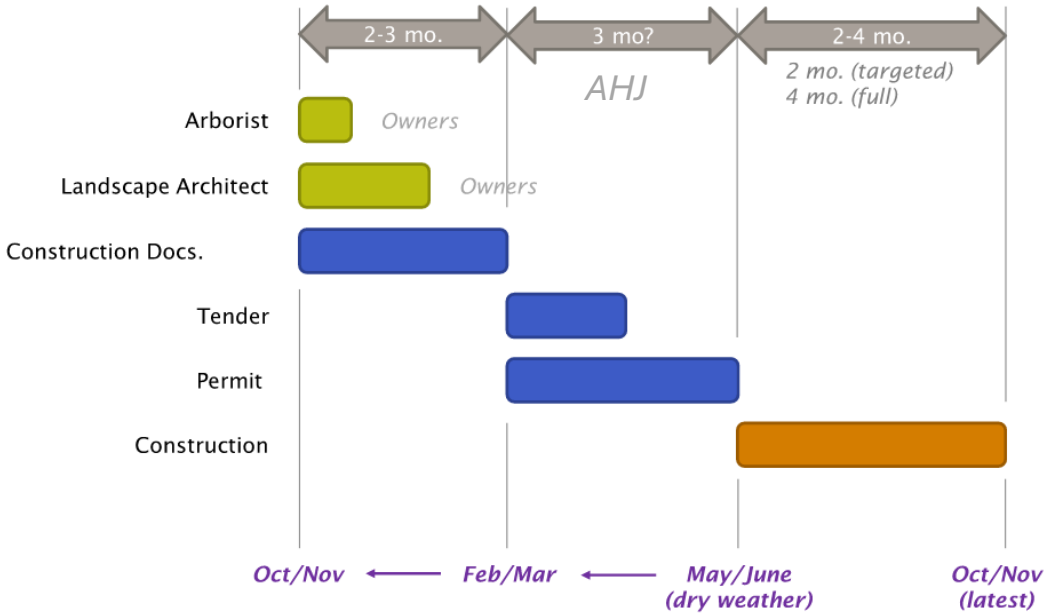
# Design/budget – other disciplines

Stairs = structural, code

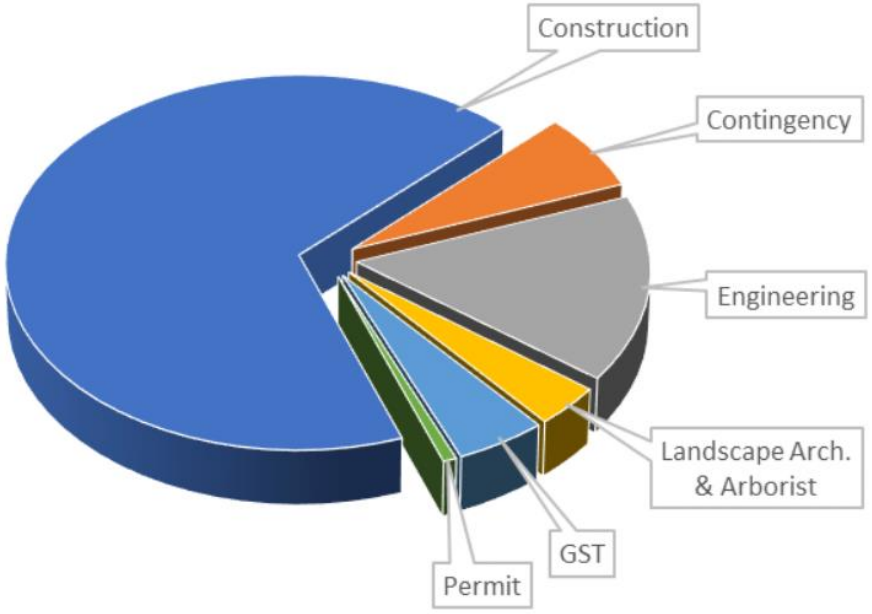


Give clients an idea of schedule
Helps them plan, budget and understand process
Justify the need for engineering fees in early stages – helps control the biggest piece (construction)

## Ideal project schedule

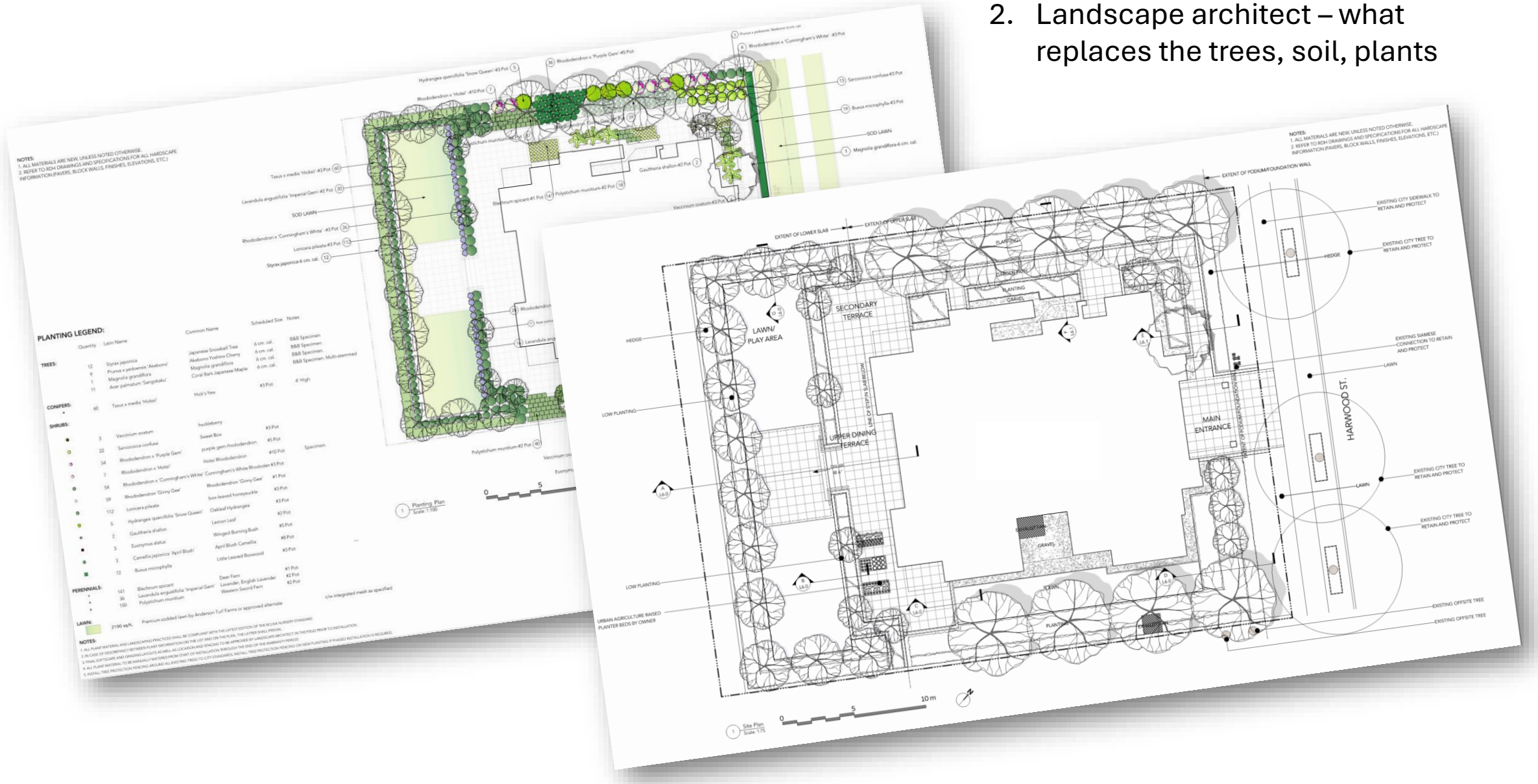



## Breakdown of project costs

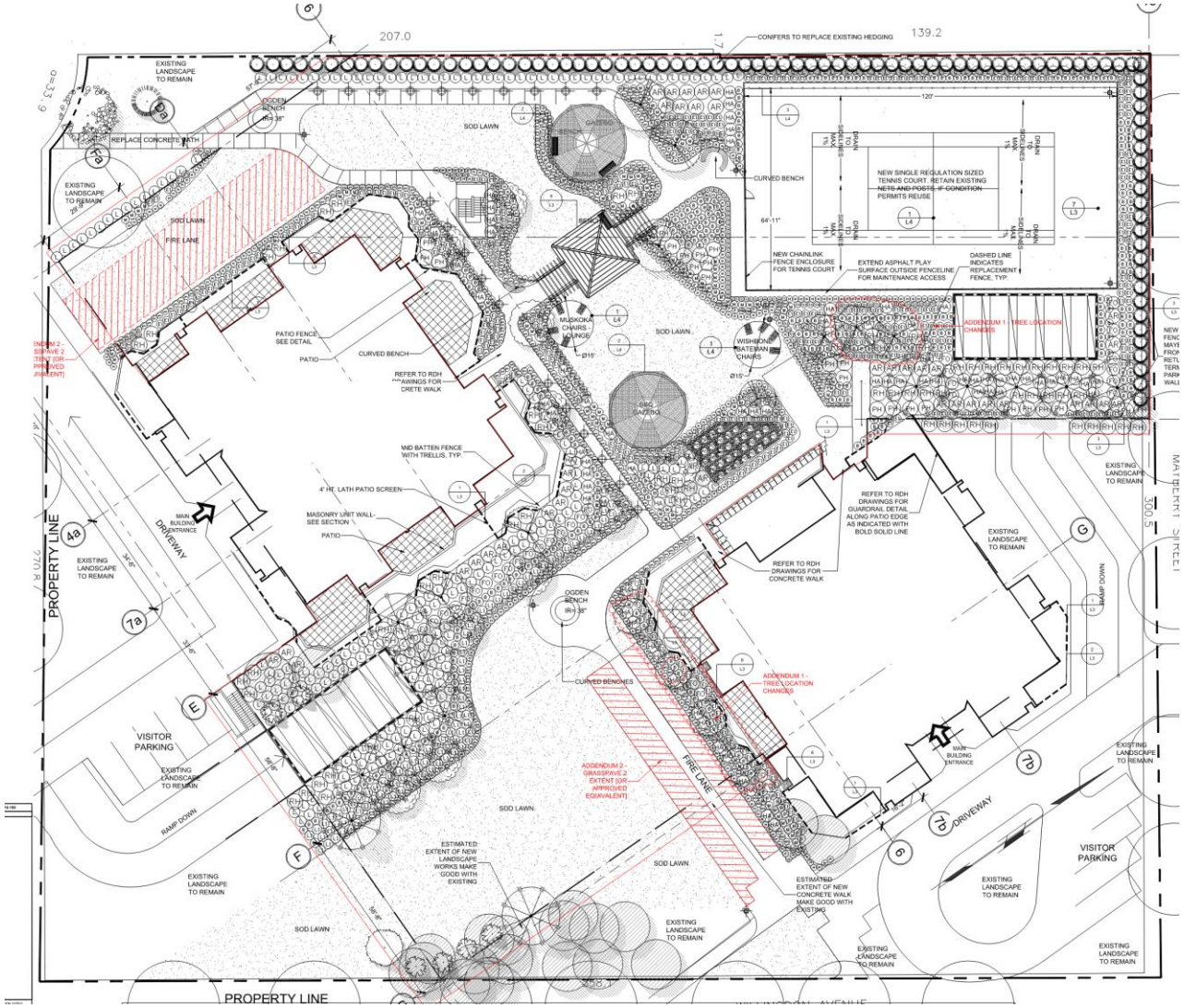


# Landscape design is a big piece!

1. Arborist report – what trees stay/go
2. Landscape architect – what replaces the trees, soil, plants



# Huge scope, multiple disciplines

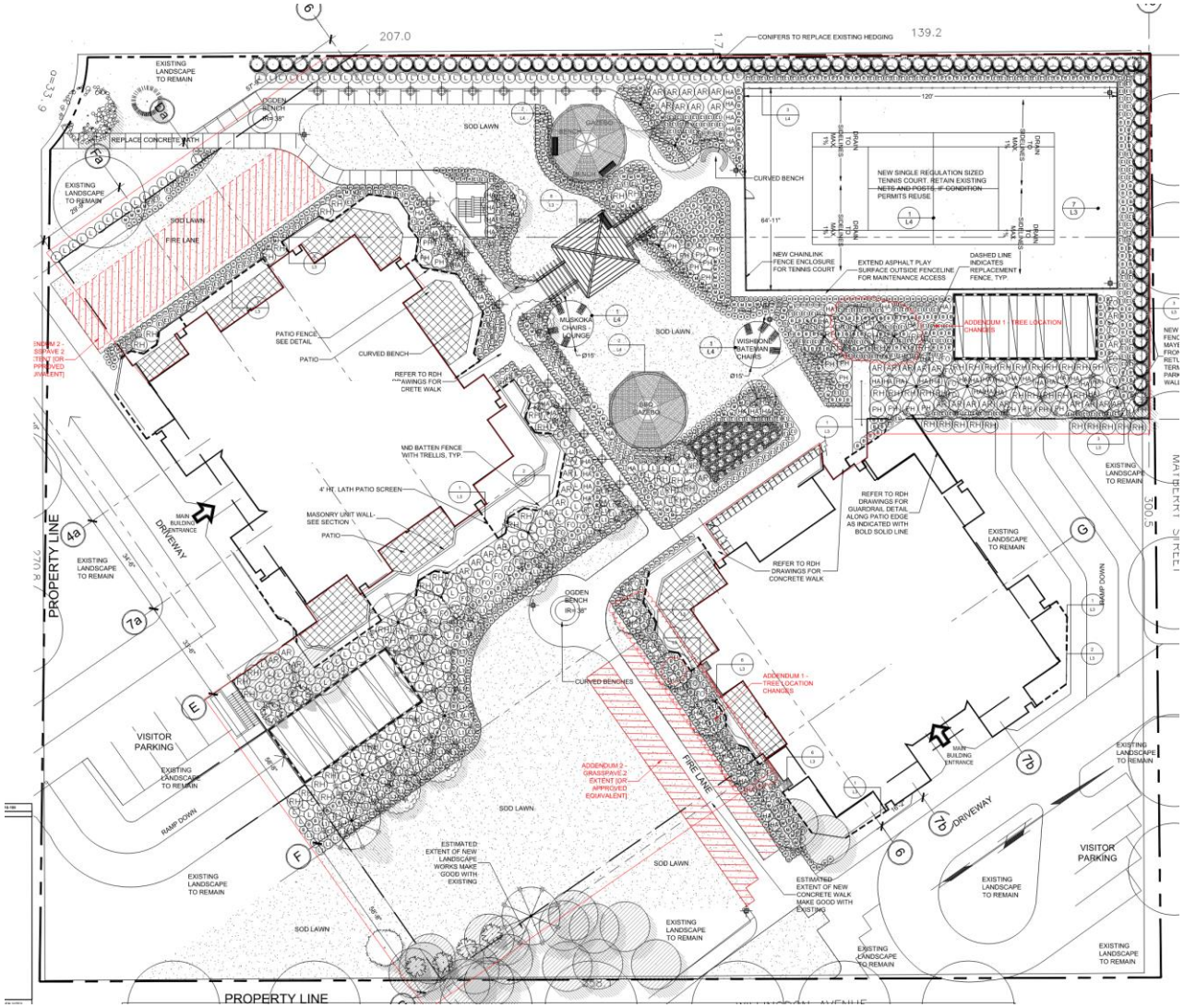



the podium slab and foundation walls are precast panels

Fire lanes
Tennis courts
Wood arbor & support piers
Benches
Ramps, stairs
Egress paths
Fences – wood, chain link
Lighting
Irrigation
Guardrails
Drains
Perimeter drainage issues
Adjacent property excavation
New doors

Who's responsible?
To what extent?
Stay within your area of expertise…

# Huge scope, multiple disciplines




the podium slab and foundation walls are precast panels

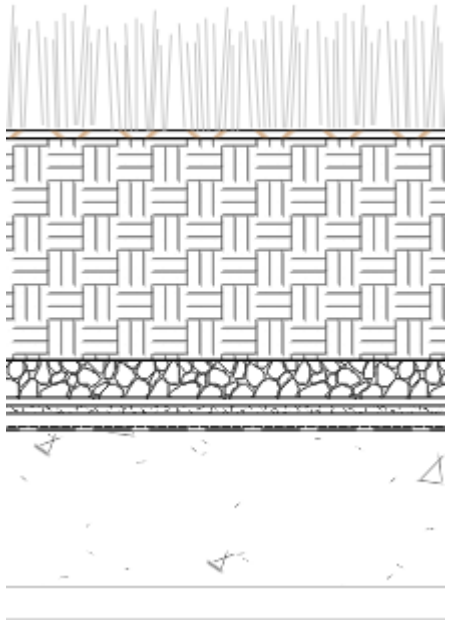
Fire lanes – structural?
Tennis courts – trade engineer
Wood arbor & support piers - structural
Benches – landscape architect
Ramps, stairs – code consult. / architect?
Egress paths – code consult. / architect?
Fences – wood, chain link
Lighting – landscape architect, electrical
Irrigation – landscape architect, plumbing
Guardrails – trade engineer
Drains – mechanical, plumbing
Perimeter drainage issues – civil
Adjacent property excavation – lawyer
New doors – trade engineer

These may vary for your project

Stay within your area of expertise…

# Assemblies & multiple disciplines

What is your area of expertise?



parkade

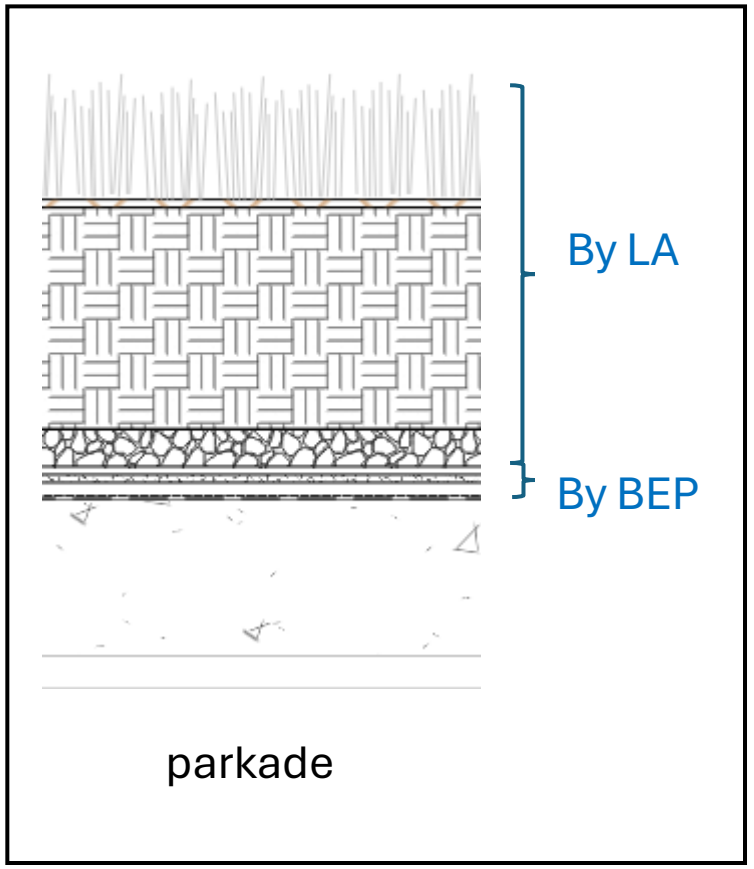
Assembly – top to bottom (**bold** is new)

- **Lawn/plants**
- **Xxx" growing medium**
- **Xxx" sand**
- **Filter fabric**
- **Xxx" gravel (specify type)**
- **Drainage mat**
- **Root barrier**
- **Membrane**
- **Xx" Topping? – slope to drain**
- Existing structural concrete slab

Total assembly thickness not to exceed xx"

# Assemblies & multiple disciplines

What is your area of expertise?




In BEP drawings…

Assembly – top to bottom (**bold** is new)

- Lawn/plants
- Xxx" growing medium
- Xxx" sand
- Filter fabric
- Xxx" gravel (specify type)

Refer to LA drawings

- **Drainage mat**
- **Root barrier**
- **Membrane**
- **Xx" Topping? – slope to drain**
- Existing structural concrete slab

Ensure assembly design and weight is within the limits of the existing structural slab

Total assembly thickness not to exceed xx"

Must make sure the overall assembly thickness works for door thresholds, planter walls, curbs, base of wall details, etc. COORDINATE.

# Soil Issues… after patios & fences were in

Soil did not meet spec = drainage issues
LA handled this aspect of scope

Rectified easily before completion
No dead plants, no disputes, no added costs

# Ideal Results

- Built per design intent, on schedule and budget
- Everyone got paid
- No disputes
- Scope met Owner expectations
- Feeling of satisfaction and trust
- Happy clients who appreciate engineers, architects and contractors
- Referrals and more work
- No callbacks

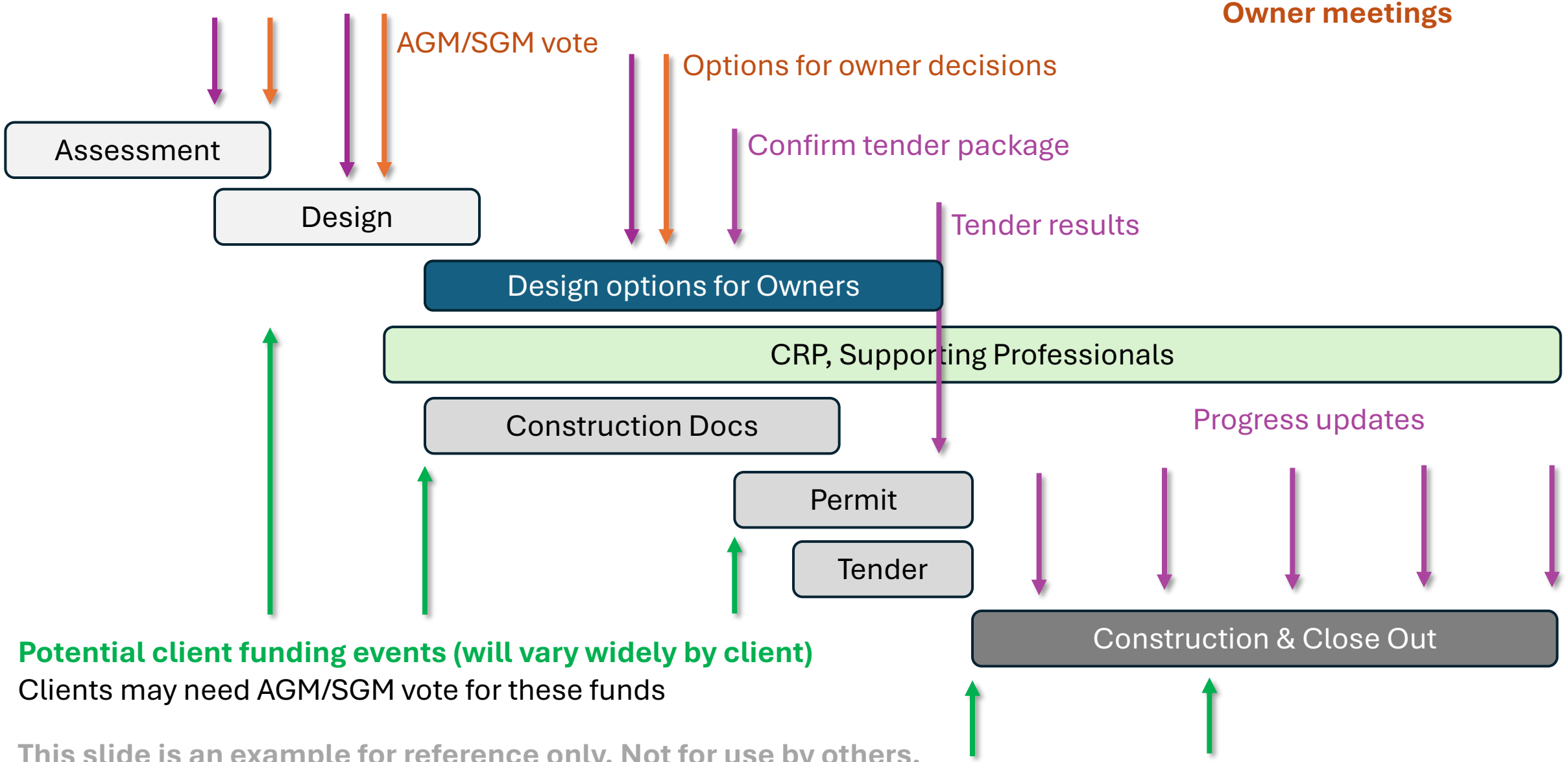
# Best Practice – Client Management

- **Assessment**
  - Owner meeting to present results (if work is required). Get buy-in early. Get face time.
- **Design/budget**
  - Owner meeting(s) as required until Owners generally accept work & cost. Face time. Trust.
    - Enclosure professional attends to address questions. Support council, avoids misunderstandings.
  - Further design/budget for Owner decisions – fences, patios, hardscape, etc.
  - Contingency planning
  - Straw poll owners at meetings to gauge approval or “pain points”
  - SGM/AGM to vote. Ideally go to vote when straw polls show majority of owners in favor.
- **Detailed Design (Construction Documents), Tender, Permit**
  - Owners engage supporting professionals. Help lead/coordinate disciplines & drive pre-con schedule.
  - Develop pre-construction schedule identifying key milestones and responsible parties.
  - Owner meeting(s) as required to confirm Owner decisions/scope. Include supporting professionals as required.
    - Get owner sign off on tender set prior to tender. Do a drawing page flip focusing on key items.
  - Owner meeting to present tender results and contract info.
- **Construction**
  - Regular meetings with council to update on progress & budget
  - Communicate need for changes early. Come with solutions. Encourage expedience. Delays add costs.
  - Close out documentation & permit close out

# Best Practice – Client Management

**Council meetings**

**Owner meetings**

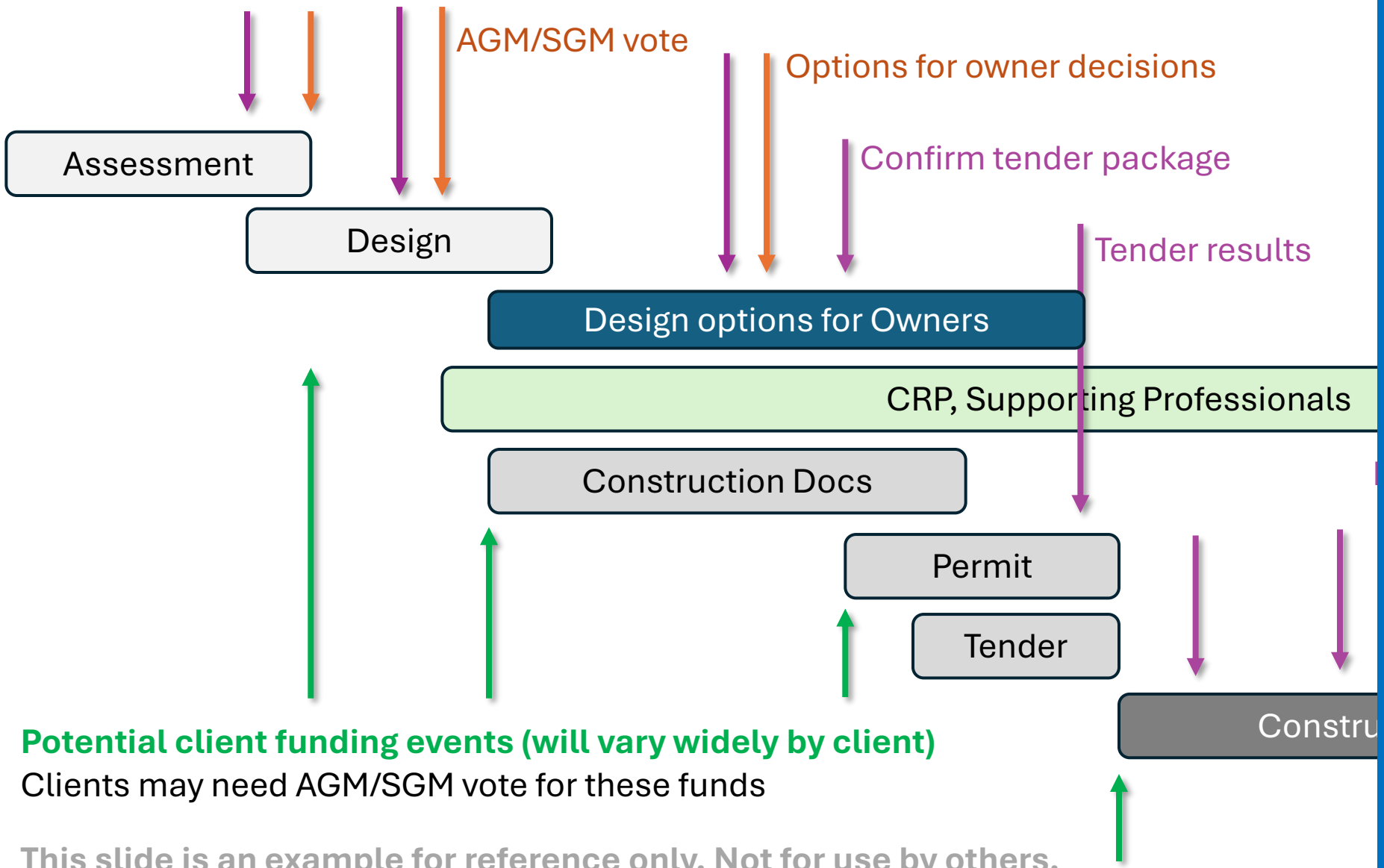



**Potential client funding events (will vary widely by client)**

Clients may need AGM/SGM vote for these funds

This slide is an example for reference only. Not for use by others.

# Best Practice – Client Management




**Potential client funding events (will vary widely by client)**
Clients may need AGM/SGM vote for these funds

This slide is an example for reference only. Not for use by others.

Suggest preparing a similar gantt chart to help illustrate the overall process to clients and key milestones.

It also helps with overall project management with supporting professionals.

# Client FAQ

- Is this necessary – provide sufficient evidence to support recommended work
- How much does it cost – depends on the scope, some owner decisions
- What will this do to my property value
- What's included in the work? Can it be sequenced? Can we do a repair only?
- How will we pay for it – CRF/special levy
- What if I can't afford it
- Can it be deferred so we have more time to raise money
- How many payments, how much and when
- When does it need to happen
- How long will it take
- What about the trees
- What about my patio and the upgrades I've done
- Where do I put my stuff while the work is going on
- How will the work affect me if I work from home
- My suite is not affected by the work, why do I have to pay for it

Suggest preparing a deck with typical FAQ and answers.

Use on multiple projects. Efficiencies save time and money.

Be mindful of answering questions that are not your area of expertise, e.g. legal, code, financial = RISK

It's ok to say it's not your area of expertise, but you should inform clients who they can rely on for professional gaps.

# Best Practice – Design/Budget

- Contractors need quantities & specs to price accurately
  - Include allowances as placeholders for early budgets until supporting professionals provide quantifiable design. Get input for allowances.
  - Use contractors who have completed numerous projects successfully.
- Dimension / quantify as much as possible
- Identify items Owners will need to decide on
  - Prepare design options with budget/risk info for decision before tender
- State assumptions – like engineering school, remember!?
- Alternate & separate prices – for Owners' decisions. Most control over pricing.
  - Need to include design intent for each alt/sep price (delete/add items from base scope)
- Include a contingency, on construction at a minimum

# Best Practice – Design/Budget

| Take-offs & assumptions | Qty | Units |
|---|---|---|
| Construction duration, projected/approx. | 6 | months |
| approx SF podium area | 5500 | SF |
| approx LF podium perimeter @ foundation walls | 500 | LF |
| approx LF podium perimeter excavation (for downturn) | 250 | LF |
| approx LF podium perimeter w upstand wall (for turn-up/gumlip & ext sealant) | 250 | LF |
| approx LF building base of wall | 510 | LF |
| approx SF patio areas (hardscape), approx 100 SF per patio x 12 patio | 1200 | SF |
| approx LF patio perimeter (3 sides, excl building), approx 30 LF x 12 patio | 360 | LF |
| approx SF softscape | 3800 | SF |
| approx vol. gravel strip (12" wide x 4" deep) - 0.25 CF/LF base of wall (30% base wall length) | 40 | CF |
| approx depth of overburden througout podium where occurs (avg) - 2 stack blocks | 12 | Inches |
| approx LF fencing @ 6' high | 700 | LF |

| Soft costs | | Unit rate | Unit | Fees |
|---|---|---|---|---|
| construction documents - RFI sketches by GC to clarify work and correlate pricing | | 1 | fixed fee | |
| arborist | | 1 | fixed fee | |
| landscape architect | | 1 | fixed fee | |
| surveyor | | 1 | fixed fee | |
| permit | | | calc. | |
| PM/CM - schedule, tender, planning | | 1 | fixed fee | |
| contract admin, incl. field review ($/month construction). Note: | = 10% contract | | month | $ - |
| **Total, soft costs** | | | | |

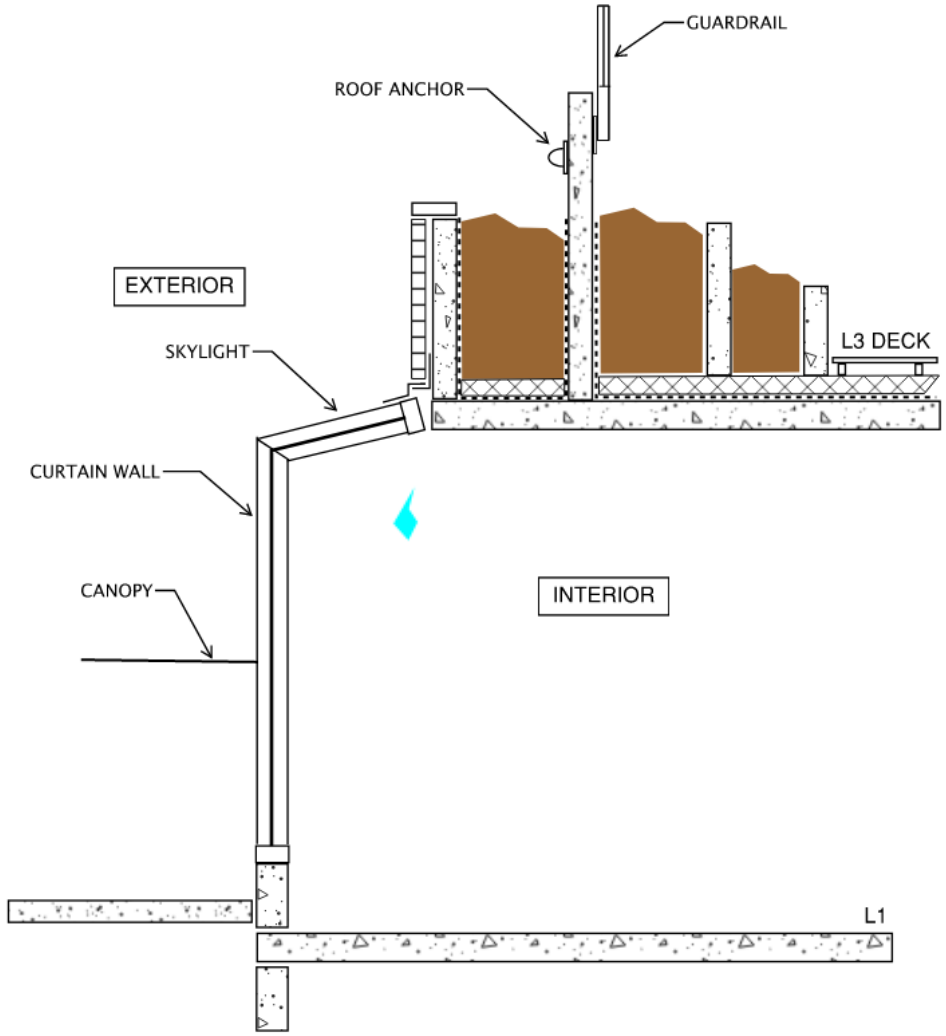
| Hard costs | QTY | Unit rate | Unit | Cost |
|---|---|---|---|---|
| general conditions ($/mo construction) - fencing, safety, parking, hoarding, egress, etc. | | | monthly | $ - |
| demo & excavation | | | SF | |
| conc repair, surface prep @ podium field area & upstand walls | | | SF | |
| membrane (field), incl drain bodies | | | SF | |
| membrane, perimeter - turn down incl. excavation & backfill. Assume term bar/mech attach | | | LF | |
| membrane, perimeter - assume PMMA termination in saw cut | | | LF | |
| ~~membrane, base of wall incl. flashings & 12"W gravel strip - excl. door re/re & tie-in~~ | | | LF | |
| plumbing connections in parkade, allow for 50 LF | | | allowance | $ - |
| overburden (drainage layers) drain mat, 2" gravel, filter fabric | | | SF | |
| overburden (soil above filter fabric), excl plants - avg depth 12" | | | CF | |
| hardscape - patios (pedestal pavers), incl. edging @ softscape interface, assume 100 SF/ste | | | SF | |
| ~~hardscape - property perimeter & beyond patios (stack block ret. Walls x 3H blocks)~~ | | | LF | |
| hardscape - stairs, ramps, etc., primarily along lane. Some at entrance. | | | allowance | $ - |
| fencing - 6'H x 8'L Home Depot panels or equiv., incl. connections to found'n & pedestals | | | LF | |
| gates x 12 | | | each | |
| sealant @ exposed cold joints ext. side of perimeter upstand walls | | | LF | |
| misc details - vent shaft, stairs, entrance | | | allowance | $ - |
| perimeter upstand walls (int/ext/top), surf prep (light grind) & crack repair, urethane cap | | | LF | |
| **Subtotal, hard costs (excl. plants)** | | | | |
| Contingency (% hard costs) | | 10% | | $ - |
| OH&P (% hard costs incl contingency) | | 10% | | $ - |
| Management (% hard costs incl contingency) | | 10% | | $ - |
| **Total, hard costs (rounded)** | | | | |

| Total project costs | |
|---|---|
| Total soft costs, rounded | $ - |
| Total hard costs, rounded | |
| **Total project costs, rounded (soft + hard)** | |
| approx. cost/suite | |
| approx. cost/SF podium area | |

| Alt prices |
|---|
| alt price - door re/re & wall/podium tie ins |
| alt price - patio finish upgrades, specific units |
| alt price - new doors |
| alt price - plants |

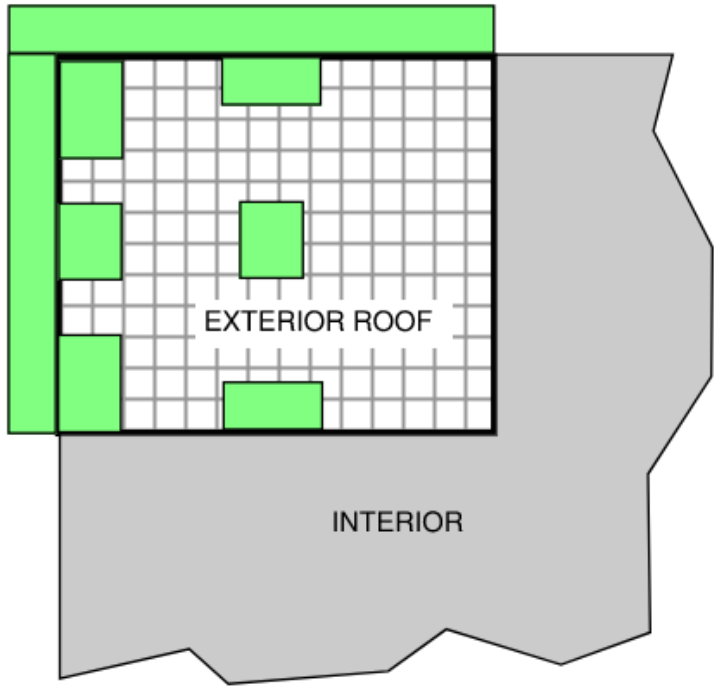
# Sustainable design for new construction – case study

Common design



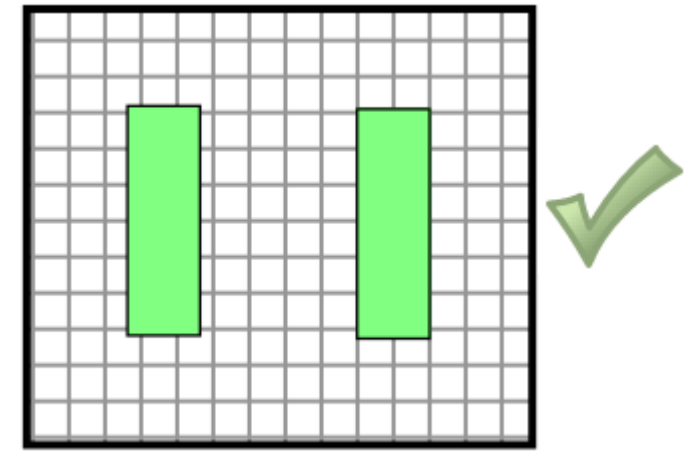

Challenging to investigate safely
Costly to access
Difficult detailing
Several unsuccessful costly repairs

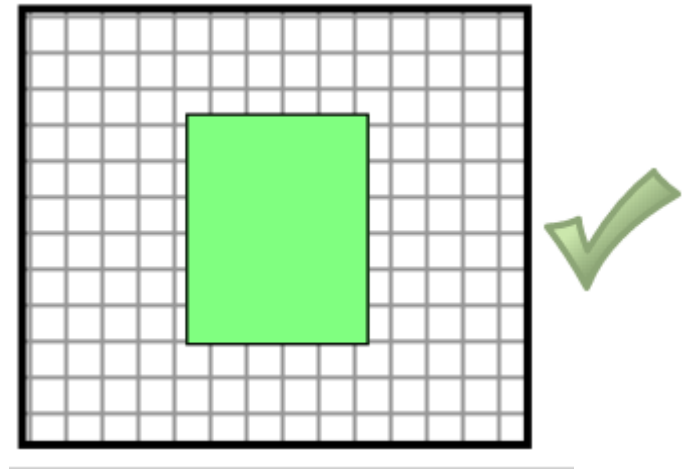
# Sustainable design for new construction – concepts




Common design

Guardrails
Access to outboard planter
Detailing – labour, risk
Drainage/scuppers
Materials – excess
Material waste
Poor for renewal/maintenance
**Added risk**
**Added cost**

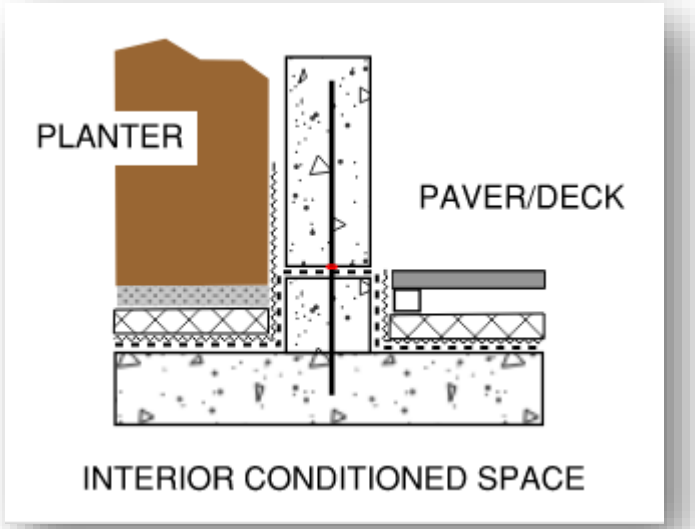


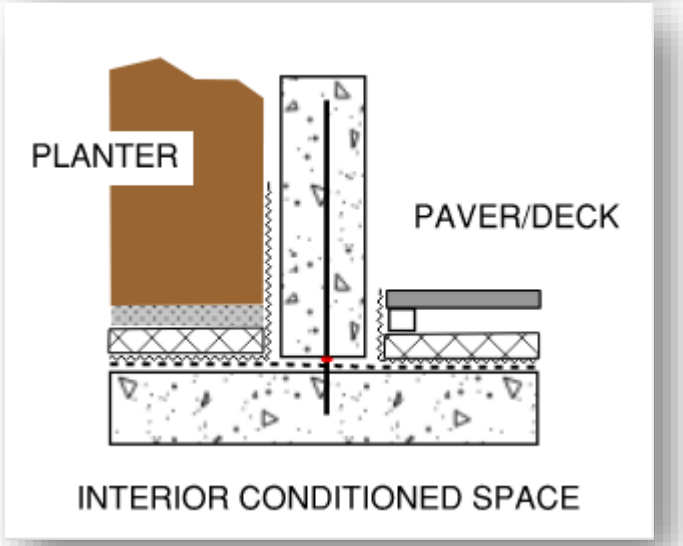


Why such intricate landscape designs?
Can landlords charge more rent for these features?
Are they required for Rainwater Management?
If so, could we achieve the same result with fewer and larger?

# Sustainable design for new construction – planter walls

Typical new construction

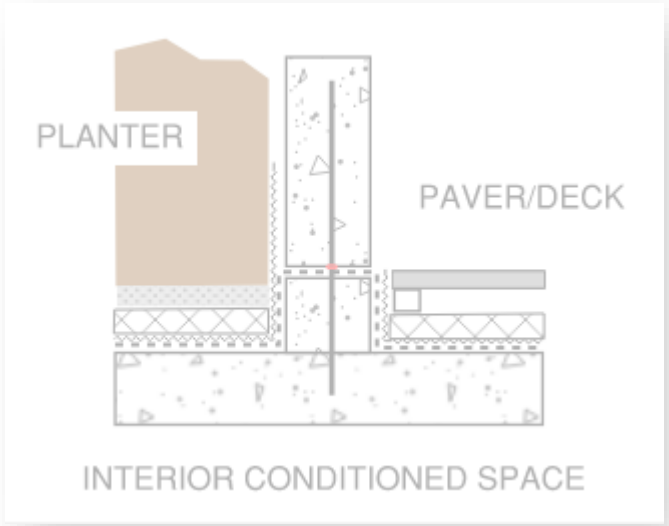


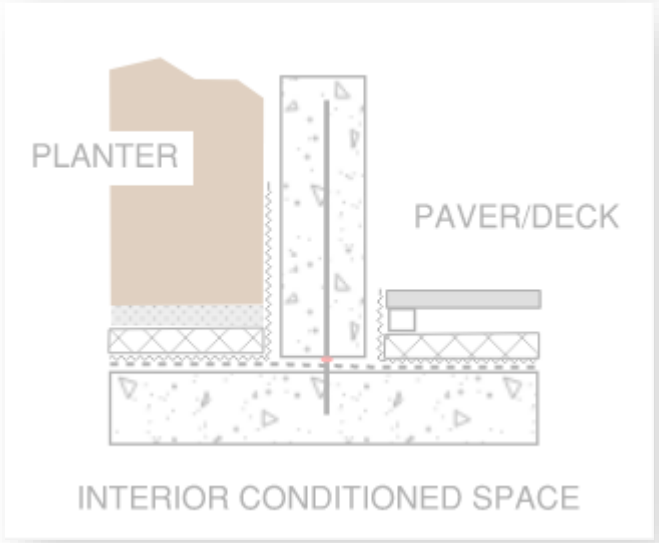



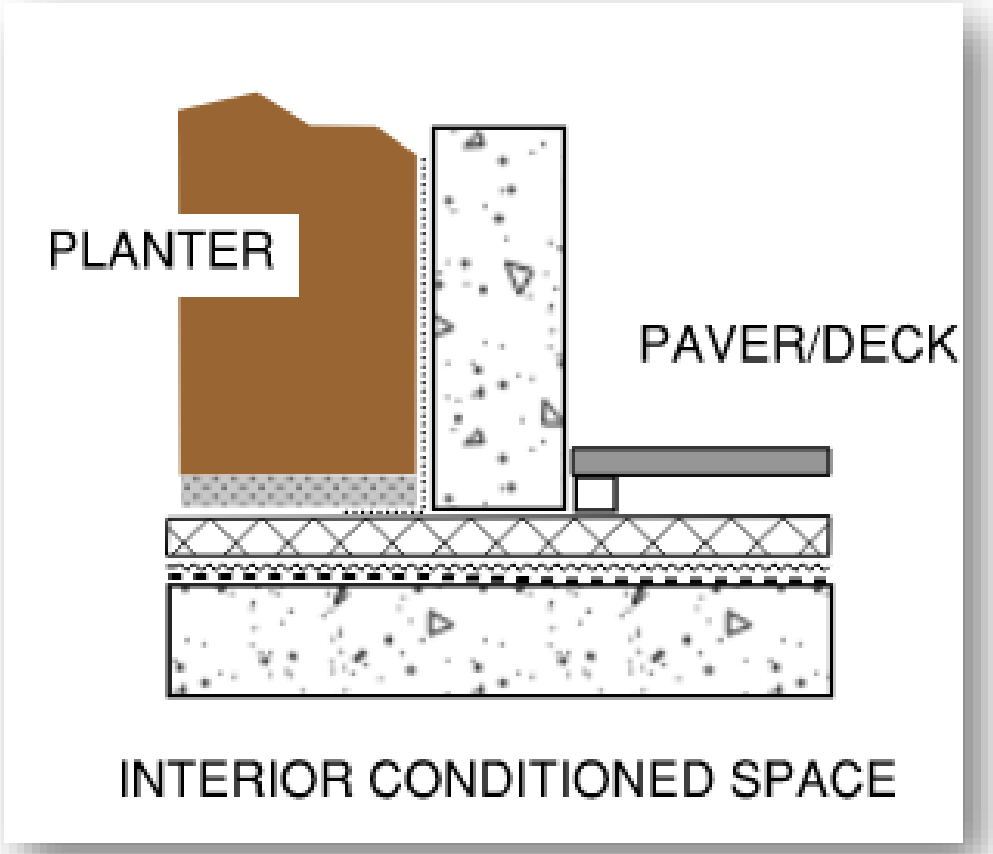

Detailing
Drainage
Non-continuous insulation
Risks
Cost
Sequencing

This is hard to repair / renew without wrapping the wall in liquid membrane or flashing = cost, maintenance.
Demolition is common for renewal. Waste. Costs. Noise.

# Sustainable design for new construction – planter walls




Consider this instead

Continuous drainage
Continuous insulation
No detailing

Note: the wall design needs more detail.
This illustrates design intent only.

# Sustainable design for new construction – planter options

Try to run the membrane continuous on the deck

Wind loads, seismic
Weight (workability/labour)

# Sustainable design for new construction – planter options

- Reduce concrete – planter walls
- Planter construction – favour modular block or landscape tie walls or planter boxes over cast in place concrete walls
  - Membrane continuous on deck – less membrane material
  - Far less detailing – less labour, lower risk of deficiencies/leaks
  - Look for blocks made from recycled materials
  - Much simpler membrane renewal; potential reuse of blocks?
- Consolidate planter areas – less and larger vs more and smaller
- Keep planters away from parapets, don’t create a climb hazard that requires more materials – railings, higher walls
- Avoid isolated planter roof areas outboard of main, accessible roof areas. Otherwise, design a means of safe access for maintenance and renewal of these areas.
- Detailing base of wall for future renewal

# Sustainable design for new construction


# In closing…

- Due diligence to assess issues & understand existing conditions
- Appropriate design to address issues and meet client needs
- **Stay in your lane – stick to your area of expertise**
- Assist clients in engaging others
- Design intent is clear & complete for budget, permit & tender
- Reduce embodied carbon
- Reduce construction waste
- Coordinate
- Communicate, communicate, communicate


Questions?
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