QUICK DESIGN WEBSITE

www.quickdesign.app

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Supervision:
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2026

EXECUTIVE SUMMARY

Problem:

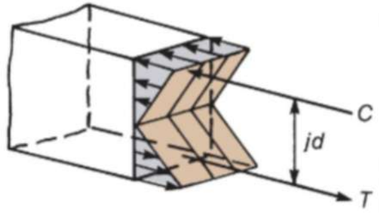
- **Engineers often spend time searching different tools for structural design.**
- **Current solutions are scattered and not centralized.**

Solution:

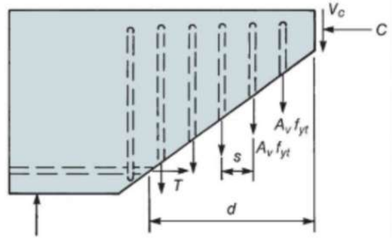
- **A single platform containing all structural design elements.**
- **Each element is represented by a clickable tile.**
- **Clicking a tile opens the corresponding design web in a new tab.**
- **Easily for drafting and reporting.**

REINFORCED CONCRETE DESIGN

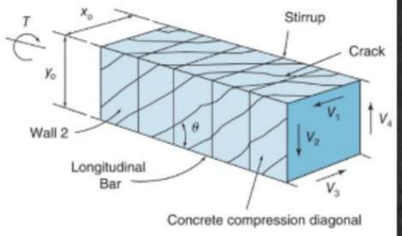
ACI 318-19
RECTANGULAR SECTION BENDING



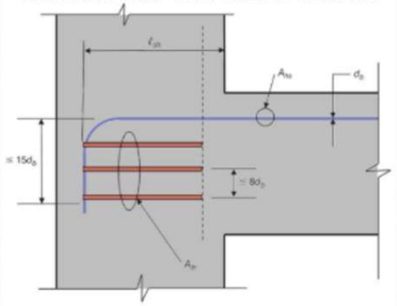
ACI 318-19
RECTANGULAR SECTION SHEAR



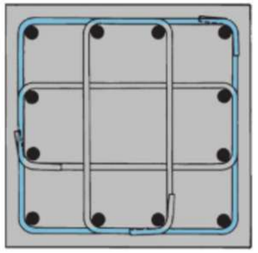
ACI 318-19
RECTANGULAR SECTION TORSION



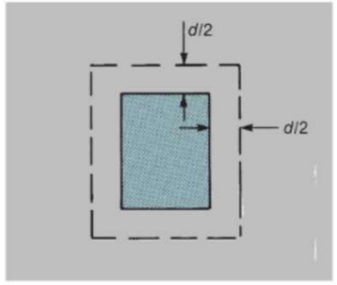
ACI 318-19
DEVELOPMENT AND SPLICE LENGTH



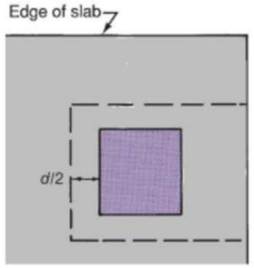
ACI 318-19
RECTANGULAR COLUMN



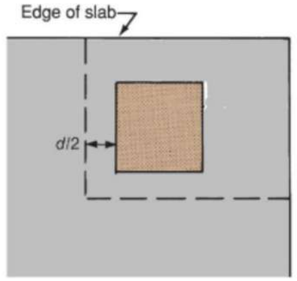
ACI 318-19
INTERIOR COLUMN PUNCHING SHEAR



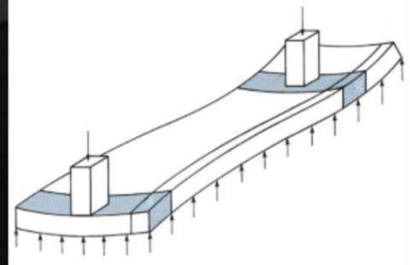
ACI 318-19
EDGE COLUMN PUNCHING SHEAR



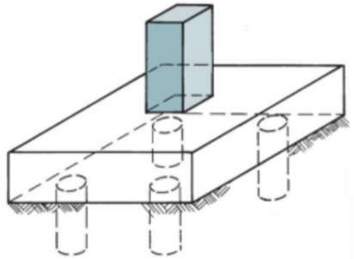
ACI 318-19
CORNER COLUMN PUNCHING SHEAR



ACI 318-19
FOOTING



ACI 318-19
PILE CAP



ACI 224-06
CRACK WIDTH BENDING

ACI 224-06
CRACK WIDTH DIRECT TENSION

ACI 318-19
CORBEL

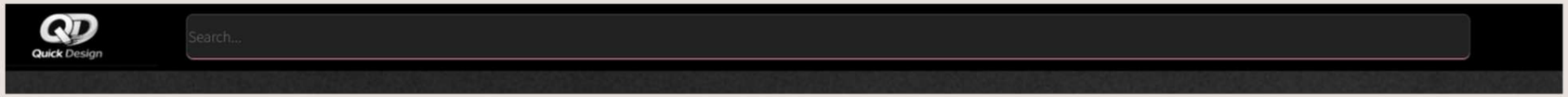
ACI 318-19
SPECIAL SHEAR WALL

HIGHLIGHTS

HEADER SECTION

Components:

- **Website logo**
- **Extendable search bar**



Function: users can search for structural elements quickly

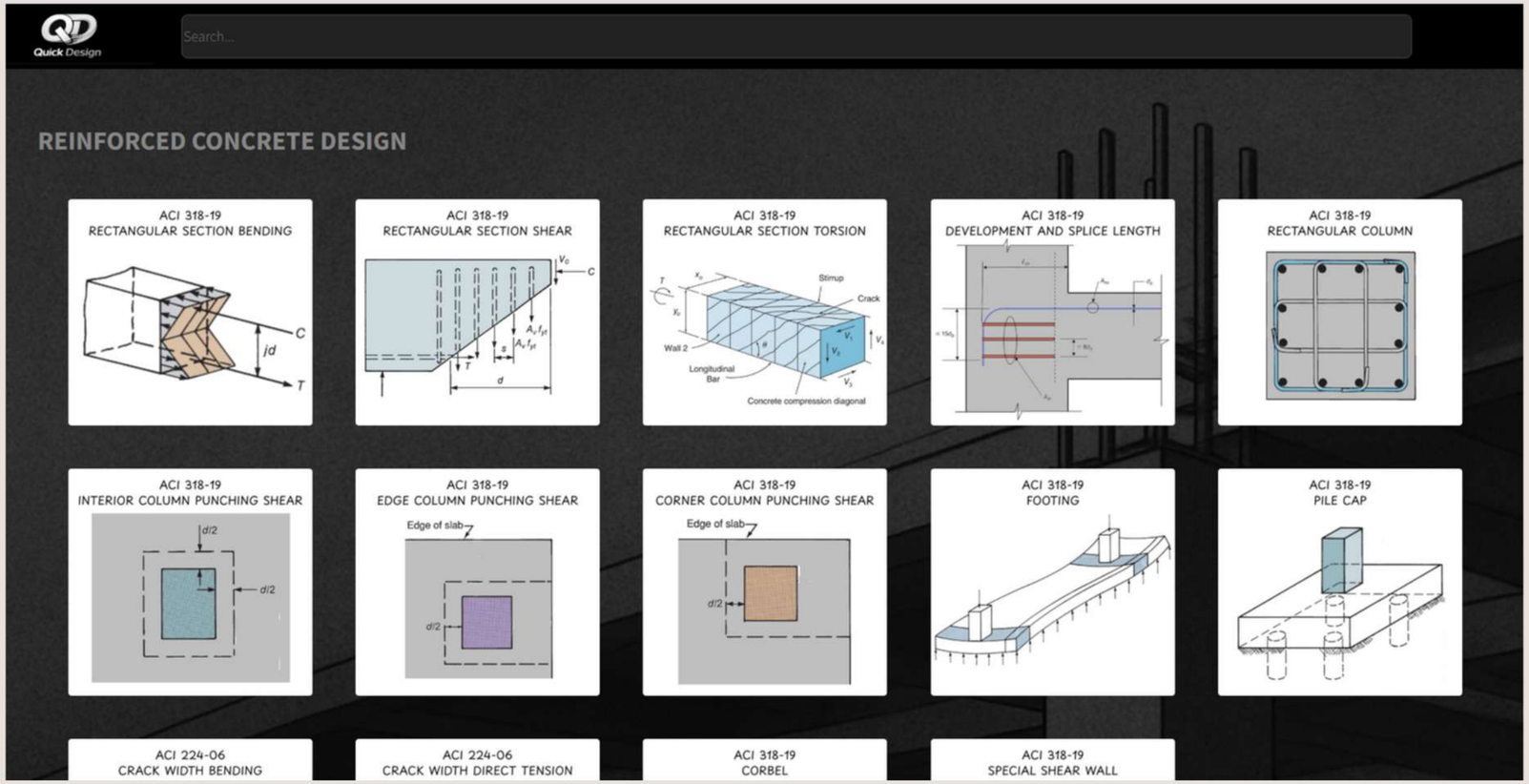
HIGHLIGHTS

MAIN SECTIONS

Sections shown on the homepage:

- Structural Analysis
- RC Design
- Steel Design

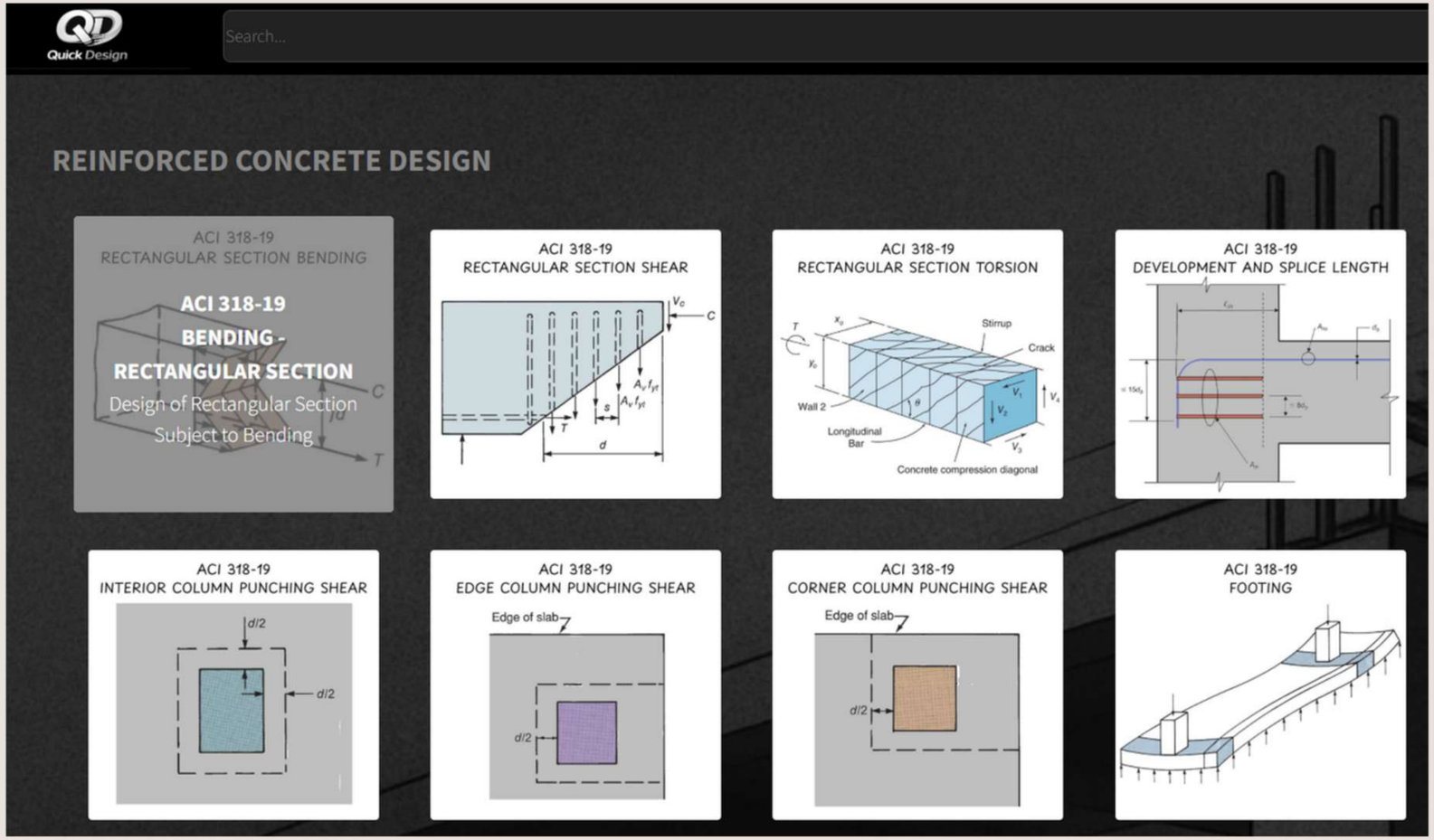
Each section contains tiles for each element design with all applied straining actions.



HIGHLIGHTS

CLICKABLE TILES FUNCTIONALITY

- Tiles represent structural elements like Columns, Beams, Slabs, Shear Walls, Foundations
- Clicking a tile opens the design web in a new tab
- Emphasize: intuitive and fast navigation



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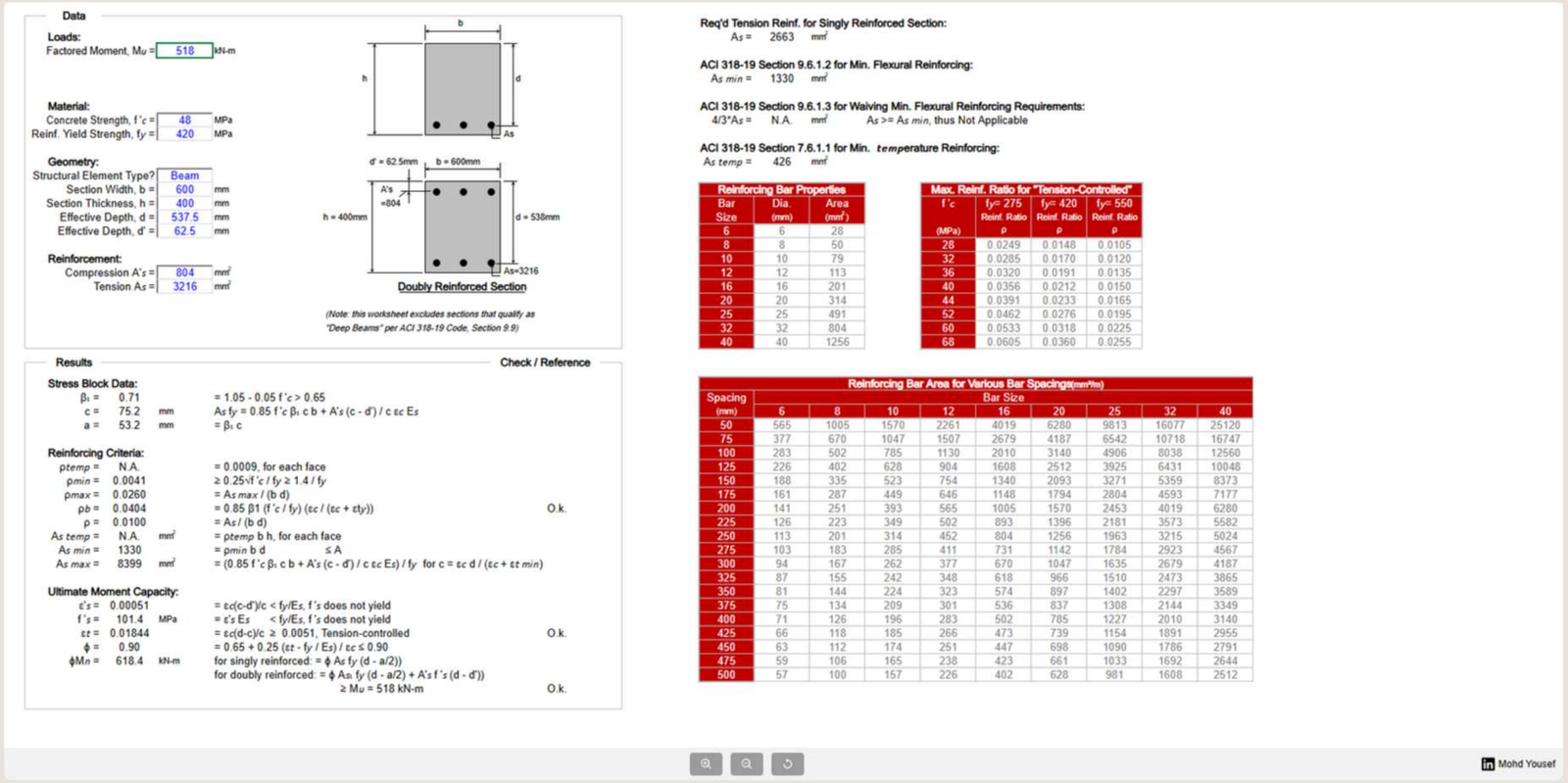


Data

Loads:
Factored Moment, M_u = 518 kN-m

Material:
Concrete Strength, f'_c = 48 MPa
Reinf. Yield Strength, f_y = 420 MPa

Geometry:
Structural Element Type? Beam
Section Width, b = 600 mm
Section Thickness, h = 400 mm
Effective Depth, d = 537.5 mm
Effective Depth, d' = 62.5 mm

Reinforcement:
Compression A'_s = 804 mm²
Tension A_s = 3216 mm²

Doubly Reinforced Section

(Note: this worksheet excludes sections that qualify as "Deep Beams" per ACI 318-19 Code, Section 9.9)

Results — **Check / Reference**

Stress Block Data:

β_1 =	0.71		= 1.05 - 0.05 f'_c > 0.65	
c =	75.2	mm	$A_s f_y$ = 0.85 $f'_c \beta_1$ c b + A'_s (c - d') / c ε_c E_s	
a =	53.2	mm	= β_1 c	

Reinforcing Criteria:

ρ_{temp} =	N.A.		= 0.0009, for each face	
ρ_{min} =	0.0041		≥ 0.25√f'_c / f_y ≥ 1.4 / f_y	
ρ_{max} =	0.0260		= $A_{s\,max}$ / (b d)	
ρ_b =	0.0404		= 0.85 β1 (f'_c / f_y) (ε_c / (ε_c + ε_{ty}))	O.k.
ρ =	0.0100		= A_s / (b d)	
$A_{s\,temp}$ =	N.A.	mm²	= ρ_{temp} b h, for each face	
$A_{s\,min}$ =	1330		= ρ_{min} b d ≤ A	
$A_{s\,max}$ =	8399	mm²	= (0.85 $f'_c \beta_1$ c b + A'_s (c - d') / c ε_c E_s) / f_y for c = ε_c d / (ε_c + $\varepsilon_{t\,min}$)	

Ultimate Moment Capacity:

ε'_s =	0.00051		= ε_c(c-d')/c < f_y/E_s, f'_s does not yield	
f'_s =	101.4	MPa	= ε'_s E_s < f_y/E_s, f'_s does not yield	
ε_t =	0.01844		= ε_c(d-c)/c ≥ 0.0051, Tension-controlled	O.k.
ϕ =	0.90		= 0.65 + 0.25 (ε_t - f_y / E_s) / ε_c ≤ 0.90	
ϕM_n =	618.4	kN-m	for singly reinforced: = ϕ A_s f_y (d - a/2))	
			for doubly reinforced: = ϕ A_s f_y (d - a/2) + A'_s f'_s (d - d'))	
			≥ M_u = 518 kN-m	O.k.

Req'd Tension Reinf. for Singly Reinforced Section:
A_s = 2663 mm²

ACI 318-19 Section 9.6.1.2 for Min. Flexural Reinforcing:
$A_{s\,min}$ = 1330 mm²

ACI 318-19 Section 9.6.1.3 for Waiving Min. Flexural Reinforcing Requirements:
4/3*A_s = N.A. mm² A_s >= $A_{s\,min}$, thus Not Applicable

ACI 318-19 Section 7.6.1.1 for Min. *temp*erature Reinforcing:
$A_{s\,temp}$ = 426 mm²

Reinforcing Bar Properties

Bar Size	Dia (mm)	Area (mm²)
6	6	28
8	8	50
10	10	79
12	12	113
16	16	201
20	20	314
25	25	491
32	32	804
40	40	1256

Max. Reinf. Ratio for "Tension-Controlled"

f'_c (MPa)	f_y= 275 Reinf. Ratio ρ	f_y= 420 Reinf. Ratio ρ	f_y= 550 Reinf. Ratio ρ
28	0.0249	0.0148	0.0105
32	0.0285	0.0170	0.0120
36	0.0320	0.0191	0.0135
40	0.0356	0.0212	0.0150
44	0.0391	0.0233	0.0165
52	0.0462	0.0276	0.0195
60	0.0533	0.0318	0.0225
68	0.0605	0.0360	0.0255

Reinforcing Bar Area for Various Bar Spacings(mm²/m)

Spacing (mm)	Bar Size 6	8	10	12	16	20	25	32	40
50	565	1005	1570	2261	4019	6280	9813	16077	25120
75	377	670	1047	1507	2679	4187	6542	10718	16747
100	283	502	785	1130	2010	3140	4906	8038	12560
125	226	402	628	904	1608	2512	3925	6431	10048
150	188	335	523	754	1340	2093	3271	5359	8373
175	161	287	449	646	1148	1794	2804	4593	7177
200	141	251	393	565	1005	1570	2453	4019	6280
225	126	223	349	502	893	1396	2181	3573	5582
250	113	201	314	452	804	1256	1963	3215	5024
275	103	183	285	411	731	1142	1784	2923	4567
300	94	167	262	377	670	1047	1635	2679	4187
325	87	155	242	348	618	966	1510	2473	3865
350	81	144	224	323	574	897	1402	2297	3589
375	75	134	209	301	536	837	1308	2144	3349
400	71	126	196	283	502	785	1227	2010	3140
425	66	118	185	266	473	739	1154	1891	2955
450	63	112	174	251	447	698	1090	1786	2791
475	59	106	165	238	423	661	1033	1692	2644
500	57	100	157	226	402	628	981	1608	2512

Mohd Yousef

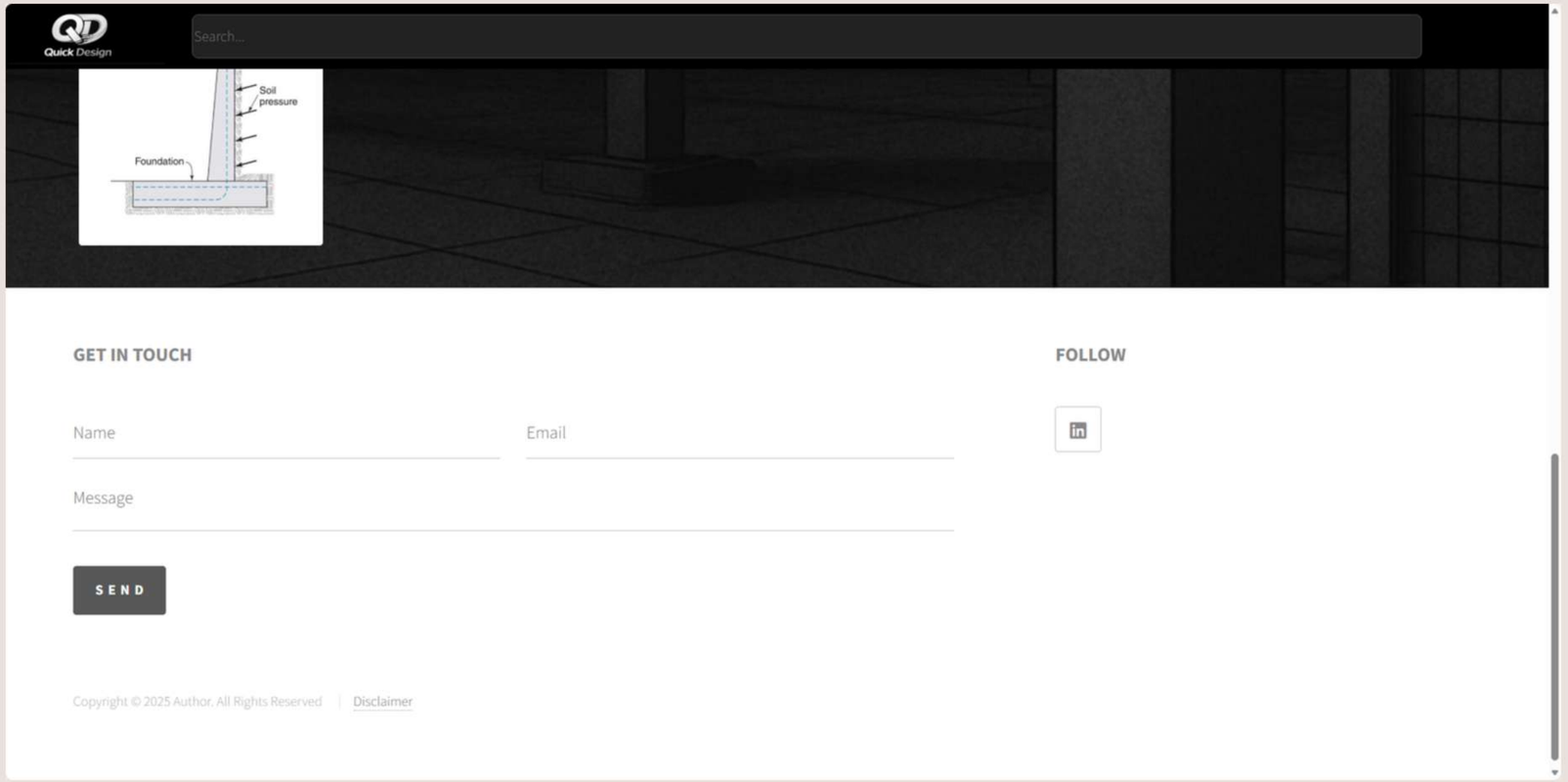
HIGHLIGHTS

FOOTER SECTION

Contains:

- Reference link for the author
- Contact info: form for sending comments

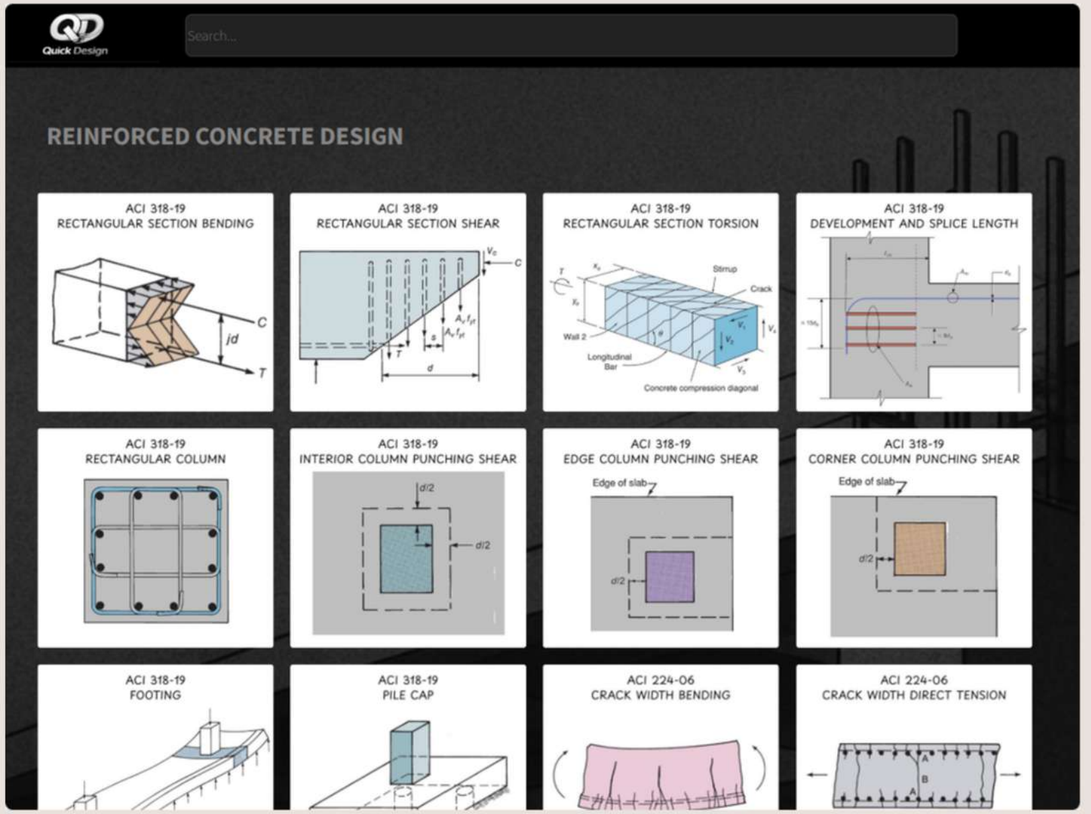
Ensures easy access to references and feedback

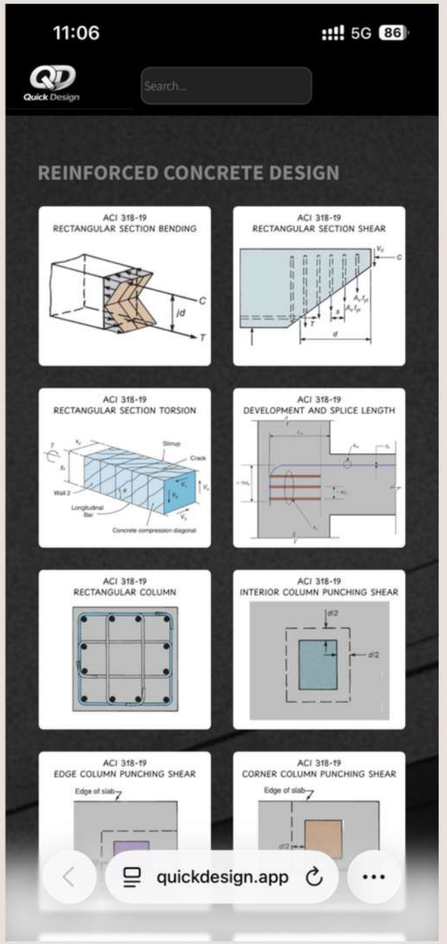


HIGHLIGHTS

USER EXPERIENCE

- Clean layout with clear navigation
- Tiles for direct access reduce time spent searching
- Responsive on PC, laptop, tablet, and mobile

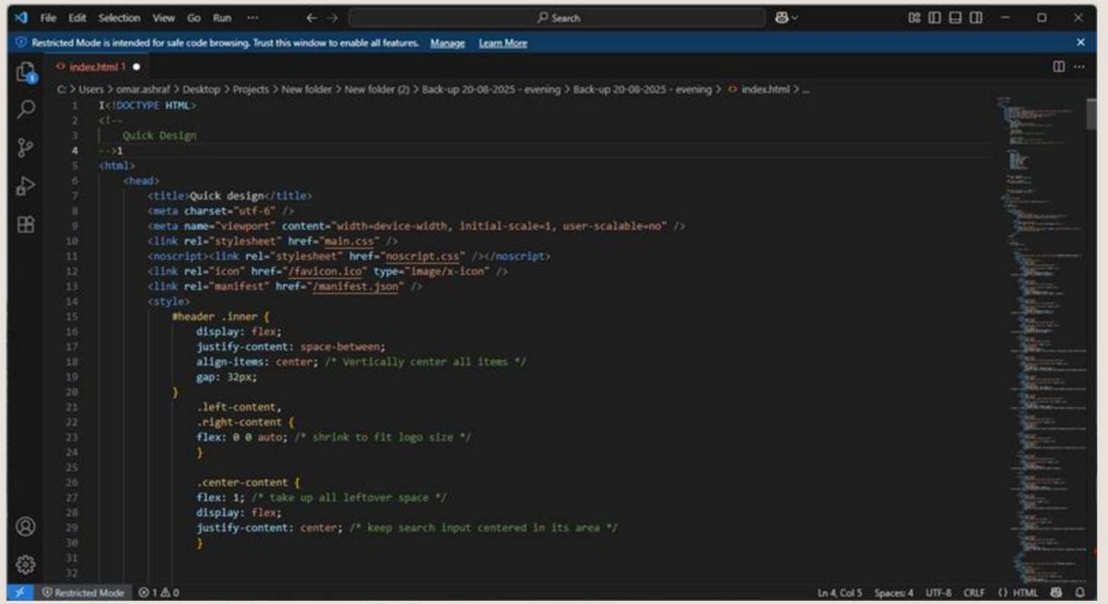


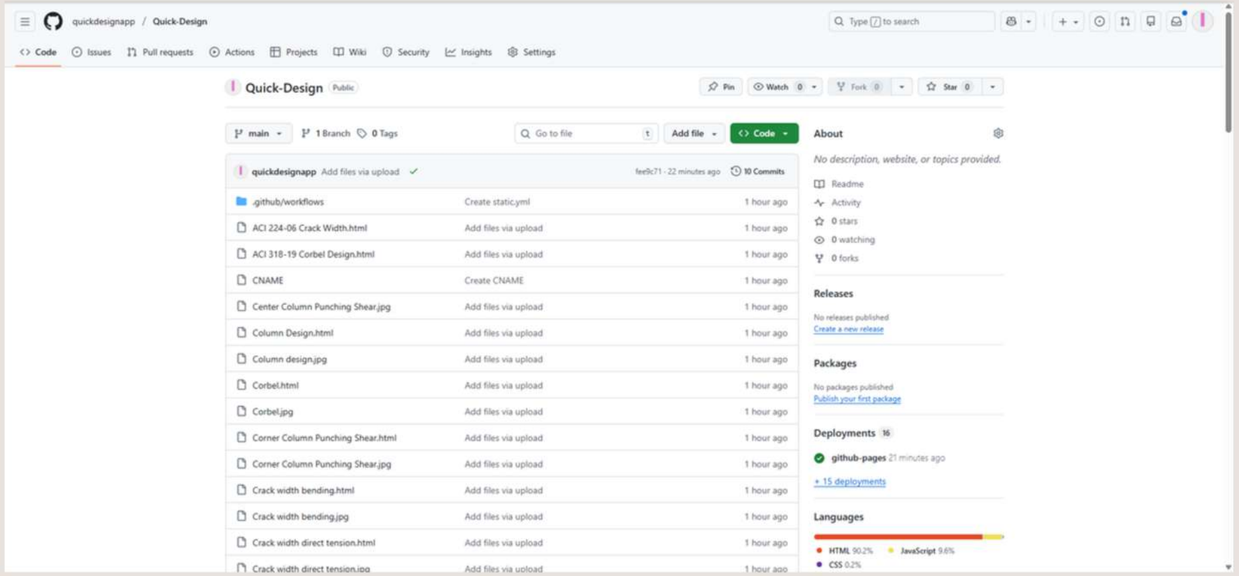


HIGHLIGHTS

TECHNOLOGY USED

- Frontend: HTML, CSS, JavaScript
- Hosting: GitHub Pages
- Domain: Namecheap
- Additional: Some frameworks and libraries





THANK YOU

2026